

# URBAN CHINA

TOWARD EFFICIENT,  
INCLUSIVE, AND  
SUSTAINABLE URBANIZATION

**The World Bank**  
**Development Research Center of the State Council,**  
**The People's Republic of China**



Urban China





# Urban China

## Toward Efficient, Inclusive, and Sustainable Urbanization

The World Bank

Development Research Center of the  
State Council, the People's Republic of China



**WORLD BANK GROUP**

Washington, DC

© 2014 International Bank for Reconstruction and Development /  
The World Bank and the Development Research Center of the State Council, P. R. China

1818 H Street NW, Washington DC 20433  
Telephone: 202-473-1000; Internet: [www.worldbank.org](http://www.worldbank.org)

Some rights reserved  
1 2 3 4 17 16 15 14

This work is a product of the staff of The World Bank and the Development Research Center of the State Council, P.R. China. Note that neither The World Bank nor the Development Research Center of the State Council, P. R. China necessarily own each component of the content included in the work. The World Bank and the Development Research Center of the State Council, P. R. China therefore do not warrant that the use of the content contained in the work will not infringe on the rights of third parties. The risk of claims resulting from such infringement rests solely with you.

The findings, interpretations, and conclusions expressed in this work are those of the authors and do not necessarily reflect the views of nor imply an official endorsement by The World Bank, its Board of Executive Directors, the governments they represent, or the Government of China. The World Bank and the Development Research Center of the State Council of P. R. China do not guarantee the accuracy of the data included in this work.

Nothing herein shall constitute or be considered to be a limitation upon or waiver of the privileges and immunities of The World Bank and the Development Research Center of the State Council, P. R. China, all of which are specifically reserved.

#### Rights and Permissions



This work is available under the Creative Commons Attribution 3.0 Unported license (CC BY 3.0) <http://creativecommons.org/licenses/by/3.0>. Under the Creative Commons Attribution license, you are free to copy, distribute, transmit, and adapt this work, including for commercial purposes, under the following conditions:

**Attribution**—Please cite the work as follows: World Bank and the Development Research Center of the State Council, P. R. China. 2014. *Urban China: Toward Efficient, Inclusive, and Sustainable Urbanization*. Washington, DC: World Bank. DOI: 10.1596/978-1-4648-0206-5. License: Creative Commons Attribution CC BY 3.0

**Translations**—If you create a translation of this work, please add the following disclaimer along with the attribution: *This translation was not created by The World Bank and should not be considered an official World Bank translation. The World Bank shall not be liable for any content or error in this translation.*

All queries on rights and licenses should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2625; e-mail: [pubrights@worldbank.org](mailto:pubrights@worldbank.org).

ISBN (paper): 978-1-4648-0206-5  
ISBN (electronic): 978-1-4648-0386-4  
DOI: 10.1596/978-1-4648-0206-5

*Cover design:* Critical Stages

Library of Congress Cataloging-in-Publication Data has been applied for.

# Contents

<i>Foreword</i> . . . . .	xvii
<i>Acknowledgments</i> . . . . .	xix
<i>Executive Summary</i> . . . . .	xxiii
<i>Abbreviations</i> . . . . .	xxix

## Part I Overview

Introduction . . . . .	3
------------------------	---

### Achievements and Emerging Challenges

<b>1</b> China's Urbanization Achievements . . . . .	5
<b>2</b> Efficiency . . . . .	7
<b>3</b> Inclusion . . . . .	16
<b>4</b> Sustainability . . . . .	25

### The Reform Agenda

<b>5</b> A Strategy for Reform . . . . .	33
<b>6</b> Reforming China's Land Management . . . . .	38
<b>7</b> Reforming Hukou, Social Services, and Labor Market Institutions . . . . .	49
<b>8</b> Reforming Urban Finance . . . . .	54
<b>9</b> Promoting Greener Urbanization . . . . .	63

<b>10</b>	Ensuring Food Security .....	69
<b>11</b>	Timing, Sequencing, and Risks .....	71

## **Part II Supporting Reports**

### **1 Urbanization and Economic Growth ..... 81**

Introduction.....	81
Urbanization and growth at a crossroads .....	83
Agglomeration, specialization, and mobility .....	90
More efficient, inclusive, and sustainable urbanization and growth .....	106
China's growth dividends from the new urbanization trajectory .....	111
Notes .....	118
References .....	120

### **2 Planning and Connecting Cities for Greater Diversity and Livability ..... 123**

Introduction.....	123
Enhancing efficiency and agglomeration economies in China.....	125
Connecting people, linking businesses .....	149
Financing China's cities .....	162
Key actions moving forward .....	167
Notes .....	172
References .....	172

### **3 Inclusive Urbanization and Rural-Urban Integration ..... 177**

Inclusive urbanization: Vision, major challenges, and key reforms .....	177
Ensuring equitable access to social services in urban areas .....	186
Social policy reforms and rural-urban integration.....	214
Strengthening institutions for an inclusive and productive labor market.....	235
Notes .....	252
References .....	256

### **4 China's Urbanization and Land: A Framework for Reform ..... 263**

Introduction .....	263
Land and urbanization in China .....	268
International approaches and experiences .....	284
China's land pilots: Guidance for the national reform agenda.....	297
A framework for land policy reform .....	319
Notes .....	334
References .....	335

### **5 China's Urbanization and Food Security ..... 337**

Introduction .....	337
China's food demand and supply projection in international comparison .....	340
Resource constraints to agricultural production .....	343
Supply, changing consumption, and demand.....	355
Policy recommendations .....	365
Notes .....	367
References .....	368

## **6 Financing Urbanization.....371**

Introduction.....	371
Urbanization in transition and its implication for financing .....	373
Financing urbanization in 2013: Key issues.....	379
Reform considerations for China.....	399
The reform agenda and expected payoffs .....	432
Annex 6A A technical note on the urbanization finance model .....	436
Notes .....	441
References .....	443

## **7 Green Urbanization .....447**

Introduction.....	447
The challenge of sustainable urban growth.....	450
The rising cost of environmental degradation.....	451
Green governance must match China's green ambitions .....	455
Sustainable sector policies are closely aligned with green objectives .....	471
Cities where a billion people want to live and work .....	524
Annex 7A Smart Greening .....	526
Annex 7B Illustrative framework and analytical tools for urban energy and emissions reduction planning.....	527
Notes .....	535
References .....	538
Annex 7B References .....	547

## **Boxes**

O.1	Residency rights in the European Union, the United States, the former Soviet Union, and Japan .....	19
O.2	Social Housing.....	22
O.3	Feeding China's cities.....	28
O.4	Expropriations in Taiwan, China .....	41
O.5	Seoul becomes a global city by recalibrating regulations and market instruments ..	45
O.6	The lack of connectivity and fine grain networks in Chinese urban development ..	45
O.7	Comparing urban densities in two areas of Shanghai .....	46
O.8	Seoul's spatial strategy: Differentiation and higher densities around metro nodes ..	47
O.9	European Union rules on investment incentives .....	55
O.10	Land value capture .....	59
1.1	Urbanization and economic growth .....	85
1.2	The Lewis turning point .....	89
1.3	Increasing social tensions.....	90
1.4	Microfoundations of agglomeration economies: Sharing, matching, and learning .....	93
1.5	Agglomeration economies are attenuated by distance.....	94
1.6	Is China's urbanization pattern unique? A global perspective.....	100
1.7	Logistic model estimates of China's urbanization trajectory.....	113
1.8	China's Development Research Center computable general equilibrium model...	115
2.1	Barcelona 22@: Urban land redevelopment led by the private sector and enabled by the government .....	131

2.2	Dual land market system . . . . .	137
2.3	Regulatory restrictions on urban redevelopment and densification . . . . .	140
2.4	Comparison of connectivity in Chinese and other cities . . . . .	141
2.5	Density compared in Pudong and Puxi, Shanghai . . . . .	143
2.6	Cost analysis of street network for various size blocks . . . . .	146
2.7	Street patterns in Paris, France . . . . .	147
2.8	China's urban villages . . . . .	148
2.9	Improvement in intercity accessibility (2000–10) . . . . .	150
2.10	Impact of highway connection on Guangdong Special Economic Zone . . . . .	151
2.11	Urban mobility plan in France . . . . .	157
2.12	Increase flexibility and variation in floor area ratio (FAR) values as in cities like New York . . . . .	159
2.13	European Commission zero emission urban logistics . . . . .	161
2.14	Split-rate property taxes in Pittsburgh . . . . .	166
2.15	Auctioning of land development rights: CEPACs in São Paulo, Brazil . . . . .	166
2.16	Planning and management to reduce risks from natural disasters . . . . .	170
3.1	China's experience with residence permits . . . . .	189
3.2	European Union migrants' eligibility for social benefits in member states . . . . .	190
3.3	China's resident population information system—Setting up a comprehensive population management information database . . . . .	196
3.4	Central government resources for compulsory education . . . . .	199
3.5	12th Five-Year Plan (2011–15): The National Basic Public Social Services System: The basic package and beyond . . . . .	215
3.6	The main labor laws in China . . . . .	244
4.1	The evolution of China's policy framework of land, 1978–2013 . . . . .	264
4.2	China's secondary urban land market: An invisible and unregulated market . . . . .	276
4.3	China's property taxation . . . . .	292
4.4	Land markets and institutions in the United States . . . . .	296
4.5	China's rural and urban land rights . . . . .	298
4.6	Documentation and registration of land . . . . .	322
4.7	China's collective land ownership . . . . .	323
4.8	General and zone takings in Taiwan, China . . . . .	331
4.9	Mortgaging of individual rights to collectively owned land . . . . .	333
5.1	Agro-ecological zones methodology . . . . .	356
5.2	China Agricultural Policy Simulation Model (CAPSiM) . . . . .	362
6.1	Reporting and budgeting of infrastructure finance . . . . .	392
6.2	Local governments' debt instruments . . . . .	394
6.3	Basic concept and categories of affordable housing in China . . . . .	397
6.4	Formula grants . . . . .	406
6.5	Options for policies and tools that capture land value . . . . .	408
6.6	U.S. securities laws applicable to municipal securities . . . . .	418
6.7	Australia: A leading model in implementing public-private partnerships . . . . .	423
6.8	Performance-informed budgeting in the Minhang district, Shanghai . . . . .	428
7.1	Reducing severe air pollution in London and in Tokyo . . . . .	453
7.2	Addressing the “central SOE problem” . . . . .	457
7.3	The three baos of data reporting . . . . .	458
7.4	Co-opting local businesses into green growth in Xiaoyi . . . . .	460
7.5	Environmental performance ratings in Jiangsu Province . . . . .	463

7.6	China 2030: Estimated impacts of carbon pricing . . . . .	469
7.7	The call for integrated, multipollutant approaches to air quality management in the United States . . . . .	477
7.8	Promoting electric vehicles in China: Opportunities, challenges, and implications . . . . .	485
7.9	“Energy efficiency utility”: Efficiency Vermont, United States . . . . .	491
7.10	Tools for low-carbon development planning: The experience of Changning District in Shanghai . . . . .	494
7.11	New York PlaNYC 2030 case study: Integrated centralized planning relying on decentralized delivery . . . . .	495
7.12	Maintaining coverage of energy efficiency obligations under the current system with the introduction of a new system of carbon emissions trading . . . . .	498
7.13	Cleaning the air indoors: The other air pollution . . . . .	502
7.14	Münster, Germany: Low-energy building standards through sale of city-owned land . . . . .	503
7.15	Singapore’s Green Mark scheme . . . . .	505
7.16	Cities take active measures to reduce harmful burning of coal . . . . .	509
7.17	The Beijing Sunshine Schools program: Linking green policy, pedagogy, and people . . . . .	512
7.18	Phasing out coal in district heating provides significant environmental and social benefits. . . . .	515
7.19	Examples of cost-effective water treatment services provided to cities by natural ecosystems. . . . .	519
7B.1	New York PlaNYC 2030 case study: Integrated centralized planning relying on decentralized delivery . . . . .	529
7B.2	Heat cascading in the Rotterdam Energy Approach and Planning . . . . .	530
7B.3	Benchmarking and energy saving tool for low-carbon cities (BEST-Low Carbon Cities) . . . . .	532
7B.4	Climate-friendly air quality management planning in the San Francisco Bay Area . . . . .	534

## Figures

O.1	China’s rapid urbanization from an international perspective. . . . .	5
O.2	Productive gains from reallocating labor and capital are almost exhausted . . . . .	9
O.3	Guangzhou could accommodate 4.2 million more people with Seoul’s density profile . . . . .	12
O.4	Gross land revenues are large, but net revenues are declining . . . . .	12
O.5	Consumption share and GDP per capita, select East Asian countries . . . . .	13
O.6	Services and urbanization in East Asia . . . . .	14
O.7	China’s rising inequality . . . . .	16
O.8	Air pollution declined over time . . . but the costs of air pollution have been rising. Particulate matter pollution and estimated health damages in urban China, 2003–11 . . . . .	26
O.9	Land requisition is outpacing urban land use . . . . .	27
BO.3.1	Self-sufficiency ratios for grain in Asian countries. . . . .	28
BO.3.2	Food consumption in energy equivalents and income . . . . .	28
O.10	Impact of urban density on carbon emissions for transport and infrastructures: road, water, and wastewater network lengths . . . . .	29
O.11	Water and wastewater tariffs. . . . .	67

1.1	China's impressive economic growth has been accompanied by a massive population shift into urban areas . . . . .	84
B1.1.1	Urbanization is inextricably linked to economic growth. . . . .	85
1.2	Growth is increasingly dependent on capital accumulation as productivity from reallocation of labor and capital is declining . . . . .	87
1.3	Small cities are less efficient users of capital, increasingly so over time, 1995–2011. . . . .	88
1.4	Changes in labor force and urban population . . . . .	88
B1.2.1	Lewis model. . . . .	89
1.5	Total factor productivity has been highest in tier 1 and northeastern cities . . . . .	94
B1.5.1	Distance to major ports and economic development level of cities within a metropolitan area . . . . .	94
1.6	Changing patterns of specialization in manufacturing and advanced services . . . . .	95
1.7	Despite recent trends, a large share of manufacturing remains in large and medium-size cities . . . . .	96
1.8	To become a high-income country, China will have to develop services quickly, but the marginal product of labor in services continues to decline . . . . .	96
1.9	Population densities of Chinese cities have fallen over the past decade as the urbanization of land was faster than the urbanization of people. . . . .	97
1.10	In places where economic densities are falling, growth is supported by capital accumulation rather than by productivity increases . . . . .	98
1.11	Structure of migrants stock by type of migration by regions in 2010 . . . . .	98
1.12	Migrants go to larger cities, where wages are higher. . . . .	99
B1.6.1	Percentage point changes in urban population shares between 1978 and 2012 . . . . .	100
B1.6.2	Urbanization rate and year country reached China's current per capita income . . . . .	101
1.13	Increased mobility and connectivity will support employment growth. . . . .	102
1.14	Higher densities are associated with higher incomes and consumption. . . . .	102
1.15	Real household incomes (adjusted for cost of real estate) are lower in the largest cities, yet they have experienced the largest increase in population . . . . .	103
1.16	The initial stages of urbanization and industrialization led to imbalances in economic growth. . . . .	104
1.17	China's middle class continues to grow, but it remains small relative to China's development level. . . . .	105
1.18	Why is urban consumption so low? . . . . .	106
1.19	The concentration of different factors of production differs widely in China . . . . .	107
1.20	Slow urbanization of people has slowed income convergence . . . . .	109
B1.7.1	Estimates of China's urbanization rates, 1974–2050. . . . .	113
B1.8.1	Analytical structure of the growth model . . . . .	115
1.21	Final consumption as a share of GDP, 2010–30 . . . . .	117
1.22	The energy and CO <sub>2</sub> intensity of China's economy will decline . . . . .	118
2.1	Per capita GDP in 2000 and 2010 . . . . .	125
2.2	Population in 2010 by city size . . . . .	126
2.3	Distribution of cities by size in China and the United States . . . . .	127
2.4	Efficiency by city size and location in 2010 . . . . .	128
2.5	Recent trends in land use allocation from farmland to other uses. . . . .	129
2.6	Annual construction land supply—direct vs. competitive allocation. . . . .	130
2.7	China's largest cities have lower densities than their peers worldwide. . . . .	133
2.8	Urban density profile comparison between Guangzhou and Seoul . . . . .	133
2.9	Spatial expansion of cities is associated with higher commute times. . . . .	134



2.10	Station locations in Wuhan and Paris .....	152
2.11	Travel mode shares in Beijing, 1986–2010 .....	153
2.12	Travel mode shares in Shanghai, 1995–2009 .....	153
2.13	Road transport cost per ton-kilometer .....	155
2.14	Economic density and stock of expressways, 2010 .....	157
3.1	Rural-to-urban migration trends in China, 2000–12 .....	179
3.2	Trends in urban resident population and population with nonagricultural hukou, 1978–2012 .....	179
3.3	Relative wages of rural migrants and urban formal employees, 2001–11 .....	180
3.4	Central and subnational expenditure by function, 2011 .....	197
3.5	Per capita subnational revenues and transfers, by province/region, 2011 .....	198
3.6	Pension coverage for urban workers in China, 2000–12 .....	207
3.7	Urban and rural dibao beneficiaries in China, 1996–2012 .....	210
3.8	Modes of access to dwellings in urban areas, by household .....	211
3.9	Share of urban population with secondary and tertiary education in China, Brazil, and Korea .....	217
3.10	Official promotion rates from junior high school to academic high school, urban and rural, 1990–2006 .....	219
3.11	Health spending by source and location, 1995–2009 .....	221
3.12	Proposed overall design of the pension system .....	227
3.13	China and G20 fiscal transparency indicators, 2012 .....	232
3.14	Elements of fiscal transparency indicators for China, 2008 and 2012 .....	233
3.15	Expansion of higher education in China, 1990–2012 .....	240
3.16	Urban minimum wage adjustments, 1995–2012 .....	245
3.17	An international comparison of the tax wedge, 2012 .....	247
3.18	Protection of permanent workers against individual and collective dismissals, 2013 .....	250
3.19	Total disputes and disputes settled through arbitration, 2001–12 .....	251
4.1	Revenue and expenditure of subnational governments, 1978–2008 .....	269
4.2	Urban construction land .....	271
4.3	Requisition of rural land .....	271
4.4	Composition of construction land use increase, 2005–12 .....	272
4.5	Shares of main urban construction land use categories, 2005–12 .....	272
4.6	Urban land prices: National average, 2008–13 .....	273
4.7	Urban land price: Eastern region, 2008–13 .....	273
4.8	Industrial land price: Regional averages, 2008–13 .....	274
4.9	Annual (urban) construction land supply, 2001–12 .....	275
4.10	Construction supply: Direct versus competitive allocation, 2001–12 .....	276
4.11	Local government income from land sales, 2003–12 .....	277
4.12	Revenue from land sales and associated cost, 1999–2013 .....	277
4.13	Revenue from land sales as a share of total local government revenue, 1999–2013 .....	278
4.14	Annual change in outstanding local government debt, 1997–2010 .....	279
4.15	Bank lending to urban development investment corporations as share of total infrastructure lending, 2009 .....	280
4.16	Bank exposure to loans to urban development investment corporations, 2010 .....	281
4.17	Illegal land use: Number of reported cases and area affected, 2001–11 .....	281
4.18	Illegal land use by violators in 2011 .....	282

5.1	Total calorie (in kilocalories per capita per day) and protein consumption in various countries (in grams per capita per day) . . . . .	341
5.2	Population growth vs. diet change: Change in CE consumption . . . . .	341
5.3	Relationship between CE food consumption and income . . . . .	342
5.4	Calorie and CE consumption trends against income in China, 1980–2009 . . . . .	342
5.5	Production, consumption, and income in China, 1980–2009 . . . . .	343
5.6	Grain self-sufficiency ratios for selected Asian countries, 1960–2013 . . . . .	343
5.7	Contribution of major grains to China's supply-demand gap, 1960–2013 . . . . .	344
5.8	Water use in China: Total and by sector . . . . .	344
5.9	Sectoral shares of China's total water consumption . . . . .	345
5.10	Trends in agricultural sector water consumption and urbanization . . . . .	345
5.11	Percentage of rural labor employed off the farm, 1995–2011 . . . . .	348
5.12	Manufacturing wages, 1994–2008 . . . . .	349
5.13	Trends in mechanization operation, 1970–2011 . . . . .	350
5.14	Average daily cost of on-farm labor, 1997–2012 . . . . .	350
5.15	Trends in labor input by commodity, 1997–2012 . . . . .	351
5.16	Expenditures on mechanization by commodity, 1997–2012 . . . . .	351
5.17	Share of mechanization expenditure to total expenditure on physical input by different crops, 1997–2012 . . . . .	352
5.18	Land conversion trends, 1988–2000 . . . . .	353
5.19	Land conversion trends, 2000–08 . . . . .	353
5.20	Changes in agricultural production potential, 2000–08 . . . . .	357
5.21	Per capita consumption of various agricultural products in response to income growth . . . . .	360
5.22	Food consumption at home and away from home for urban residents by income . . . . .	361
5.23	Projected supply shortages for various food items . . . . .	364
6.1	Cost of urbanization as a share of GDP . . . . .	377
6.2	Government expenditures as a share of GDP . . . . .	378
6.3	Fiscal space, government expenditures, and public debt as shares of GDP . . . . .	379
6.4	Cost of urbanization in the reform scenario, as a share of GDP . . . . .	380
6.5	Government expenditures in reform scenario as a share of GDP . . . . .	381
6.6	Fiscal space, government expenditures, and public debt in reform scenario as shares of GDP . . . . .	381
6.7	Central and subnational expenditure, by function, 2012 . . . . .	382
6.8	Budget transparency trends in the OECD and China, 2008–12 . . . . .	427
7.1	Fast economic growth outpaced improvements in efficiency . . . . .	451
7.2	Air pollution declined over time and has recently been stable: PM <sub>10</sub> concentrations . . . . .	451
7.3	Estimates of the value of mortality and morbidity from air pollution . . . . .	452
B7.1.1	Air pollution concentrations in London and Tokyo, 1950–2013 . . . . .	453
7.4	Global net transfers of CO <sub>2</sub> emissions embedded in traded goods, 1991–2008 . . . . .	454
7.5	Only a quarter of provincial EPB directors came from within the organization . . . . .	456
7.6	Border spot prices for thermal coal traded in China and other countries, 2012–13 . . . . .	465
7.7	Residential electricity prices of 10 cities in China compared with other major cities, 2011–12 . . . . .	466

7.8	China's transport fuel prices are still relatively low but have increased significantly . . . . .	467
7.9	Natural gas prices paid by industrial end-users in Chinese cities compared to prices in other countries, 2000–11 . . . . .	467
B7.6.1	Effect of a carbon price on emissions and economic growth . . . . .	469
7.10	Household energy expenditure shares, 2012 . . . . .	470
7.11	PM <sub>10</sub> and PM <sub>2.5</sub> monitoring results from 74 pilot cities, including 3 regions, 2009–13. . . . .	473
7.12	Framework for comprehensive integrated air quality management . . . . .	476
7.13	Example of a nested modeling system of air quality in the Jingjinji region in China. . . . .	477
7.14	Potential of redensification in the densest 600 km <sub>2</sub> in Guangzhou, compared to Seoul . . . . .	478
7.15	Water network length and urban density. . . . .	478
7.16	Road network length and urban density . . . . .	479
7.17	Fuel consumption for freight (40-ton trucks) and congestion . . . . .	479
7.18	Superposition of carbon emissions per capita for private transport and urban density in metropolitan London, New York, and Paris . . . . .	480
7.19	Total length of bus and metro lines in operation . . . . .	482
7.20	Vehicle emissions contributions in China . . . . .	484
7.21	Expected pollution reduction from raising current emission standards to Euro VI standard . . . . .	486
7.22	Primary energy supply in Beijing, Shanghai, and Chongqing municipalities, 2011. . . . .	488
7.23	Per capita CO <sub>2</sub> emissions for 11 large Chinese cities and selected cities around the world. . . . .	489
7.24	Industrial energy use as a share of total energy demand in cities, 2010. . . . .	489
7.25	Industrial and nonindustrial CO <sub>2</sub> emissions per capita in selected Chinese and other cities . . . . .	489
7.27	Primary household cooking energy in urban and rural areas, 2006 . . . . .	490
7.26	Energy use in commercial buildings in China, the United States, and Japan. . . . .	490
7.28	Energy consumption by neighborhood . . . . .	492
7.29	Mapping London's electricity demand. . . . .	493
B7.10.1	Marginal abatement cost curve for Hongqiao area of Changning District, Shanghai . . . . .	494
7.30	Energy use per unit of water treated by municipal water utilities, various years . . . . .	496
B7.13.1	Concentrations of formaldehyde and benzene concentrations in buildings . . . . .	502
7.31	Primary energy consumption in China by end use in residential and commercial buildings, 2010. . . . .	503
7.32	Access to natural gas in China's 10 largest cities compared with other cities . . . . .	508
7.33	Supply of piped gas to urban households needed to achieve universal access to piped gas by 2020 . . . . .	510
7.34	Estimated fuel required to supply 65 percent of district heating with natural gas by 2030 . . . . .	510
B7.18.1	Carbon emissions under different scenarios of increasing gas use for heating. . . . .	515
7.35	Water and wastewater tariffs in Chinese cities compared to other cities around the world. . . . .	517
7.36	Sources of main water pollutants, 2011. . . . .	518
7.37	Share of utilities with net positive margins, by province, 2009 . . . . .	520

7B.1	An example of the energy and emissions planning process . . . . .	528
7B.2	Examples of energy potential mapping from the Netherlands, Rotterdam and Groningen. . . . .	531

## Maps

Map 2.1	Population changes from 2000 to 2010 . . . . .	127
Map 2.2	Sprawl in Shanghai Metropolitan Region between 2000 and 2010 . . . . .	136
Map 5.1	Major river systems in China and locations of the 10 largest river basins . . . .	346
Map 5.2	Land conversion: From cultivated land to other uses, 1988–2008 . . . . .	354
Map 5.3	Land conversion: From cultivated land to other uses, 2000–08 . . . . .	354
Map 5.4	Land conversion: From other uses to cultivated land, 1988–2000 . . . . .	355
Map 5.5	Land conversion: From other uses to cultivated land, 2000–08 . . . . .	355

## Tables

O.1	Returns on capital are declining over time: China compared with Japan, Korea, and Taiwan, China . . . . .	9
O.2	China's carbon emissions and drivers of growth . . . . .	25
O.3	China's urbanization scenarios . . . . .	35
O.4	Urbanization costs and fiscal space: Baseline and reform scenarios . . . . .	37
1.1	Incremental capital-output ratio in China and other economies, various periods .	87
1.2	Growth's drivers on the new urbanization trajectory . . . . .	91
1.3	The 12 types of economies of scale . . . . .	92
1.4	Structure of migrants stock by receiving and sending region, 2010. . . . .	98
1.5	Migrant worker employment by sector, 2004–12 . . . . .	99
1.6	Percentage of population with consumption between \$10–\$100 a day, in 2005 PPP dollars . . . . .	105
1.7	Summary of the reforms scenario . . . . .	114
1.8	Urban population projections over the medium term . . . . .	114
1.9	Sources of growth, five-year averages: Baseline and reform scenarios, 2015–30 .	116
1.10	Composition of the demand side of GDP: Reform scenario, 2010–30 . . . . .	116
1.11	Industrial structure of GDP and employment: Baseline and reform scenarios, 2010–30. . . . .	116
1.12	Urbanization will bring potential gains and pose risks to enterprises, households, and governments . . . . .	118
2.1	Annual change in key economic and welfare indicators between 2000 and 2010 . . . . .	132
2.2	Examples of key national plans . . . . .	138
2.3	Key local planning institutions . . . . .	139
2.4	Factors making up an integrated urban plan . . . . .	139
2.5	Sources of fiscal revenues for financing investment in public service facilities, 2011. . . . .	162
2.6	Provision of basic infrastructure services in urban areas . . . . .	163
2.7	Role of different agencies and stakeholders . . . . .	168
3.1	Educational attainment of rural workers in 2012 . . . . .	181
3.2	Distribution of rural-to-urban migrant workers by city level, 2009–12 . . . . .	181

3.3	Enrollment of migrant children in universal compulsory education, Beijing municipality . . . . .	200
3.4	Status of migrant children enrollment in universal compulsory education in selected cities, various years. . . . .	200
3.5	Conditions for migrant children's enroll in public schools, 2011. . . . .	201
3.6	Assistance in financing migrant children's education. . . . .	201
3.7	Summary of characteristics of the three health insurance schemes . . . . .	205
3.8	Comparison of the three health insurance schemes . . . . .	205
3.9	Summary of characteristics of the major pension schemes in China . . . . .	207
3.10	Cost of extending urban social services to cover rural migrants . . . . .	213
3.11	Composition of funding in universal compulsory education, 1997 and 2010 . . . .	217
3.12	Examples of extended free basic education in China, various years . . . . .	220
3.13	Proportion of pension contributions transferred to provincial adjustment funds . .	228
3.14	Proposed financing arrangements for the pension system . . . . .	229
3.15	Dibao and medical financial assistance in urban and rural China, 2012 . . . . .	230
3.16	Trends in employment and wages of college graduates, 2008–12 . . . . .	241
3.17	Social insurance and housing fund contributions in urban China, 2013. . . . .	247
4.1	Industrial land price development by region, 2000–11 . . . . .	274
4.2	Supply of construction land and land concession income, 2001–12 . . . . .	275
4.3	Cost structure of land concession, 2008–12 . . . . .	278
4.4	Expenditure patterns of land sales profits to local government, 2008–12. . . . .	279
4.5	Mechanisms capable of capturing betterment . . . . .	286
4.6	Transport sector investment projects and land value capture . . . . .	287
4.7	Land and property tax in Germany, 2003. . . . .	291
4.8	Land and fixed property tax in Japan . . . . .	291
5.1	Total increase rate of water use in China by sector, 1949–2011 . . . . .	344
5.2	Water supply, water demand, and water balance in China's 10 major river basins, averaged over 2006–10 . . . . .	346
5.3	Planned expansion of irrigation areas . . . . .	347
5.4	Proportion of rural laborers working off-the-farm, by age cohort, 2011. . . . .	349
5.5	Hourly wage rate of rural migrant workers across regions in 2011. . . . .	349
5.6	Machinery subsidies in China, 2008 . . . . .	352
5.7	Change in total production potential by province, 2000–08 . . . . .	356
5.8	Impact of a 1 percentage point increase in China's urbanization rate on China's domestic food production to 2020 . . . . .	357
5.9	China's supply and demand of agricultural products in 2012, 2020, and 2030 . .	358
5.10	Impact of a 1 percentage point increase in China's urban population on China's international trade to 2020. . . . .	359
5.11	China's current and projected supply and demand of livestock products in 2012, 2020, and 2030 . . . . .	363
6.1	Urbanization costs and fiscal space: Baseline scenario. . . . .	376
6.2	Urbanization costs and fiscal space: Reform scenario . . . . .	380
6.3	China's investment in public utilities, infrastructure and facilities, 2011 . . . . .	390
6.4	China public debt, June 2013 . . . . .	393
6.5	Proposed fiscal rule and debt limit indicators . . . . .	413
6.6	Local government bonds by issuers . . . . .	416
6.7	Local government fiscal tiers in the world. . . . .	430
6.8	Comprehensive reform program . . . . .	433

7.1	Sector priorities for green urbanization . . . . .	472
7.2	Breakdown of PM <sub>10</sub> and PM <sub>2.5</sub> sources nationwide and in Beijing . . . . .	474
7.3	Estimated waste generation levels and main outlets in China, 2011 . . . . .	522
7B.1	“Green” and “low-carbon” indicators for the transport sector in Chinese cities. .	529
7B.2	Illustrative examples of tools to assist city leaders in developing low-carbon plans . . . . .	533

# Foreword

Today, more than half of the world's population lives in cities, and by 2030 that will rise to an estimated 60 percent. Nearly all of this growth is happening in developing countries, where as many as 66 million people migrate to urban areas each year. Urbanization has historically served as an essential engine for economic development: No country has reached high-income status without undergoing a successful urbanization process.

China's urbanization over the last three decades has been unprecedented in scale: 260 million migrants have moved to cities from rural areas, supporting the country's rapid economic growth and development progress. Despite the enormity of this transition, China has avoided some of the ills often associated with urbanization, particularly large-scale urban poverty and unemployment. But strains have begun to emerge in the form of rising inequality, environmental degradation, and the quickening depletion of natural resources.

Chinese leadership understands these challenges. Premier Li Keqiang has placed urbanization as one of the government's top priorities. In November 2012, he asked the World Bank Group to partner with China in conducting a joint study on the country's urbanization challenges. Earlier that year, the Bank Group and China's Development Research Center of the State Council produced a groundbreaking study entitled *China*

*2030: Building a Modern, Harmonious, and Creative Society*, which laid out the key, long-term challenges facing the Chinese economy. The urbanization study aimed to build on this successful collaboration and help China tackle another key development challenge: forging a new model of urbanization.

To this end, China's Ministry of Finance, the Development Research Center of the State Council, and the World Bank Group established a joint work team to address several overarching questions related to China's urbanization process, such as: How can a new model of urbanization become an engine for higher-quality economic growth? How can more efficient urbanization support China's future economic transformation? How can more inclusive urbanization promote integration and cohesion? How can more sustainable urbanization help slow environmental deterioration, achieve more efficient use of resources, and advance food security objectives? How can reforms to the land, *hukou*, fiscal, and financial systems reinforce China's new vision of urbanization?

To answer these questions, the team held a series of workshops; prepared numerous studies, cases, and background papers; and developed common ideas based on a deep understanding of the challenges and opportunities of urbanization in China and around the world. This report, *Urban China*:

*Toward Efficient, Inclusive, and Sustainable Urbanization*, represents the results of that work. The report takes as its point of departure the conviction that China's urbanization can become more efficient, inclusive, and sustainable. However, it stresses that achieving this vision will require strong support from both government and the markets for policy reforms in a number of areas.

The report proposes six main areas for reform: first, amending land management institutions to foster more efficient land use, denser cities, modernized agriculture, and more equitable wealth distribution; second, adjusting the *hukou* system to increase labor mobility and provide urban migrant workers with equal access to a common standard of public services; third, placing urban finances on a more sustainable footing, while fostering financial discipline among local governments; fourth, improving urban planning to enhance connectivity and encourage scale and agglomeration economies; fifth, reducing

environmental pressures through more efficient resource management; and sixth, improving governance at the local level.

The report also provides recommendations on the timing and sequencing of reforms. It stresses the need to first implement reforms related to land, fiscal, and public service systems. Doing so will facilitate China's transition to higher-quality economic growth.

The team prepared interim reports that were shared with China's top policy makers as inputs to policy discussions on urbanization during 2013, providing an important basis for the formulation of China's new model of urbanization.

Going forward, we hope the final report will provide the insight to help central and local authorities navigate China's ongoing transition to an urban-based society. More broadly, we hope this work will provide a useful contribution to global knowledge on urbanization, and help other countries better manage their urbanization challenges.



LI Wei  
President  
Development Research Center of the State  
Council, P.R.C.



Jim Yong Kim  
President  
The World Bank Group



# Acknowledgments

This research was organized jointly by China's Ministry of Finance (MOF), the Development Research Center of the State Council (DRC), and the World Bank Group. President Jim Yong Kim of the World Bank Group, Minister Jiwei Lou of MOF, and Minister Wei Li of DRC provided valuable guidance and strong support throughout. Guiding this research was a Chinese internal steering committee comprising Minister Wei Li of DRC, Minister Jiwei Lou of MOF, Vice Ministers Baoan Wang and Yaobin Shi of MOF, Vice Ministers Shijin Liu and Jun Han of DRC, former Minister Xuren Xie of MOF, former assistant Minister Xiaosong Zheng of MOF, plus a World Bank Group internal steering committee comprising Sri Mulyani Indrawati, Jin-Yong Cai, Axel van Trotsenburg, Kaushik Basu, Rachel Kyte, Keith Hansen, Otaviano Canuto, Janamitra Devan, Jaime Saavedra, Ana Revenga, Zoubida Allaoua, and Klaus Tilmes.

Under the overall leadership of Minister Wei Li of DRC and Managing Director Sri Mulyani Indrawati of the World Bank, the report was prepared by a joint team from the three organizations, led by DRC Vice Minister Shijin Liu, DRC Vice Minister Jun Han, World Bank Country Director for China, Mongolia, and the Republic of Korea, Klaus Rohland, and World Bank Chief Economist for the East Asia and Pacific region, Bert

Hofman. Within the World Bank, Chorching Goh was the technical task team leader.

The overview report was prepared by a joint team comprising Chorching Goh, Jun Han, Yupeng He, Bert Hofman, Yongzhi Hou, Peilin Liu, Shijin Liu, Klaus Rohland, Mara Warwick, and Xian Zhuo, with support from Shusong Ba, Changsheng Chen, Sen Gong, Sanlin Jin, Shouying Liu, Yunzhong Liu, Jinzhao Wang, and Yida Wang (DRC and MOF), and Uwe Deichmann, Gailius Draugelis, Elena Glinskaya, Somik Lall, Mark Lundell, Paul Procee, Ulrich Schmitt, Karlis Smits, and Min Zhao (World Bank). The overview report benefited from inputs provided by Anass Afilal, Richard Auty, Roy Bahl, David Bulman, Wei Cai, Shaohua Chen, Zhao Chen, Basab Dasgupta, Yongheng Deng, Wanli Fang, Bruce Fitzgerald, Li Gan, Ming Lu, Yanyun Joyce Man, Baoyun Qiao, Shonali Sen, James G. Wen, and Colin Lixin Xu.

The joint DRC and World Bank team benefited from commentary and review provided by Arup Banerji, Benu Bidani, Milan Brahmbhatt, Fang Cai, Rugui Chen, Khoo Teng Chye, Yuanzhu Ding, Chuangling Fang, Martin Feldstein, Zangchun Gan, Peiyong Gao, Chaolin Gu, Jiankun He, Richard Herd, Andrew Hilton, Biliang Hu, Cunzhi Hu, Jikun Huang, Xiaohu Huang, Yukon Huang, Kang Jia, Xiangzhi Kong, Qiang Li, Mai Lu,

Chaping Mu, Stefano Negri, Vikram Nehru, Pengfei Ni, Baoxing Qiu, Yulong Shi, Ming Su, Zhonghua Sun, Woo Wing Thye, Jun Wang, Yiming Wang, Debbie Wetzel, Guang Xia, Lin Xu, Xianping Xu, Kaizhong Yang, Yulong Ye, Xiangquan Zeng, Liu Zhi, Qiren Zhou, and Deci Zou. The overview team gratefully acknowledged the helpful suggestions from the peer reviewers Marianne Fay, Abha Joshi-Ghani, Indermit Gill, and Jesko Hentschel, as well as the support and guidance from John Roome, Sudhir Shetty, Tunc Uyanik, and Xiaoqing Yu.

The seven supporting reports were prepared under the overall guidance of Jun Han, Bert Hofman, Shijin Liu, and Klaus Rohland.

Supporting Report 1 “Urbanization and Economic Growth” was prepared by a joint team led by Changsheng Chen (DRC) and Karlis Smits (World Bank). The team included Bingde Duan, Jianwu He, Yu Jiang, Ting Shao, Wei Xu, Zhaoyuan Xu, and Xian Zhuo (DRC), and David Bulman, Chorching Goh, and Bingjie Hu (World Bank). The report benefited from inputs provided by Yong Hwan Cha, Shaohua Chen, Tianming Chen, Li Gan, Jingyi Jiang, Edward Leman, Binglie Luo, and Jian Zhang.

Supporting Report 2 “Planning and Connecting Cities for Greater Diversity and Livability” was prepared by a joint team led by Yunzhong Liu (DRC), Somik Lall, and Paul Procee (World Bank). The team included Jianwu He, Bin Huang, Shen Jia, Zongmin Lan, Jiabin Lin, Rufe Liu, Yong Liu, Xiong Niu, Zhiyan Sun, Hui Wang, and Xiaowei Xuan (DRC), and Edward Leman, Joanna Masic, Gerald Paul Ollivier, Serge Salat, and Andrew Salzberg, (World Bank). The report benefited from inputs provided by Anass Afilal, Zoubida Allaoua, Mats Andersson, Mesky Brhane, Wei Cai, Basab Dasgupta, Chandra Deuskar, Emiliano Duch, Marianne Fay, Wanli Fang, Ellen Hamilton, Vernon Henderson, Abhas Kumar Jha, Ying Jin, Fan Li, Stefano Negri, Ira Peppercorn, Binyam Reja, Fatima Shah, Pablo Vaggione, Sameh Wahba, Runze Yu, Rufe Zhang, and Pengjun Zhao. The team benefited from suggestions from Changchun Feng, Chaolin Gu, Feng Li,

Jian Lin, Bin Lv, Baoxing Qiu, and Deci Zou. In addition, data support and other inputs were provided by Sheng Luo, Tingting Shi, Tingting Xie, Chaoyi Xu, Min Zhang, and Fanfan Zhao.

Supporting Report 3 “Inclusive Urbanization and Rural-Urban Integration” was prepared by a joint team led by Sen Gong (DRC) and Elena Glinskaya (World Bank). The team included Liejun Wang, Xiongjun Wang, and Bingzi Zhang (DRC), and John Giles, Gerard Martin La Forgia, Xiaoyan Liang, Philip O’Keefe, Shonali Sen, Dewen Wang, (World Bank), and Christine Wong (University of Melbourne). The report benefited from inputs provided by Jehan Arulpragasam, Luis Benveniste, Meskerem Brhane, Xiangming Chen, Maitreyi Das, Mark Charles Dorfman, Mary Gallagher, Qingyue Meng, Toomas Palu, Albert Park, Jin Song, Minna Hahn Tong, Xiaoxia Wang, Liping Xiao, Xiaoqing Yu, Chenggang Zhang, and Shuo Zhang.

Supporting Report 4 “China’s Urbanization and Land: A Framework for Reform” was prepared by Shouying Liu (DRC) and Ulrich Schmitt (World Bank). The report benefited from inputs provided by Andrew Hilton, Xueping Hou, Ruixian Hu, Xiaohu Huang, Lixing Li, Ping Li, Yihao Li, Shenmin Liu, Paul Munroe-Faure, Xiazhen Shao, Ran Tao, Xiaoqin Wang, Xiaohui Wu, and Chongfa Yuan.

Supporting Report 5 “China’s Urbanization and Food Security” was prepared by a joint team led by Sanlin Jin (DRC) and Ulrich Schmitt (World Bank). The team included Kym Anderson, Emiko Fukase, Jikun Huang, Yan Liu, Willam Martin, Scott Rozelle, and Jun Yang. The team benefited from comments and suggestions from Jun Han, Yupeng He, Shouying Liu, and Xingqing Ye (DRC), as well as other supporting report authors. It also benefited from background papers provided by Junfei Bai, Xiangzheng Deng, Songqing Jin, Ji Ma, Huangang Qiu, Laping Wu, Jinxia Wang, and Xiaobing Wang.

Supporting Report 6 “Financing Urbanization” was prepared by a joint team led by Shusong Ba (DRC), Yida Wang (MOF), and Min Zhao (World Bank). The team included

Mingge Lv, Hong Tang, Xianling Yang, and Zilong Zheng (DRC), Shuanyou Ma, Li Xu, and Yongzhen Yu (MOF), Hongye Fan, Cati-ana Garcia-Kilroy, Lili Liu, Ira Peppercorn, Juan Pradelli, Binyam Reja, Robert Tali-ercio, and Luan Zhao (World Bank). The report benefited from inputs from Roy Bahl, David Painter, Baoyun Qiao, Anwar Shah, Lina Li, and Guangrong Ma. The team benefited from suggestions from Kang Jia, Jun Ma, Lin Xu, and Sudarshan Gooptu, Ming Su, Jun Wang, and other supporting report authors. Part of the proofreading of the translation work was provided by Jian Chen.

Supporting Report 7 “Green Urbaniza-tion” was prepared by a joint team led by Jinzhao Wang (DRC) and Uwe Deichmann and Gailius Draugelis (World Bank). The team included Jianpeng Chen, Jianwu He, Tao Hong, Weiming Li, Xiong Niu, Guang Shi, Zifeng Song, Haiqin Wang, Xu Wu, and Xiaowei Xuan (DRC), and Garo Batmanian, Liping Jiang, Todd Johnson, Xiaokai Li, Feng Liu, Jostein Nygard, Gerald Ollivier, Binyam Reja, Serge Salat, Christopher Sall, Rob-ert Taylor, and Frank Van Woerden (World Bank). The report benefited from inputs pro-vided by Dimitri De Boer, Xiangxin Guo, Genia Kostka, Zhi Li, Ximing Peng, Paul Procee, Wenjin Pu, Yu Qin, Li Qu, Shuai Ren, Yanqin Song, Xiaodong Wang, Yun Wu, Runze Yu, Yabei Zhang, Yu Zhang, and Xi Zhao. The team benefited from comments and suggestions from Fei Feng, Jiankun He, Xiulian Hu, Guang Xia, and other support-ing report authors.

Invaluable support for the endeavor was provided by MOF Vice Ministers Yaobin Shi, Baoan Wang, Guangyao Zhu, Directors-General Wenhan Ou, Shaolin Yang, Jiayi Zou, Deputy Directors-General Zhongyong Hu, Yida Wang, and Yingming Yang, as well as the Chinese Executive Director to the World Bank, Shixin Chen.

Coordination teams led by Yongzhi Hou (DRC), Wenhan Ou and Jiayi Zou (MOF) and Mara Warwick (World Bank), and com-prising Dongwei Wang, Hai Wang, Yida Wang, Yan Xie, Yingming Yang, and Licheng

Yao (MOF), Hui Han, Yupeng He, Shen Jia, Qing Li, Peilin Liu, Hui Wang, and Xian Zhuo (DRC), Ying Fan, Li Li, Guangqin Luo, Yu Shang, Elaine Sun, and Hua Zhu (World Bank) provided strong support for the suc-cessful completion of the study. Tianshu Chen of the World Bank served as interpreter for the project and organized and coordinated the translation work. Yueyang Bao and Yuan-jing Shang of the China Development Press and Weiling Zhang of DRC managed the coordination and production of the Chinese edition. The World Bank’s Kathryn Funk, Li Li, Lasse Melgaard, and Mara Warwick managed the coordination and production of the English edition. The team is grateful to Susan Graham of the World Bank’s Publish-ing and Knowledge Division for managing the editing and layout of the English version, as well as to Andres Meneses for the printing and file conversions. The International and Comprehensive Departments of MOF, the General Office and International Department of DRC, and the World Bank provided effec-tive support in organizing all the conferences, discussion meetings, and international field study trips throughout this research.

This research also benefited enormously from comments and suggestions from Chi-nese ministries and local governments, including The National Development and Reform Commission, Ministry of Educa-tion, Ministry of Public Security, Ministry of Human Resources and Social Security, Ministry of Land and Resources, Ministry of Environmental Protection, Ministry of Housing and Urban-Rural Development, and National Population and Family Plan-ning Commission. Development Research Centers of Shanghai, Tianjin, Chongqing, Guangdong, Zhejiang, Inner Mongolia, Henan, Shaanxi, Hubei, Hunan, Yunnan, Shenzhen, Xi’an, and Zhengzhou provided case study reports, and Finance Bureaus of Liaoning, Henan, Sichuan, Chongqing, Hunan, Guangdong, Hainan, and Ningbo provided assistance in local field study trips. The joint research team is grateful for all their support.



# Executive Summary

*Over the past three decades, China's urbanization has supported high growth and rapid transformation of the economy, allowing people—among them some 260 million migrants—to move from agriculture to more productive activities. In the process, 500 million people were lifted out of poverty, and China managed unprecedented growth that averaged 10 percent a year for three consecutive decades. China's cities, with abundant labor, cheap land, good infrastructure, and competition among local governments to attract industry and investment, have created an environment that has been highly conducive to growth. Growing cities that have become increasingly connected with each other and with the rest of the world have added to productivity growth through agglomeration effects, and China's mega cities now have income levels comparable to some member countries of the Organisation for Economic Co-operation and Development (OECD).*

*China has avoided some of the common ills of urbanization, notably urban poverty, unemployment, and squalor. But strains are starting to show. China's growth has been increasingly driven by investment rather than productivity, and investment has become less effective in generating growth at the national as well as the city level. Urbanization has*

*relied excessively on land conversion and land financing, which is causing inefficient urban sprawl and, on occasion, ghost towns and wasteful real estate development. Barriers to migration have kept China's urbanization rate too low, thus underutilizing people's potential and exacerbating urban-rural income inequality. Unequal access to public services between citizens with urban household registration (*hukou*) and those without, although diminishing, remains and is a barrier to mobility. At the same time, the large influx of migrants puts pressures on urban services, and urban citizens perceive an erosion of service quality. Rural-urban land conversion has been inequitable in the distribution of its gains, has added to wealth inequalities, and has fed social unrest among farmers whose land has been expropriated. Despite progress in environmental standards and policies, the cost of pollution to the nation's health is rising as China's population is increasingly concentrated in cities. And land-intensive urbanization has reduced the availability of farmland, is competing for scarce water resources, and is adding to pollution that affects the quality of farm produce and food production capacity.*

*China's leadership is well aware of these challenges and has called for a new model of urbanization to match China's evolving*

*development goals and meet the emerging challenges.* A new model can support more efficient growth through better allocation of land, labor, and capital; be more inclusive and share benefits of urbanization more widely than in the past; and be environmentally sustainable and safeguard China's food security. China's urban landscape will continue to change: the largest cities will likely become larger and boost their role as gateways to the world and centers of a diverse economy, moving increasingly into services, knowledge, and innovation. Secondary cities within metropolitan areas are likely to attract more land-intensive manufacturing, benefiting from specialization and links to markets. China's large inland cities can compete with coastal cities if they are well connected to markets. Hinterland cities and rural towns would focus on activities with firm-level scale economies and on providing the public services that allow people to move to opportunities elsewhere. Better allocation of land, labor, and capital will accelerate the shift of industry to secondary cities, and as job opportunities open up in these areas, migration pressures in large cities are likely to moderate. As surplus labor diminishes with more rapid urbanization, the wage share in gross domestic product (GDP) will rise and urban-rural disparities will narrow. That would also promote consumption—increasingly driven by a growing middle class, whose demand will spur a more services-based urban economy. More inclusive growth and more equitable distribution of income will reinforce the shift toward consumption, because lower-income earners consume more of their income than higher-income earners.

*A new model of urbanization requires a different role for government.* Government should support rather than supplant market forces in shaping China's urban landscape, allowing China's cities to grow more organically and efficiently in response to market forces within the context of the government's strategic development plan. Government would need to rebalance its involvement from exercising administrative control to regulating

the market-based allocation of people, land, and capital across China and the provision of public services to support these allocations. At the same time, a growing number of people will be exposed to environmental hazards, and government would need to increase its effectiveness in enforcing existing legislation while enhancing market pricing to reflect environmental externalities in market transactions. The reform strategy underpinning this new role would focus on four areas: better policies on land, including creation of the institutions in which more market pricing for land can take place; removal of obstacles to people's mobility, including reforms of the hukou system and provision of a minimum public services package across China; a fiscal and financial strategy that will make the new model of urbanization affordable; and a change in the incentives for local government officials to pursue the goals of the new urbanization model.

*The main benefit of reforms will be higher-quality growth.* The reforms proposed in this report—specifically regarding land, hukou, and fiscal system reforms, and a change in the incentives for local governments to attract investment—will make the allocation of land, capital, and labor more market based. That in turn will change the distribution of economic activities across China's urban landscape. Accelerating the shift of industrial activities to cities where land and labor are cheaper would provide a stronger economic basis for those cities, and therefore promote small and medium-size cities. At the same time, this shift in industrial activities would also reduce migration pressures for the largest cities that would increasingly specialize in high-value services and innovation and attract higher-skilled labor rather than a low-skilled industrial workforce.

Land reforms would improve the efficiency of rural and urban land use and increase the compensation rural residents receive from land conversion, thus improving the distribution of income and wealth. Land reforms will also likely lead to denser cities, which would reduce the energy intensity and car use in



cities, thus improving environmental sustainability. And reduced land use for urbanization would leave more land for environmental services and agricultural production.

Hukou reforms and supporting reforms in public services would increase the mobility of workers across China and added to their productivity and wages. It would also accelerate rural-urban migration, which combined with land reforms, would accelerate agricultural modernization and increase rural incomes, thereby reducing rural-urban income inequalities. More equal service delivery across China would expand the equality of opportunity for all China's citizens. Better access to housing finance for migrants would allow them to acquire urban property and benefit from capital gains, thus reducing growing wealth disparities.

Fiscal reforms would generate the revenues to finance a minimum package of services across China and reduce the need for land-based financing, while limiting the risk to the financial system resulting from unregulated borrowing by local governments. Fiscal and financial reforms would also exert more discipline on local governments, thereby reducing the wasteful development of ghost towns and empty industrial parks.

Six priorities for establishing a new urbanization model emerge from this study.

***First, reforming land management and institutions.*** More efficient land use, denser cities, modernization of agriculture, and better income and wealth distribution between rural and urban areas all require more efficient and equitable utilization of land. A critical element of reforms is the current land system, which can be improved by better protecting land rights and optimizing the use of land resources in rural and urban areas. Land rights could be better protected by: (1) legalizing the central policy of “long term without change” for farmland leases and specifying the nature of the contractual rights to farmland, including the rights to occupy, use, profit from, transfer, mortgage, and bequest land; (2) improving land title registration by enforcing written land leases,

establishing a register for land titles and land transactions. Over time, a unified land registration system based on unified rules, standards, and procedures applicable to all land should be established; (3) reforming collective ownership by codifying that collective assets belong to the collective's members, clarifying membership and qualifications for entering and terminating collective membership, and defining rights to collective assets, including the rights to occupy, use, profit, transfer, withdraw with compensation, mortgage, guarantee, and bequest an inheritance of those rights; and (4) defining “public interest” for which the government can exercise its eminent domain power, while unifying the principles and standards for rural and urban land expropriation.

Rural and urban land use could be further optimized by (1) allocating rural land in a more market-driven way. In line with land-use plans and regulations, government could clarify equal market entry of collective and state construction land, while the collective construction land that has already entered into the urban market needs to be classified accordingly and integrated into urban master plans and managed according to the law; (2) integrating urban villages into the formal urban development process and allowing the use of rural collective construction land in peri-urban areas for urban development within the framework of urban master plans; (3) shifting land use from industry toward services and residential use, increasing transparency in the secondary land-market transactions, and boosting the availability of land for low-income housing from vacant government land and consolidated urban village land; and (4) pricing of industrial land in line with competing uses to improve the use of this land and strengthen local government finances.

***Second, reforming the hukou system to create a mobile and versatile labor force with equal access to a common standard of public services.*** To achieve this, the household registration system would need to move from an origin-based to a residence-based

system. The hukou system and residency system can operate in parallel. A residency registration would provide access to services such as education, health care, welfare, and affordable housing, whereas hukou could be maintained to provide land rights. As land reforms and pension reforms progress, this balance could be adjusted in the future. Central government needs to define the rules for establishing residency and a framework for extending access of new residents to urban services. Initially, local variations in levels of access and the timeframe in which new residents gain full access to services may be necessary, but standards for residency should be gradually unified across China. The first priority is to enable migrants and their families to better integrate into urban society and provide them with the social services they need—which would likely require a central fiscal subsidy to those cities that host a large share of migrants. In the medium term, reforms in social services and the public finance system could allow a nationwide common service standard, irrespective of location. Sustainability and portability of pension benefits are of particular importance and would require central administration over time. Further developing a fiscal system based on expenditure needs and revenue capacity would lay the foundation for equal access to a minimum level of public services across China.

*Third, placing urban finances on a more sustainable footing while creating financial discipline for local governments.* China's fiscal system has served the country well since the major reforms of 1994, but further reforms will be required to meet the public service demands from new urban residents and lower revenues from land financing as excessive land conversion is phased out and compensation standards improve. For local governments to make optimal choices when using scarce resources, reforms in the fiscal and financial systems should impose hard budget constraints on them. There are four priorities for reforms:

- *Improve the revenue base of local governments* by mainstreaming a property

tax on housing—gradually phased in to allow people to adjust—to provide local governments with a stable, sustainable source of finance linked to land prices; charging higher prices for urban services such as water, energy, and transport to cover full costs and promote efficient use of resources; and increasing taxes and charges on motor vehicles to raise revenues and reduce congestion. China could also consider reassigning some consumption taxes to local government—possibly while maintaining central collection. Irrespective of the policy choice on local revenues, at the margin China's cities must be financed from local taxes so that local government decisions will be scrutinized by those that pay the taxes and benefit from public services.

- *Improve the intergovernmental grants system.* In 2013, China had some 200 different earmarked grant programs, each meeting separate objectives. Consolidating these in a limited number of sectoral block grants could make the system more effective in the short run. In the medium term, moving to a general grants system that considers revenue capacity and expenditure needs (including a measure for the number of residents) would ensure that money follows people and would enable local governments to provide a minimum level of public services for all citizens. Central government would also need to develop standards for the subprovincial fiscal system, where large fiscal inequalities remain.
- *Establish an explicit framework for local government borrowing.* Allowing local governments to borrow requires a well-defined central government framework, which should include rules that define which local governments can borrow, from whom they can borrow, and the conditions under which they can do so, and which, at least initially, puts limits on borrowing for individual municipalities and for local governments as a whole. The regulatory framework should also include a credible no-bailout commitment by the central government and clear rules of debt workout in case a local government becomes



overindebted. Nonviable local government financing vehicles (LGFVs) should be reabsorbed within the local administration, and overindebted governments and LGFVs restructured to regain financial viability.

- *Reform the financial sector to enhance fiscal discipline of local governments.* In other countries, market discipline alone has regularly failed to limit local borrowing, so China would need to regulate the bond market, banks, and shadow banks on equal footing to ensure local government discipline and competitive access to finance without undue risk to the financial system. For the local government bonds market to function well, local governments would have to abide by independent creditworthiness assessments and rules on disclosure of financial statements, requirements that are already common for banks and enterprises. In the short term, bank finance will remain important, however, and to ensure that local government borrowing does not risk banks' stability, legal and regulatory limitations already in place should be enforced. These include exposure limits, which cap a bank's loan exposure to a single client; concentration limits, which restrict a bank's exposure to a certain type of client, such as all local governments taken together; and insider lending limits, which limit lending to the owners or co-owners of the bank. After experiencing widespread subnational defaults, countries such as Brazil banned subnational ownership of financial institutions.

*Fourth, reforming urban planning and design.* Global experience shows that urbanization has led to a diversity of viable and livable cities, different in size, location, and population density, but well connected at the national level and clustered at the local and regional levels. Rather than prescribing city size, policies that create a level playing field can encourage scale and agglomeration economies across cities to emerge. China would benefit from replacing the current standards-driven master planning with more dynamic approaches based on sound economic strategies for cities. Within cities,

flexible zoning that promotes smaller plots and greater mixed-land use would allow for denser and more efficient development. China could make better use of existing urban land by rezoning excess industrial land into commercial and residential land; raising floor area ratios (the ratio of a building's floor area to the land on which it sits); integrating urban villages into urban planning; and linking transport infrastructure with urban centers. Finally, promoting coordination among cities in metropolitan areas and city clusters would enhance agglomeration benefits and encourage better management of congestion and pollution.

*Fifth, managing environmental pressures.*

China already has an impressive set of environmental laws, regulations, and standards, and many technical solutions to address pollution and increase resource use efficiency have been piloted and some mainstreamed for many years. Improvements will therefore come with a strengthening of the institutions, incentives, and instruments that enable effective enforcement across sectors and at an appropriate geographic scale. An intergovernmental transfer mechanism to compensate for environmental compensation could be considered. Management of water and air quality, the latter especially in large urban clusters, would be most effectively conducted at a regional scale. An improved data collection system with wider information dissemination would promote monitoring and compliance and allow greater public participation in holding polluters to account. The legal system could be better leveraged to complement government enforcement by expanding and formalizing current experiments with environmental courts. Furthermore, rebalancing environmental policy instruments toward more market-based tools such as taxes and trading systems for carbon, air, and water pollution, and energy use would create a greener urban environment.

*Sixth, improving governance at the local level.* The performance evaluation system of local officials could be adjusted to give greater weight to variables that will drive

a more efficient, inclusive, and sustainable urbanization. Local governments' incentives to attract industries would need to be moderated by national rules to ensure that local actions promote national goals. Improving local government financial management and transparency could contribute to more efficient and sustainable urbanization through the introduction of a medium-term expenditure framework, comprehensive budgets that include all government fiscal funds, and disclosure of full financial accounts including a local government balance sheet. Establishment of a chief financial officer for each local government would ensure clear accountability for financial management and local borrowing. Finally, new governance structures for metropolitan areas could realize agglomeration benefits and manage externalities. Many administrative models exist in other countries and could be tested in China. They range from loose organization, with objectives restricted to one sector or fully integrated across all local government planning and services to more formal arrangements, such as the Kreis in Germany or the metropolitan area councils in a variety of countries.

***Timing, sequencing, and monitoring.*** The policy agenda proposed in this report is a comprehensive one, and authorities will need to set priorities. Perhaps the most urgent is

the land agenda: once cities have expanded in an inefficient way, it is hard to reverse. While government prepares for stronger property rights for farmers, it may wish to tighten land conversion and make more efficient use of existing urban land. Second, government would need to focus on local borrowing of all kinds, first and foremost to assess whether the situation requires urgent action, as has already been done through the recently completed audit of local debt by the National Audit Office. Rules for debt resolution will have to be issued and applied, especially regarding instituting a system of property taxation, a source of stable revenue. Formal access to borrowing will have to wait until a full regulatory framework is in place, and preferably after local government revenue sources have been strengthened. A decision on a temporary fiscal subsidy for integrating migrants would accelerate the implementation of a residency system and could be made early on. Finally, market-based conversion from rural to urban land is likely to require more experimentation before it can be mainstreamed nationwide. Other systemic changes in the policy areas discussed could come later, but presenting a comprehensive plan for implementing the agenda and establishing a monitoring mechanism for follow-up would lend credibility to the urbanization agenda.

# Abbreviations

ACFTU	All-China Federation of Trade Unions	CDB	China Development Bank
AEZ	Agro-Ecological Zone	CE	cereal equivalent
AQM	air quality management	CEPAC	certificate of additional development potential
AOTU	Autorité Organisatrice de Transport Urban (France)	CET	compulsory education transfer
BAAQMD	Bay Area Air Quality Management District (California)	CFO	chief financial officer
BRICS	Brazil, Russian Federation, India, China, and South Africa	CHC	community health center
BEEC	building energy efficiency code	CHIP	Chinese Household Income Project
BEEL	Building Energy Efficiency Labeling	CNAAQS	China's National Ambient Air Quality Standards
BEST	Benchmarking and Energy Saving Tool	CO <sub>2</sub>	carbon dioxide
CAPEX	capital expenditure	COD	chemical oxygen demand
CAPSiM	China Agricultural Policy Simulation Model	CPC	Communist Party of China
CASBEE	Comprehensive Assessment System for Building Environmental Efficiency (Japan)	CULS	China Urban Labor Survey
CASS	Chinese Academy of Social Sciences	CWSM	China Water Simulation Model
CBD	central business district	DRC	Development Research Center (China)
CCAP	Center for Chinese Agricultural Policy	ECDE	early childhood development and education
		EIA	environmental impact assessment
		ELITE	Eco and Low-Carbon Indicator Tool for Evaluating (Citie)
		EMMA	Electronic Municipal Market Access (system)

ENGO	environmental nongovernmental organization	ICCT	International Council of Clean Transportation
EnMS	energy management systems	ICOR	incremental capital-output ratio
EPB	environmental protection bureau	ID	identification
ERI	Energy Research Institute	ILO	International Labour Organization
ESCO	energy service company	ISIC	International Standard Industrial Classification (system)
ESMAP	Energy Services Management Assistance Program	IT	information technology
ET	evapotranspiration	LCL	Labor Contract Law (2008)
ETS	emission trading system	LEAP	Long-range Energy Alternative Planning (System)
EU	European Union	LEED-ND	Leadership in Energy and Environment Design for Neighborhood Development
EV	electrical vehicle	LGFV	local government financing vehicle
FAO	Food and Agriculture Organization of the United Nations	LPG	liquefied propane gas
FAR	floor area ratio	MAC	marginal carbon dioxide abatement cost
FDI	foreign direct investment	MACTool	Marginal Abatement Cost Tool
FIRE	finance, insurance, and real estate	MEP	Ministry of the Environment
FIT	feed-in tariff	MIT	Massachusetts Institute of Technology
FOB	free-on-board	MOE	Ministry of Education (China)
FSI	Floor Space Index	MOHRSS	Ministry of Human Resources and Social Security (China)
G-20	Group of 20	MOHURD	Ministry of Housing and Urban-Rural Development (China)
GB	general obligation bond	MSRB	Municipal Securities Rulemaking Board (United States)
GBES	Green Building Evaluation Standard	Mtce	million tons of coal equivalent
GCTF	Green Codes Task Force	MTEF	medium-term expenditure framework
GDP	gross domestic product	MTR	Mass Transit Railway (Hong Kong SAR, China)
GGBP	Green, Greater Buildings Plan	NCD	noncommunicable disease
GNI	gross national income	NCRMS	New Cooperative Rural Medical Scheme (China)
GONGO	government organized nongovernmental organization		
GVIO	gross value of industrial output		
HB	hybrid bond		
HPF	housing provident fund		
HR	human resource		
HSR	high-speed railway		
IB-NET	International Benchmarking Network for Water and Sanitation Utilities		

NDC	notional defined contribution	SENCE	Servicio Nacional de Capitación y Empleo (Chile)
NDRC	National Development and Reform Commission	SEZ	special economic zone
NGO	nongovernmental organization	SO <sub>2</sub>	sulfur dioxide
NH <sub>3</sub>	ammonia	SO <sub>x</sub>	sulfur oxides
NO <sub>x</sub>	mono-nitrogen oxides	SOE	state-owned enterprise
NQF	national qualifications framework	SPM	suspended particulate matter
O <sub>3</sub>	ozone	SPV	special purpose vehicle
OECD	Organisation for Economic Co-operation and Development	SUEEP	Sustainable Energy and Emissions Planning
OEI	Open Environmental Information	TC280	National Petroleum Products and Lubricants Standardization Committee (China)
OM	operation and maintenance	TEOS	Two Exemptions and One Subsidy (program)
OMEX	operation and maintenance expenditure	TFP	total factor productivity
OOP	out-of-pocket (expenditure)	TM/ETM	Thematic Mapper/Enhanced Thematic Mapper
PES	payments for ecological or environmental services	TOD	transit-oriented development
PFM	public financial management	TRACE	Tool for Rapid Assessment of City Energy
PM	particulate matter	TVEs	town and village enterprises
PPP	public-private partnership	TVET	technical and vocational education and training
PPP	purchasing power parity	TWh	terawatt hour
PRPD	performance rating and public disclosure	UDIC	urban development investment corporation
PSU	public service unit	UEBMI	Urban Employee Basic Medical Insurance (China)
PV	photovoltaic	UMCT	urban maintenance and construction tax
R&D	research and development	URBMI	Urban Resident Basic Medical Insurance (China)
RAM	Rapid Adjustment Model	UWP	Urban Worker Pension (China)
RB	revenue bond	UWS	urban workers scheme
REAP	Rotterdam Energy Approach and Planning	VAT	value added tax
RESCO	renewable energy service company	VOC	volatile organic compound
RMB	renminbi	WAT	wage adjustment transfer
RPS	Resident Pension Schemes (China)	WHO	World Health Organization
RSL	rural surplus labor	WTO	World Trade Organization
RSP	resident social pension		
SAR	special administrative region		
SEC	Securities and Exchange Commission (United States)		



# Part I

## Overview





## Introduction

Over the past three decades, China has experienced record growth that has lifted 500 million people out of poverty. Growth was triggered by reforms and opening up, which caused a rapid transformation of the economy that allowed people to move out of agriculture to more productive activities. Rapid economic development was facilitated by urbanization that created a supportive environment for growth with abundant labor, cheap land, and good infrastructure. Local officials keen to attract industry and investment and to create employment played an important role in this transformation. Despite the speed of urbanization, China avoided some of the common ills of urbanization, notably urban unemployment, urban poverty, and squalor. In 1978, less than 20 percent of China's population lived in cities; now the share is more than half. On the basis of the country's per capita income, China's urbanization is projected to reach about 70 percent—some 1 billion people—by 2030. How China will manage the next wave of urbanization will be an important determinant of the country's success in meeting its evolving development objectives.

China is now an upper-middle-income country, well positioned to become a high-income country. China's leadership has recognized that achieving this goal requires a new growth model that is more balanced, is based on productivity increases and innovations, is more equitable in the distribution of the benefits of growth, and produces more sustainable environmental outcomes. These objectives are well reflected in the 12th Five-Year Plan. Urbanization has an important role to play: urban areas, if well managed, provide efficient factor markets that support continued transformation and productivity increases through agglomeration effects, allow innovation and new ideas to emerge, spur domestic demand from a rising middle class, give the services sector space to grow,

and save energy, land, and natural resources. Such efficient, inclusive, and sustainable urbanization would contribute to China's development goals.

*Efficient urbanization* makes the best possible use of China's productive resources—its people, land, and capital. Higher efficiency—or productivity—would increase the welfare of China's people; more growth would be achieved with the same work effort, land use, and capital accumulation. Reforms could increase efficiency by removing barriers that prevent optimal use of China's productive resources.

*Inclusive urbanization* provides all people access to equal opportunity to benefit from urbanization—to use their labor where they are most productive, to accumulate assets and savings, and to use public services of similar quality across China. Reforms could promote inclusion by integrating rural migrants in cities, providing them and their families with social services comparable to those of urban *hokou* holders, while ensuring that rural areas are not left behind in terms of public service access and quality.

*Sustainable urbanization* means urbanization that can be supported by China's environment (land, air, water) and natural resources, while providing an urban quality of life commensurate with the desires of China's people. Reforms that improve the urban environment, balance conflicting demand on land and water, and minimize the use of natural resources would contribute to sustainable urbanization.

This overview report analyzes how China can make its urbanization more efficient, inclusive, and sustainable. In the first section, “Achievements and Emerging Challenges,” chapters 1 through 4, analyze China's achievements in urbanization and the challenges it faces in achieving efficient, inclusive, and sustainable urbanization. In the second section, “The Reform

Agenda,” a comprehensive reform agenda is proposed. Chapter 5 lays out the vision for urban China in 2030 and the reform package that will be needed to achieve it. It also describes the urban landscape in 2030 under the reform scenario. Chapters 6 through 10 provide a detailed set of recommendations in the key areas of reform. Finally, chapter 11 proposes the sequencing and timing of reforms. This report is complemented by

seven supporting reports—Urbanization and Economic Growth; Planning and Connecting Cities for Greater Diversity and Livability; Inclusive Urbanization and Rural-Urban Integration; China’s Urbanization and Land: A Framework for Reform; China’s Urbanization and Food Security; Financing Urbanization; and Green Urbanization—that further deepen the analysis and expand on the policy recommendations.

# Achievements and Emerging Challenges

## Chapter 1 China's Urbanization Achievements

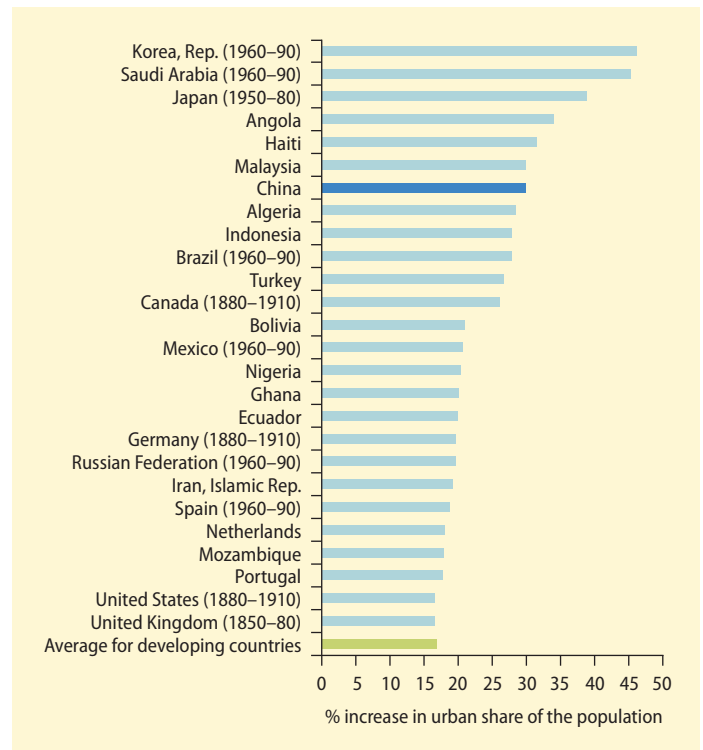
China's urbanization over the past three decades has been rapid. China's urban population rose from less than 20 percent of the total in 1978 to 52 percent in 2012, an increase of more than 500 million people. Although China's urbanization is without precedent in absolute numbers, the increase in its urbanization rate has not been exceptional when compared to other countries (figure O.1). In fact, China's change in urbanization rate has been lower than that of countries such as Japan and the Republic of Korea at comparable stages of development, but higher than that of the United States and the United Kingdom in the past. Moreover, despite rapid urbanization, the share of the population that is urban remains below that expected at China's current per capita income. Most important, China's urbanization remains incomplete: some 260 million residents of urban areas, known as migrants, lack urban hukou, the urban registration that regulates access to urban public services and social security.

Over the past decade, China's cities have gained an additional 100 million urban residents, and the annual growth rate of the urban population reached almost 4 percent, five times that of the total population. Some 40 percent of the new urban residents became urban because a nearby city expanded to encompass the rural area in which they were living, while a similar share moved to the cities to seek work.<sup>1</sup> Population growth in the largest cities has been especially rapid, despite government policies intended to encourage migration to small and medium cities.

Rapid urbanization has facilitated an unprecedented economic transformation in

the past 30 years, which catalyzed China's brisk GDP growth and pulled more than 500 million people out of poverty, many of whom participated in China's massive rural-urban migration, moving from the countryside to the cities and from agriculture into jobs in industry and services. China's average

**FIGURE O.1** China's rapid urbanization from an international perspective<sup>a</sup>



Source: World Bank staff calculations based on *World Development Indicators* and Bairoch and Goertz (1986).

Note: It should be noted that the urbanization rates on which this figure is based are not fully comparable, as definitions of urban areas differ from country to country.

a. The time period for all countries is 1978–2012, unless otherwise noted.

GDP growth rate over the past three decades reached nearly 10 percent, and urban areas that provided cheap land, abundant labor from migrants, and expanding infrastructure catalyzed this rapid growth. Demand from a growing world economy, into which China increasingly integrated, outpaced domestic demand, while investment in manufacturing and infrastructure transformed China's economic geography.

A key driver of China's success was the decentralization of decision making to local governments, which started in 1980. This decentralization encouraged local experimentation and competition for resources between cities and motivated local initiatives through a performance system that rewarded local leaders' success against national development goals. In the transformation process, employment in manufacturing and services grew during the same period from less than 30 percent of the labor force to more than 60 percent. Reallocation of labor to manufacturing and services—sectors that rapidly increased their productivity—accounted for almost a fifth of China's GDP growth. Reallocation of capital and labor to the more efficient non-state sectors further boosted the productivity of China's economy.

China's cities have largely avoided the social ills of rapid urbanization such as widespread urban unemployment and poverty.

Many countries have urbanized in the course of development, but some have seen their cities expand without much growth, and in such cases, urbanization has been accompanied by rising unemployment, slums, congestion, and squalor. China has avoided these problems, in part by regulating the flow of people to its cities, but more so by creating the conditions for rapid growth in income and employment. Mobile migrant labor that was temporarily employed either moved back to the rural areas or on to the next job, thus containing open urban unemployment.

China is embarking on a new model of urbanization with conditions that are vastly different from three decades ago. China is reaching a stage in its development in which efficient use of resources is becoming more important for growth than simply mobilizing resources. In the future, the services sector—rather than industry—is going to play a larger role in growth, and domestic demand is likely to grow faster than external demand. China's cities today are much larger and far better connected to the rest of the world and to one another because of the massive investment in infrastructure. This is a strong basis for continued growth, because it allows agglomeration effects and specialization to be the drivers of future growth. It is also a motivator for improved policies that build on these conditions.

## Chapter 2 Efficiency

Rapid urbanization has facilitated an unprecedented economic transformation in China over the past 30 years. However, China's existing growth model is running out of steam because of its inefficient use of capital, labor, and land. These inefficiencies result from administrative obstacles to labor mobility and from incentives that have caused local governments to become overly reliant on capital accumulation and land conversion. For China's urbanization to be more efficient, its factors of production need to be used more productively, and city agglomeration and specialization need to be exploited. These actions will accelerate urbanization, make it more conducive to growth, and indirectly contribute to higher consumption.

### Urbanization and agglomeration

Urbanization is generally associated with higher income and productivity levels. International experience suggests that, done well, urbanization can be an important driver of productivity increases and growth because urban areas offer positive agglomeration effects, including larger, more efficient labor markets, lower transaction costs, and easier knowledge spillovers. Agglomeration effects can also occur in smaller cities with sufficient specialization and transport linkages to larger urban areas. In the absence of sound public policy, however, those agglomeration effects may be easily outweighed by congestion costs—pollution, traffic congestion, and higher costs of living.

In member countries of the Organisation for Economic Co-operation and Development (OECD), regions with a higher share of urban population are generally linked to a per capita GDP higher than the national average; a 3.5–8 percent increase in total factor productivity can be expected for every doubling of the size of a city-region. A recent survey concludes that such phenomena are not limited to OECD countries,<sup>2</sup> and indeed agglomeration economies apply equally strongly in developing countries. Estimates for China suggest a 10 percent

increase in productivity for every doubling of city size.

Market forces are already starting to “right-size” China's cities for economic efficiency as China's rapid growth and migration have made urban economic systems more efficient through higher concentration of production. Furthermore, experience from Japan, Korea, and the United States, suggests that China's large cities will move from their current concentration of industry toward a higher concentration of services and that in the future the innovation and service economy will be even more concentrated than the industrial one has been. Indeed, concentration of services is already taking place across China's large cities. For example, between 2000 and 2010, finance, insurance, and real estate services grew almost 2 percentage points more in metropolitan than in nonmetropolitan cities. But these tradable services are still much less concentrated than global norms would suggest.

A key feature of China's urbanization has been the rapid growth and concentration of economic activity in large cities with high access to international markets. Cities with a population of 2.5 million or more generate 95 percent of China's urban exports. The combined economies of Beijing, Guangzhou, Shanghai, Shenzhen, and Tianjin amounted to \$1 trillion in 2010—comparable in size to Korea's economy. Incomes in these cities have climbed swiftly as well: between 2000 and 2010, per capita GDP rose from RMB 35,000 to RMB 82,000 in Shenzhen and from RMB 32,000 to RMB 66,000 in Shanghai. Rising prosperity in large cities has attracted millions of people from the countryside. Between 2000 and 2005, migration from other provinces boosted population numbers by 6.6 percent annually in Beijing and by 9.1 percent in Shanghai. Economic concentration is still substantially lower than in the United States, where the largest 10 metropolitan areas account for about 38 percent of GDP, compared with only half as much in China.

On the policy implications of agglomeration effects, the international literature

is careful to emphasize that policy should not favor any city. In fact, policies that are “spatially neutral” seem preferable.<sup>3</sup> Governments should create a level playing field among cities to encourage firms and individuals to locate where they are most productive. The existence of agglomeration economies on their own does not imply favoring big cities,<sup>4</sup> and because density has downsides, the benefits must be weighed against the costs.

Agglomeration effects will become more important for China as the economy shifts increasingly to services. In China’s richer cities, services will become more important as a share of GDP. Agglomeration effects play an even more important role in services than in industry. In the United Kingdom, financial and insurance services are 35 times more concentrated than manufacturing is (and information and communications 7 times more concentrated).<sup>5</sup> Close proximity also stimulates the growth of other specialized services such as legal, software, data processing, advertising, and management consulting firms. Urban density allows frequent face-to-face contact among employees, entrepreneurs, and financiers—contact that in turn promotes innovation and productivity.<sup>6</sup>

As services become concentrated in cities, industry will spread out—from a few big cities to a larger number of small ones. For example, as service employment grew in U.S. metropolitan areas during 1972–2000, industry moved to the suburbs 20–70 kilometers away.<sup>7</sup> Aiding this decentralization were transport infrastructure investments, which made trade cheaper. Similarly, after Korea made massive investments in transport and communications infrastructure in the early 1980s, industry decentralized from the three largest cities to smaller cities and the hinterlands.<sup>8</sup>

### Inefficient capital use

China’s growth has become increasingly reliant on capital accumulation in recent years, especially after the global financial crisis to which China responded with an investment-driven economic stimulus. China’s investment rate is now more than 45 percent of GDP, constitutes almost half of demand, and

over the past decade accounted for 80 percent of growth. At the same time, the growth dividends from reallocating factors of production across sectors—and across ownership forms—have declined considerably. Further, the share of growth that can be attributed to productivity growth not associated with factor reallocation declined from 2.5 percent of GDP in 1991–2000 to just 0.3 percent in 2001–10 (figure O.2).

Other Asian economies that grew rapidly in the past—Japan, Korea, Singapore, and Taiwan, China—all relied on high investment over an extended period of time to reach high income, and China’s capital stock per capita still remains significantly lower than in advanced economies, so much capital still needs to be accumulated. But continued capital accumulation will contribute less and less to growth as the ratio of capital to labor rises. China’s investment rate, at over 45 percent of GDP, is also exceptionally high. Moreover, the efficiency with which China is accumulating capital is declining. China’s incremental capital-output ratio (ICOR), an indicator of how much investment is needed for each additional unit of growth, deteriorated from an average of 3.6 in 1991–2011 to 4.7 in 2009–11, in the aftermath of the global financial crisis. That is considerably higher than in Japan, Korea, and Taiwan, China in their high growth years (table O.1), although comparable to other large emerging economies after the global financial crisis, a period during which most economies experienced a deterioration of their investment efficiency. If China’s investment efficiency (as measured by ICOR) had stayed constant from 2000 to 2012, the same growth rate could have been achieved in 2012 with over 20 percent less investment.

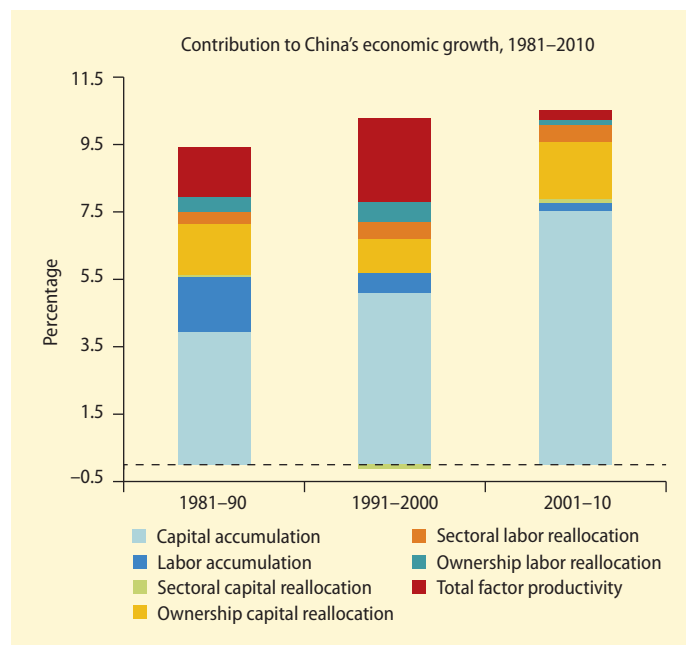
At the city level, investment efficiency has also declined. The ICORs have increased consistently across all city size categories in China, although returns on capital remain higher in the larger cities than in smaller ones. International experience suggests that capital use is efficient when ICORs are around 3, meaning that cities would need capital formation of around 30 percent of GDP to achieve 10 percent growth. Actual capital investments in China’s cities have

been at twice that level.<sup>9</sup> Across cities, capital is used least efficiently in smaller cities and inefficiencies are increasing over time. ICORs across city types have risen from the 2–3 range in 1995–2001 to well over 4 in 2009–11; cities with fewer than 500,000 people had average ICORs above 5.5 over the latter period.<sup>10</sup> On the ground, this inefficiency is tangible: in some instances, government-led developments of “new towns” have turned into wasteful “ghost towns” unlinked from market demand, while in others the excessive infrastructure developed cannot be maintained from limited budget resources.

Two main reasons explain this overuse of capital at the city level. Local governments eager to attract investments have provided subsidies in the form of inexpensive land, subsidized utilities, and tax reductions. Also, China’s financial sector has provided inexpensive credit for those who have access—in part because deposit rates are controlled and in recent years because the economic stimulus led to a rapid expansion of credit.

Local government debt has become a key issue. To attract investment and jobs, local governments have heavily invested in infrastructure. Despite strict limits on local government borrowing in the Budget Law, local governments have used urban development and infrastructure corporations (UDICs) and local government financing vehicles (LGFVs) to raise financing for infrastructure development. According to the 2013 audit by the National Audit Office, at end-June 2013, local governments’ direct debt amounted to RMB 10.89 trillion, local government guarantees RMB 2.67 trillion, and other local government contingent debt RMB 4.34 trillion. If only explicit debt is taken into

**FIGURE 0.2** Productive gains from reallocating labor and capital are almost exhausted



Source: Based on research by David Bulman and Aart Kraay for this study.

account, China’s general government debt-to-GDP ratio at the end of 2012 was 36.7 percent, very modest by comparison with OECD countries. If all contingent debts are included, the debt-to-GDP ratio would be 53.5 percent, still modest by international comparison, more so if one considers that China’s government also owns considerable assets, such as state-owned enterprises. While the level of debt stock is manageable, the growth of local government debts, at a yearly rate of around 20 percent in 2010–13, is a major concern, and some subnational governments may be

**TABLE 0.1** Returns on capital are declining over time: China compared with Japan, Korea, and Taiwan, China

	Gross fixed capital formation (percentage of GDP)	Average annual GDP growth (%)	Incremental capital-output ratio
China (1991–2011)	36.7	10.4	3.6
China (2009–11)	45.4	9.6	4.7
China 2012	46.1	7.8	5.4
Japan (1961–70)	32.6	10.2	3.2
Korea, Rep. (1981–90)	29.6	9.2	3.2
Taiwan, China (1981–90)	21.9	8.0	2.7

Source: Urbanization study team based on CEIC Data (n.d.).



overindebted. In addition to the risk to the financial system, the opaque manner in which local governments borrow *de facto* is likely to raise the cost of borrowing because of the ambiguous status of debt and uncertainty about whether local governments would back their financing vehicles. Land has played an important role as collateral for borrowing by UDICs and LGFVs, thus linking the health of local finances to land prices and real estate development.

### Incomplete migration

Despite China's impressive urbanization and migration record, the country is still less urbanized than expected at its level of income. Moreover, while 38 percent of China's labor force still works in agriculture, rapidly rising migrant wages in cities and shortages of low-skilled labor suggest that fewer people than before—and fewer than warranted on economic grounds—choose to leave the countryside to move to the city. International experience suggests that when workers are able to move freely across cities and sectors in search of better opportunities, wages and productivity should converge across localities. Data for prefecture-level cities in China in 2010 show that differences between marginal productivity and real wages persist and are greatest in midsize cities, suggesting that labor mobility is less than optimal.

Migrant workers are an increasingly important part of the labor force, becoming better educated, older, and keen to stay in the city in which they work.<sup>11</sup> Migrant workers made up more than one-third of the labor force in 2012. Two-thirds of China's migrant workers live in the eastern provinces and two-thirds of these originate from the same province. City-to-city migration is gaining in importance: it made up almost 14 percent of the total in 1990, but more than 22 percent in 2010. The majority of migrant workers are male, and on average they are better educated than the general rural labor force. Wages for migrants are rising rapidly, and the wage differential between migrant workers and their urban counterparts for similar work performed has fallen over time. The average migrant worker stays in the city for

only seven to nine years, and only 20 percent of migrants have brought their families, although more than 50 percent would like to settle in urban areas.

While there are demographic and other reasons that explain a slowdown in migration, the key reasons are administrative: the hukou system and its link to entitlement of public services in the city and right to land in rural areas; lack of portability of social security; and insufficient low-income housing. In an economic sense, these administrative barriers work like an expensive tax on migration; based on current productivity differences between agriculture and urban occupations in industry or services, every 1 percent more migration from rural to urban areas would yield 1.2 percent more GDP.<sup>12</sup> At the current level of mechanization, agricultural surplus labor is estimated to be 105 million people,<sup>13</sup> and this could increase as China's agricultural modernization accelerates. If China's migration rates had matched those of Korea's in the past, China's economy would be nearly 25 percent larger today.<sup>14</sup>

### Inefficient land use

Urbanization has used land inefficiently. Rural land requisition and conversion for industrial use has been particularly inefficient because it has been largely driven by administrative decisions rather than market demand. The incentives for local government to expand the city rather than develop existing underused urban land are strong: requisition of rural land and sale for commercial and residential purposes yield a large windfall gain for the city finances. In contrast, requisition of urban land is more expensive and cumbersome, because urban residents and enterprises have stronger property rights. Furthermore, national regulations that protect farmland from conversion have the unintended consequence of fragmenting the urban periphery because available land for conversion is often not adjacent to the core city.

The territorial expansion of cities has far outpaced population growth—according to some estimates, average population density in China's cities has dropped by more than 25 percent in the last decade.<sup>15</sup> In 2000, China's



urban land was about 99,000 square kilometers, or 1 percent of China's surface area; by 2010, it had increased to 127,000 square kilometers, an average growth of 2.5 percent a year. China is not alone in this trend toward less dense cities—many OECD countries have experienced similar drops in density in the past 50 years, driven by suburbanization, increased mobility, and growing demand for urban space. But many cities in OECD countries are now aiming to turn this trend around. There are good reasons for doing so: agglomeration effects are larger in denser cities; providing services and infrastructure to a more compact population costs less; and less of the land that is crucial to support agricultural production and environmental sustainability is lost.

Within China's cities, land allocation is biased toward industry. Unlike commercial and residential land, industrial land is rarely auctioned and is usually directly allocated or sold at heavily subsidized prices, on average only 10 percent of commercial land prices. As a result, despite the abundance of urban land, land for residential development and the services sector is limited and expensive, resulting in surging housing prices and an underdeveloped services sector.

The current regulatory approach to city land use contributes to inefficient urban development. Overly strict limits on floor area ratios (FARs, the ratio of the floor area of a building to the area of the land the building sits on) in central urban areas also lead cities to accommodate new demand by expanding outward. Moreover, planning controls are regulated at the superblock level, rather than the small building plot level, and any petition for land use or density changes—which are rarely given, barring exceptional circumstances—occur at the original lot level. While the law provides options for developers to transfer, mortgage, and lease land use rights to individual citizens and organizations, conventional land subdivision and sale, as practiced in many countries around the world, is not possible in China.

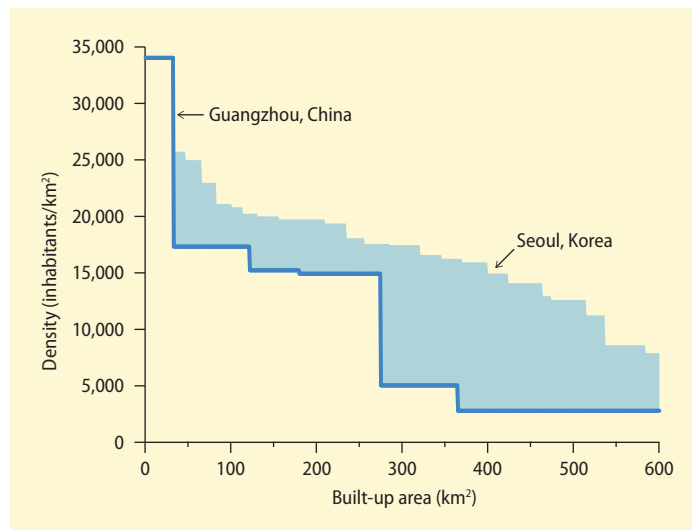
In rural areas, land remains underused. China's rural land remains fragmented,<sup>16</sup> with the average farm size, at 0.6 hectares, now smaller than at the start of reforms.

Moreover, more than 60 percent of plots are less than 0.1 hectares.<sup>17</sup> The 2003 Rural Contracting Law allows subleases of farmland, but despite increases in land transfers in recent years, farmland consolidation has remained slow, in part because property rights remain unclear. International evidence suggests that stronger property rights bring significant increases in agricultural investment and productivity through mechanization and increases in rural plot size. For instance, in the decade after Taiwan, China, privatized rural land in the 1950s, annual rice yields rose 60 percent and farm incomes increased 150 percent.

In Vietnam, new laws passed in 1993 increased both efficiency and equity by establishing the right to inherit, transfer, sell, lease, or mortgage land, while extending the duration of land use rights from 20 to 50 years. Rental market participation quadrupled in the five years following reform, and land sale transactions increased sevenfold. These changes unambiguously boosted productivity, helping Vietnam transform itself from a net rice importer to the world's second-largest rice exporter.<sup>18</sup> Similarly, in the United States—where the number of farms has declined since 1900 by 63 percent, but the average farm size has risen by 67 percent—the period of most rapid transition (1950–90) saw even faster productivity growth in agriculture than in manufacturing.

Existing urban land can accommodate a great deal of future urbanization. Some of China's larger cities, including Beijing and Shanghai, have already started to redensify in the past decade—with population densities up by 50 percent in the core of Beijing. However, there is considerable scope for further densification: if Guangzhou had the same density as Seoul, Korea, it could accommodate 4.2 million additional inhabitants on its existing land, while Shenzhen could accommodate an additional 5.3 million inhabitants (figure O.3). China currently uses more than a quarter of its urban land for industrial purposes, even in some of its largest cities—a stark contrast with Seoul, which uses 7 percent and with Hong Kong SAR, China, which uses 5 percent. As China grows richer, conversion of industrial land into commercial

**FIGURE 0.3** Guangzhou could accommodate 4.2 million more people with Seoul's density profile



Source: Salat 2013.

Note: The dark blue line indicates the potential for redensification in the densest 600 km² of Guangzhou.

and residential land could provide the main land resource for cities—and provide a new source of revenues for local governments. In addition, development of urban villages and redevelopment of existing urban space at higher FARs can all contribute to densification without further expansion of urban land.

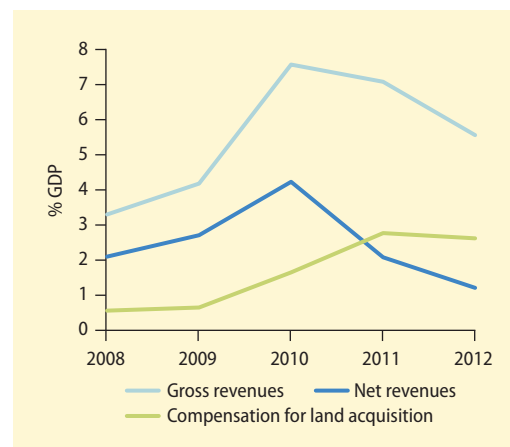
Land pricing will play an important role in the densification of cities. For China's 35 largest cities, rapid increases in urban land prices correlated with greater increases in density; that is, low land prices lead to urban sprawl.<sup>19</sup> In recent years, the intensity of land development in coastal cities has increased—by more than 40 percent in Guangzhou and Shenzhen. Those cities recognized the unsustainability of reliance on rural land for urban expansion. They implemented institutional innovations to encourage greater use of existing urban land, which has led to less sprawl and more efficient land use. National reforms along these lines would improve land use throughout the country.

Land sales revenues have been fluctuating and declining drastically in some years. At their peak in 2010, gross revenues totaled

7.5 percent of GDP; however, net of compensation and the cost of land preparation, land revenues are more modest and have declined from 4.2 percent of GDP in 2010 to 1.2 percent in 2012 (figure O.4). Compensation for land taking, including cost for land requisition, resettlement, and demolition explains part of the decline: from barely 0.5 percent of GDP in 2008, or 15 percent of gross revenues, these payments grew to 2.6 percent of GDP in 2012, or almost half of gross revenues. Further, some land revenues are earmarked for specific spending categories, including agricultural infrastructure and water conservancy, compulsory education, and social housing, thus reducing the use of land revenues for urban construction purposes.

China's urbanization has led to large gains in efficiency through reallocation of labor from rural to urban activities, and agglomeration effects have increased the productivity of China's cities. At the same time, China's growth could use capital, labor, and land more efficiently. Removing barriers to migration, reducing the incentives for local government to convert rural into urban land, and making financial sector reforms that instill more discipline on local governments and investors alike are key directions for reform.

**FIGURE 0.4** Gross land revenues are large, but net revenues are declining



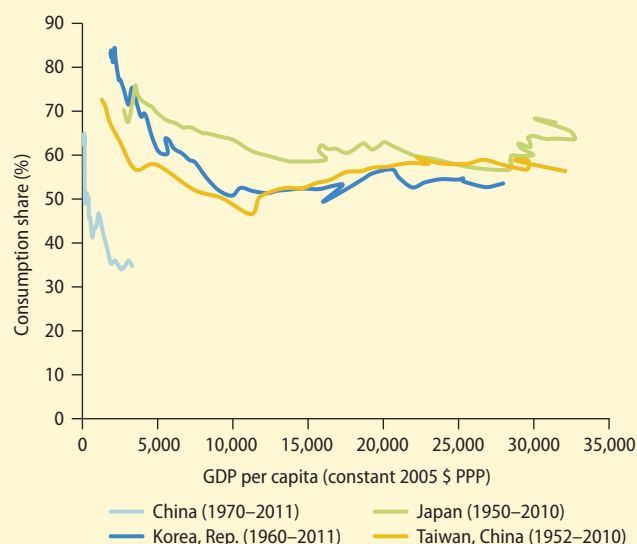
Sources: MOF data (annual budget reports); China Ministry of Land and Resources; CEIC Data; World Bank and DRC staff estimates.

## Urbanization and domestic demand

Can urbanization help rebalance demand? This is a key question for China, which seeks a more balanced pattern of demand, including a shift from external to domestic demand and from investment to consumption, because the existing model, while highly effective in the past, may not be a sustainable growth strategy going forward. The global environment has changed: labor costs are rising, and exports can no longer be counted on to drive demand growth. Although consumer demand in China has been growing rapidly by international standards, it has continued to lag behind China's phenomenal growth. At some 35 percent of GDP, the trend has been downward on the back of a dwindling wage share in the economy and rising household savings (figure O.5).

Several factors can explain the low consumption share in GDP. First, statistics may underestimate the share of consumption in GDP. In particular, the share of housing services may be underestimated because the imputed rent depends on the value of housing, which in urban areas has increased rapidly. Further, the consumption of other services may also be underestimated, because this sector has grown rapidly in the past decade. Second, the share of labor remuneration in GDP has fallen precipitously in recent decades, declining by 7 percentage points of GDP over 2000–09. In part, this drop can be explained by the shift of labor from agriculture to industry and services: in agriculture, labor remuneration accounts for some 90 percent of value added, whereas in industry and services, it is about half that.<sup>20</sup> As more people move out of agriculture, the share of labor in GDP declines, even though people increase their wages by moving. Third, household savings rates increased—accounting for 4 percentage points of the decline of consumption as a share of GDP over 2000–09. While the increase in the savings rate is associated with urbanization, the driving factor is income: savings increase because people save more as income increases, and people who move to cities earn more than those in rural areas.

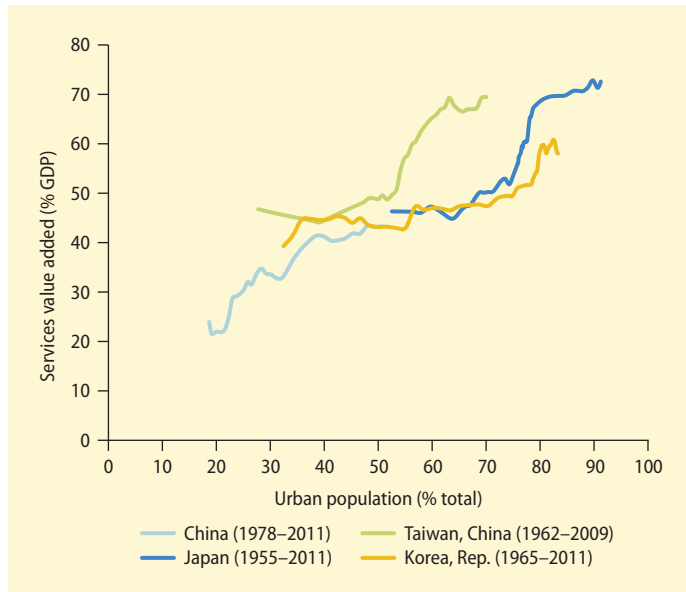
**FIGURE O.5** Consumption share and GDP per capita, select East Asian countries



Sources: World Bank *World Development Indicators* and authors' calculations.

The low share of consumption in the economy is reflected in the size of China's services sector, which remains relatively underdeveloped by international standards—47.8 percent of GDP in 2011—although it is similar to levels Japan, Korea, and Taiwan, China experienced when their urbanization rates were around 50 percent (figure O.6).

Urbanization can be an indirect driver of consumption growth. China's consumption has been growing rapidly in the past 30 years, averaging about 8 percent a year, but it has still lagged behind China's record growth, and as a result, consumption as a share of GDP has declined. The largest driver behind a rise in China's consumption rate is likely to be the share of household income in GDP. This share declined from 68.5 percent in 1990 to 60.4 percent in 2011, while over the same period the wage share in the economy declined even more rapidly to 47 percent in 2011—accounting for most of the decline in consumption as a share of GDP. One reason for this decline is the move of labor from agriculture, with a high share of labor in value-added industry, which is more capital

**FIGURE 0.6 Services and urbanization in East Asia**

Sources: Data from World Bank *World Development Indicators*; Council for Economic Planning and Development (Taiwan), various years; Statistics Bureau of the Japan Ministry of Internal Affairs and Communications, various years.

intensive. The other is the abundance of surplus labor that kept wage pressures low.

Because the labor share in services is higher than in industry, a shift of production is likely to increase the wage share in the economy. In addition, continued urbanization is likely to exhaust surplus labor in the coming decade, which in turn will accelerate wage increases that will drive up consumption. Real wage increases have already been brisk in recent years, especially for skilled labor but also increasingly for the unskilled labor usually provided by migrants. Accelerating urbanization by removing obstacles to migration could bring forward the point where wage increases start to outpace GDP growth. At that stage, China's consumption share in the economy is likely to increase. In other economies that experienced rapid development in the past (Japan, Korea, and Taiwan, China), the consumption share in the economy bottomed out at per capita incomes between \$10,000 and \$15,000, an income level China will reach this decade if it maintains relatively rapid growth.<sup>21</sup> Changing consumption patterns of migrants in China's cities are unlikely to directly

drive increases in consumption. Although migrants consume far less as a share of their income than urban residents in the location they work, the overall savings rate for migrants and their families back home hardly differs from those with urban hukou at similar levels of income. Thus, extending urban hukou rights to migrants by itself would not increase consumption. Savings rates rise rapidly with income: the richest 10 percent of the population has a savings rate above 60 percent, whereas the poorest 10 percent saves very little.<sup>22</sup> Part of the drop in consumption as a share of income reflects the higher incomes China's people enjoy now. At the same time, this finding would imply that more inclusive growth that benefits the lower-income strata—whether migrant or not—could increase the consumption share of GDP. Accelerating rural-urban migration would benefit those lower-income earners, and they will consume more. As a share of their increased income, they would still consume less, and thus national consumption as a share of GDP is not likely to rise.

As China's cities expand rapidly, urban investment demand has been high. Investment in infrastructure has topped 10 percent of GDP in the past decade, while urban construction has been peaking at 3.5 percent of GDP in 2008–12. Urban construction investment per additional citizen rose sharply in the past three decades—from RMB 294 per additional urban resident in 1980 to RMB 64,000 in 2007—in part driven by the rising costs of land and labor.<sup>23</sup> Arguably, rapid growth in infrastructure investment is unsustainable and will moderate in the future for three reasons: more efficient, denser cities that are shifting into services will require less additional investment in infrastructure; much of the necessary basic infrastructure has been built already, and additions to the urban population will require less additional investment than in the past; and maintenance of infrastructure is taking an increasing share of local government budgets, which will become a constraint on additional capital investment.

While demand for housing is likely to remain strong, urban real estate investment is already very high at 16 percent of GDP, up from 9 percent a decade ago. It is unlikely to

grow much further as a share of GDP: first, a projected urbanization rate of 70 percent by 2030 implies a slowdown in urbanization compared with the past 2 decades. Second, in recent years this investment has been driven by rapid credit growth that may not be sustainable. Finally, the stock of empty housing

is growing, while the supply of low-income housing falls short of demand, despite the government's ambitious social housing investment of 2 percent of GDP per year. Thus, whereas the composition of real estate investment may change, it is unlikely to grow more rapidly than GDP in the coming years.

## Chapter 3 Inclusion

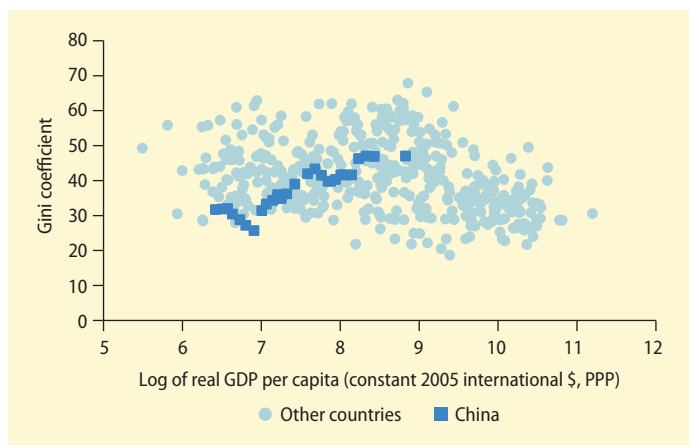
China has achieved a remarkable transformation with the movement of over 260 million migrants from rural to urban areas. These individuals have left their agricultural jobs to seize the opportunities offered by urbanization and to take up more productive and higher paying jobs in cities. Through this process, China has managed to sustain high wage growth and even higher productivity growth and to reduce poverty on an unprecedented scale. At the same time, China's spatial and rural-urban inequality has grown, and social tensions have emerged as a result of the rapid conversion of rural land at below-market value and the incomplete integration of migrants into China's cities. Barriers to labor mobility remain, largely because social security and other benefits are not portable: those who migrate are often forced to leave their families behind in rural areas where access to quality services such as education and health may be limited. Social policy reforms in the household registration system, public finance, service delivery, and labor market institutions will be needed to reduce these social challenges and make China's urbanization more inclusive.

### China's growing inequality and social tensions

China's rapid urbanization has been accompanied by growing income and wealth inequality. China's Gini coefficient, a measure of inequality, stands at 0.47 according to official data, while unofficial estimates put this number even higher. Although not exceptional by international standards (figure O.7), inequality has risen rapidly in the past three decades and is high compared with other East Asian and OECD countries. Income inequalities have been rising in urban as well as rural areas, and the gap between urban and rural incomes is as high as it was at the start of reforms in 1978. Within urban areas, inequalities between migrant workers and the population with urban hukou remain. Even though migrant wages have been catching up and migrants are increasingly paid wages comparable to those of urban residents doing similar work, migrants often lack the skills and educational background for higher-wage jobs. Inequality from capital income is on the rise as well, and inequality in wealth among the urban population—much of it driven by house ownership—is also rising. As is usual in other countries, assets are even more concentrated than income, and in China this concentration is very high: the top 10 percent of households is estimated to own 85 percent of assets, whereas they earn 57 percent of total income.<sup>24</sup> This places China's wealth inequality near the top by international comparison.<sup>25</sup> For the median urban household, housing constitutes the main asset.

China's barriers to migration explain in part the persistence of regional and urban-rural wage gaps, and they indicate inefficiency in the use of labor. International experience suggests that increased mobility is likely to reduce spatial and rural-urban inequality. Consider the United States, where mobility has nearly eliminated interregional and rural-urban wage differences: rural-urban migration helped to equalize agricultural and non-agricultural wages, with a disproportionate

**FIGURE O.7** China's rising inequality



Source: World Bank staff calculations; Milanovic 2013.  
Note: PPP = purchasing power parity.



effect on poorer agricultural states.<sup>26</sup> The result was regional convergence, with the north-south labor-income ratio falling from 2.4 to 1.1, while the urbanization rate rose from 28 to 74 percent. Evidence from Korea also shows that free rural-urban migration reduced inequality. By 1994, three decades into reform, Korea's urban-rural wage gap had disappeared entirely—indicating that workers had migrated to their optimal locations.<sup>27</sup> In China, the interprovincial gap in wages continues to grow, but interprovincial migration nonetheless lags behind that of the United States, where wage differences among states are much lower.<sup>28</sup>

Social tensions in urban and rural areas are growing. The absorption of 260 million migrants into China's cities has not always been smooth, and urban hukou holders experience a crowding of public services and perceive a decline in service quality because of the rapid growth in urban population. Meanwhile, discontent among farmers who feel unfairly treated because of the low level of compensation they received for expropriated land is one of the main causes of social unrest in China, especially in peri-urban areas at the city fringe. From 1990 to 2010, local governments expropriated rural land at an estimated RMB 2 trillion below market value.<sup>29</sup> Assuming that this compensation would have generated returns similar to overall growth, farmers today would have more than RMB 5 trillion in household wealth—greatly lowering asset inequality and leading to greater consumption through a wealth effect.

Labor disputes nearly doubled between 2005 and 2012 and largely involved migrant workers. The three most common reasons for labor disputes are wages and compensation, social insurance, and contract terminations.<sup>30</sup> Labor disputes are becoming more complex, more difficult to resolve in a timely fashion, and more likely to have an impact on public opinion and social stability.

The dispute resolution system in China is organized to settle “rights” disputes but not “interest” disputes. Rights disputes involve statutory or contractual claims, while interest disputes are conflicts over interests (such as wages, work conditions, and work

organization) that do not allege violations of minimum legal standards or contractual obligations. As Chinese workers' consciousness of protections under the labor markets has increased, so too has the number of interest disputes, but the institutional vacuum for resolving them may explain in part why collective work actions such as strikes and demonstrations have increased in recent years. While some demonstrations are clearly about legal violations (such as the failure to pay wages), many other demonstrations occur because workers wish to highlight disagreements and tensions with employers that are a normal part of industrial relations.

Higher demand has intensified competition for urban services, creating tensions between long-term urban residents and newcomers.<sup>31</sup> Therefore, keeping the quality of provision at a level acceptable to the long-term residents is important. At the same time, the delivery of social services in urban areas can build on the natural “technological advantages” of cities—economies of scale in service provision and increasing returns to scale. Urbanization also offers greater potential for agglomeration of service providers and thus potentially an enhanced choice for clients.

## The evolution of the hukou system

Hukou reform has been undertaken gradually since the early 1980s in response to China's evolving economic and social transformation. Significantly, the mobility restriction function of hukou has largely been eliminated. In 2006, the State Council promulgated a milestone document that provided a comprehensive policy framework for the treatment of rural migrant workers in cities with respect to their entitlement to social services. This document explicitly linked access to services with the goal of facilitating integration of migrants into cities. Since then, as required by the central government, reforms have been explored and promoted at the local level.

Some provinces started pilots that adopted parallel residence permits and the provision of social services linked to these permits.

Several large cities and provinces, such as Chengdu, Chongqing, Guangdong, Jiangsu, Shanghai, Shenzhen, and Zhejiang, have adopted the residence permit system—some with strict limitations. In 2011, the State Council announced hukou reform as a key component of a coordinated set of urban and rural reforms and took several steps including issuing hukou system reform guidelines linked to a city’s administrative level, requesting institutions to improve registration of temporary populations in the cities, and calling for a gradual rollout of the residence permit system.<sup>32</sup>

For migrants from outside municipal or provincial jurisdictions, local reforms have been the least complete in large cities, where most rural migrants are moving to, attracted by the higher returns to their labor. On the other hand, in small and medium cities, social services and social protection are less developed, which is one factor that explains the limited success of the policy aimed at attracting migrants to smaller cities. Reforms in the larger cities have generally been focused on selecting migrants with the desired characteristics and are oriented toward attracting high-skilled and wealthy individuals, thus significantly limiting the labor market impact of the reforms and reducing their equity benefits.<sup>33</sup> Migration restrictions continue in a variety of ways, for example, through entry barriers based on skills, investments, or income, or through quota rationing.

Reforming hukou to encourage mobility should be mindful of capacity constraints in urban public service delivery. These are already evident for the current migrant population but will increase once migrant families reunite and migration accelerates as access to urban services increases. The government is concerned that large additional demands on services may undermine service quality for existing urban residents, which could aggravate social tension. A second concern is that migration will be driven not by opportunities in the labor market but by access to services. China has large differences in the quality and quantity of public services between urban and rural areas. Internationally, there is not much evidence of such “benefit migration” in advanced economies,<sup>34</sup> but the differences

in public services quality in those countries are not as large as in China. Evidence from China suggests that even for large cities such as Chengdu, relaxing limitations on access to services does not lead to an excessive influx of migrants seeking benefits. Even the advanced economies regulate access at the local level (box O.1).

Hukou reforms face financial constraints to some extent. In principle, money should follow people—that is, if a family migrated from a rural to an urban area, the money that financed their services in the rural area should be transferred to the city. Over time, the fiscal system and the service delivery system can adjust to accommodate the additional demand in urban areas. Centralizing some public services, notably social security, would help address part of the problem, but a temporary fiscal subsidy to urban areas to rapidly increase service delivery capacity may be needed in the short run to accelerate improvements in service delivery to migrants until the fiscal system has been adjusted (see chapter 7 and supporting report 6). The benefits from accelerated migration and the improved stock of human capital—which accrue nationwide—are worth that investment.

## Access to urban social services

In the 2000s, the central government required local governments to include migrant children in the local education systems, accommodating them mainly in local public schools. This requirement represents a dramatic change in the official policy on the rights of migrant children. The implementation of the policy was supported by fiscal resources from both central and local governments. Yet migrant children still face difficulties enrolling in urban public schools—in Guangdong, for instance, some 50 percent of migrant children are not in public schools—and many attend migrant schools, which typically have poor teaching facilities, undeveloped curricula, insufficient funding, and less qualified teachers. Barriers that keep migrant children out of the mainstream education system include capacity constraints in urban schools, which were planned for the hukou population only; legal and regulatory barriers with high



### BOX 0.1 Residency rights in the European Union, the United States, the former Soviet Union, and Japan

Within the European Union (EU), a “right to reside” in another EU country beyond three months is linked to one’s employment status. Workers and self-employed persons have the right to reside without any conditions but must have the proper documentation to prove their status, such as a certificate of employment or proof of self-employment. In the case of students or “economically inactive” persons (unemployed or retired, for example), the right to reside involves proving that they have comprehensive health insurance as well as “sufficient resources” to not become a burden on the host EU country’s social assistance system during their residency. In addition, students are also required to be enrolled at an establishment for the principal purpose of following a course of study or vocational training. The “right to permanent residence” requires five years of continuous legal residence in the host EU country and, once acquired, is not subject to the conditions mentioned above. Some categories, notably workers or self-employed persons, receive more favorable treatment in this regard and may acquire this right before five years, under certain conditions. One can lose the right to permanent residency only through an absence of more than two consecutive years, although there are certain stipulated reasons for which such an absence is acceptable.

In the United States, state residency is required for a variety of rights, including the right to receive public services such as education and health, and eligibility to receive public assistance. Broadly speaking, there are two types of residency requirements: a “bona fide residency requirement,” which simply requires that the person establish residence before demanding the services restricted to residents; and a “durational residency requirement,” which obligates individuals to show that, in addition to being a bona fide resident of the state, they have resided there for a certain stipulated period of time. Attempts by states to make certain fundamental rights conditional upon residency have not remained unchallenged in court, however. Since the 1960s, the Supreme Court has struck down several attempts by states to impose residency requirements (particularly durational ones) on persons applying for welfare, public housing, and medical services, while upholding the state’s ability to do so for the right to attend particular public schools and gain access to tuition waivers, among

other programs. Residency is determined differently for different purposes and often varies by state.

In the former Soviet Union, the *propiska* residence permit system was adopted for economic, law enforcement, and other purposes, such as access to jobs, social benefits, housing and utility payments, taxes, conscription, medical care, and the like. Acquiring a *propiska* to move to a large city, especially Moscow, was extremely difficult for migrants. Following the dissolution of the Soviet Union, the *propiska* system was officially abolished for the citizens of the Russian Federation, but access to services remains challenging for the millions of migrants from former Soviet republics. Some of the former Soviet republics, such as Belarus and Kyrgyzstan, chose to keep their *propiska* systems, or at least a scaled down version of them, and these present the most complex challenge to entitlement reform.

In Japan, there are two distinct systems of registries to manage citizen information: the Basic Resident Registry (or *Jūminhyō*) and the Family Registry (or *Koseki*). The *Jūminhyō* is essentially a registry listing current address, basic sociodemographic information (name, address, date of birth, gender, head of household, nationality/region from where they came, status of residency, and the like), together with information related to social benefits and insurance including national health insurance, medical insurance for the elderly over age 75, long-term care insurance, national pension plan, child allowance, and rice distribution. The *Koseki*, in contrast, is the formal record of a family’s (instead of an individual) history.<sup>a</sup> Unlike the *Jūminhyō*, a *Koseki* is not normally used to verify information or required to get government services. It is similar to the registration systems in other East Asian countries influenced by the ancient Chinese system of government, including China (*hukou*), Vietnam (*Hộ khẩu*), and the Democratic People’s Republic of Korea (*hojul/hojeok/bojok*).

The *Jūminhyō* is the basis for the issuance of basic resident registration cards (*jūmin kihon daichō kaado*) by municipalities, and Japanese law requires every citizen to report his or her current address (and any changes therein)<sup>b</sup> to the local authorities, who compile the information for tax, census, and various other purposes. More important, *Jūminhyō* is required to access various social services including

(Box continues next page)

**BOX 0.1** (continued)

registering children at a local school district or starting or renewing national health insurance membership. It basically serves as a proof of residence where required, such as for opening a bank account or to apply for government permits. *Jūminhyō* registration is also required to officially register a name seal, which functions as one's official signature.

Since 2002, *Jūminhyō* information is available electronically through the Basic Resident Register Network, run by a government-backed provider in Tokyo (the Local Authorities Systems Development Center). The Juki Net is the electronic registration system currently used by more than 1,700 local gov-

ernments in Japan and has greatly helped to simplify moving-in/out procedures, obtain a residence registry card, and eliminate the need to attach a copy of the resident's record in various administrative procedures. It also helps residents acquire an "electronic certificate" that can be used to authenticate themselves in electronic applications on the Internet. Since December 2008, it has also eliminated the need for pensioners to annually confirm benefits eligibility,<sup>c</sup> since the Basic Resident Registration Network System reports directly to the Japan Pension Service on behalf of the pensioner.

a. Japanese law requires all Japanese households to report births, acknowledgments of paternity, adoptions, disruptions of adoptions, deaths, marriages, and divorces of Japanese citizens to their local authority, which compiles such records encompassing all Japanese citizens within their jurisdiction. Marriages, adoptions, and acknowledgments of paternity become legally effective only when such events are recorded in the *Koseki*. Any changes to this information have to be sealed by an official registrar. The *Koseki* simultaneously fills the function of birth certificates, death certificates, marriage licenses, and the census in other countries as well as serving as proof of Japanese citizenship.

b. All Japanese residents are required to obtain a move-out notice/certificate from the municipality where they move from before submitting a move-in notice/certificate to the municipality where they are moving. This helps facilitate the smooth provision of public services including national health insurance and child allowance and also prevents overlap of collections of taxes and insurance premiums.

c. The Japan Pension Service requires annual reporting in the pensioner's birth month to confirm eligibility status and to continue receiving pension payments, failing which pay outs are suspended.

transaction costs because of the documentation required for enrollment; high school fees; and the policy requiring students to take the university and high school entrance examination in their province of origin.

The disparities in education in urban areas are also evident among local children from different social strata. This can be seen in the differential enrollment rates between higher-quality "key" schools and regular schools, and in indicators such as average class size and transition rates. The increased importance of family connections and "placement fees" to get children into elite urban public schools risks reinforcing existing social disparities. In urban cities such as Beijing and Shanghai, key elementary and junior high schools generally use exams to select their students.

For urban health insurance schemes, the government has a policy of open enrollment, but employers have few incentives to

enroll migrants because it raises their costs. The majority of migrants are enrolled in the New Rural Cooperative Medical Scheme (NRCMS), which charges lower premiums. Yet migrants cannot conveniently take advantage of NRCMS benefits when they access health services in urban areas, because the benefits are not portable. Enrollees would first have to pay for care in urban facilities and then seek reimbursement from the NRCMS upon visiting their county of residence, usually during long holidays.<sup>35</sup> Few can afford to wait many months for reimbursement.

Policies to increase access to health services need to be matched with measures to control costs—for the sake of all urban residents, not only migrants. Between 2007 and 2010, real annual growth in health spending averaged about 15 percent compared with annual GDP growth of approximately 8 percent. Health is also consuming a growing share of public spending as government

expands insurance systems and invests in health services to improve access and reduce out-of-pocket spending.

Pension coverage has dramatically expanded over the past five years, but the inclusion of migrant, self-employed, and informal sector workers remains a challenge. Further systemic reforms are required to ensure portability, decent benefits, and financial sustainability of the system. Starting with rural areas in late 2009, and with urban areas in July 2011, China began rolling out a nationwide voluntary pension scheme for urban and rural residents with a combination of individual accounts and basic pensions. The “rural resident pension scheme” and the “urban resident pension scheme” are innovative efforts to encourage participation through public subsidies. Although migrants cannot participate in local urban resident pensions, they can contribute to the urban or rural resident pension scheme in the town where they have local hukou, and in this way ensure provision for their old age. The policy framework and fiscal subsidy policy of the urban and rural resident pension schemes are well aligned with each other, and it is anticipated that the two schemes will be merged shortly.

In 2012, 229.8 million people contributed to urban employee pension schemes, while the rural system covered about 460 million people by the end of that year. The number of migrants who participated in the urban employee pension scheme increased from 14.2 million (or 10.8 percent of urban migrants) in 2006, to 45.6 million (or 27.8 percent) in 2012, but the coverage rate remained less than half that of urban workers. Several factors explain the low participation rate of rural migrant workers in the urban worker pension scheme. These include lack of enforcement of the Social Insurance Law of 2011 and the Labor Contract Law of 2009, which require employers to treat urban and migrant workers equally; high tax and social contribution rates that are close to the OECD average, and even exceed it if housing fund contributions are included; and the lack of implementation of the State Council’s decision of 2009 to secure portability of social insurance rights.

Urban dibao, introduced in 1997 to support the reform of state-owned enterprises by providing income assistance for laid-off workers and their families, has evolved into a backbone of the social safety net in China. Dibao is a noncontributory cash transfer program that aims to ensure a minimum living standard for eligible households. Rural dibao was rolled out nationwide in 2007. By 2012, urban and rural dibao covered 23.4 million urban beneficiaries and 53.4 rural beneficiaries, accounting for 3.0 percent of urban and 8.3 percent of rural population, respectively. In addition to the dibao, several other programs provide poor and low-income families with assistance, such as exemptions or reductions on education fees, subsidies for health insurance, and subsidized utilities that provide temporary cash and in-kind support. In 2012, 20.8 million urban and 59.7 million rural individuals received these subsidies. The rural wubao and urban Three-No are assistance programs that provide income and in-kind support to those who have “no capacity to work, no source of income, and no legal dependents, or whose legal dependent has no capability to provide support” in rural and urban areas, respectively. Most social assistance programs in China target only households with local hukou—urban or rural—and migrants and their families are excluded from the urban programs.

## Access to housing

Urban hukou households in China have a very high rate of homeownership by international standards. About 84 percent of families in the cities live in homes they own, primarily the result of government policies in the 1990s that allowed occupants of work-unit housing to purchase homes at heavily discounted prices.<sup>36</sup> In contrast, only 10 percent of migrants own their urban residence, and affordability, rather than residency status, now constitutes the strongest barrier to accessing quality housing. Across urban areas, prices doubled between 1999 and 2010—in some cities like Shanghai and Beijing, they increased more than fivefold—making the Chinese housing market unaffordable for many.<sup>37</sup> Studies show that in

## BOX 0.2 Social Housing

Since 2007, China has implemented an ambitious social housing program for rural and urban residents. The program includes 7 categories and 12 varieties of social housing, including low-cost rental housing, assisted home ownership, public rental housing, and shelter improvements. By 2012, these programs had addressed housing needs of 31 million urban households, or 12.5 percent of total urban households, while over 5 million urban households benefited from rental subsidies. Fiscal support for social housing has rapidly increased, from RMB 10 billion in 2007 to RMB 380 billion in 2012. Earmarked grants from the central government for social housing rose from RMB 7 billion to RMB 235 billion over the same period. In addition, tax reductions and exemptions were granted. The financial sector financing of such programs also grew rapidly: by 2012, bank loans had reached RMB 571 billion; enterprise bonds had raised RMB 226 billion; and loans from public housing funds amounted to RMB 49 billion. Since 2010, land use plans for social housing projects have been listed separately in the annual residential land supply plan and given priority. Between 2010 and 2012, land supply for social housing projects across the country increased from 11,000 hectares to 38,000 hectares.

Despite these achievements, many challenges remain. The 12th Five-Year Plan targets 35 million units of social housing, bringing total coverage to 20 percent of households, which is higher than in most developed countries. Land availability financing, effective targeting of public subsidies, and operating and maintenance of housing units are among the key challenges that China faces in meeting its goals. Aside from improving the functioning of the housing market more generally, introducing a property tax on housing to better utilize existing housing stock, and encouraging industries to move to more affordable locations in secondary cities, lessons from international experience suggest that China can introduce specific policies to promote social housing.

*Increasing flexibility for municipalities in achieving their social housing construction goals.* Rather than mandating a specific number of a particular type of unit, broad goals could be set for each municipality, which could then be required to develop a specific plan on how to achieve these targets. The plan should be done on the basis of careful analysis of housing demand (such as demographic and socioeconomic conditions) and supply (such as types of housing available for different income groups, at

what cost). The overall plan would include a market study, a market plan, a financial plan, an analysis of job growth and infrastructure needs, and a long-term management plan including contingencies. The findings of the analysis should determine the housing needs of a locality and enable local governments to define the nature, scope, and policy interventions required to effectively align housing demand and supply.

*Improving availability of land for social housing.* Promoting mixed-use developments can increase the availability of social housing throughout a municipality. Planning for housing should bring together many stakeholders including those involved in planning for local economic development, transportation, urban space, and infrastructure services. “Inclusionary zoning” policies, an instrument used in many U.S. municipalities and in European countries, can be applied to require developers to set aside 10–30 percent of the developments for affordable housing. Rezoning industrial land for housing would increase the availability of land in many cities and bring down prices, as discussed elsewhere in this report. Improving the inventory of public land and identifying underused parcels could expand the availability of land for social housing development. Including “urban villages” in the city and zoning them for low-income housing is another option, while better connecting existing social housing in remote locations would improve their usefulness and occupation.

*Improving targeting of social housing subsidies.* Focusing subsidies on low-income households that are unable to access housing without public assistance can be done by establishing clearly defined eligibility criteria on the basis of housing demand analysis using refined socioeconomic and demographic data. Expanding social housing eligibility to migrants through criteria of the residency system, as recommended in this report, would improve targeting for low-income households, because migrants usually are at the lower end of the income distribution. Examples of subsidies to households include capital grants toward home purchase (such as assistance for a down payment) or rental vouchers. Successful international examples include a rental assistance program to low-income households under the Section 8 program in the United States, which provides housing vouchers or direct payments to private landlords.

*(Box continues next page)*

**BOX 0.2** (continued)

Given China's social housing demand, shifting subsidies from ownership to renting may be appropriate in many locations. Regulations to ensure exit from low-income housing when households are no longer eligible also is needed to ensure a steady supply of low-income housing over time.

*Diversifying the supply and management of low-income housing developments by encouraging entry of specialized firms and nonprofit organizations.* Specialized firms can bring competition and innovation to serve the low-income segment. Private developers elsewhere have managed to specialize in the social housing sector by bringing down the cost of construction through innovative construction methods. Xerbia in India and GEO SAB de CV in Mexico are good examples. Smaller plots and more fine-grained zoning, as discussed elsewhere in this report, would lower the barrier to entry for firms. In Europe, specialized nonprofit organizations, including cooperatives in continental Europe and housing councils in the United Kingdom, were instrumental in expanding and managing the low-income housing stock—often with government support to ensure their access to finance and membership fees to provide an equity buffer. International good practice

calls for government departments to promote specialized entities that manage the housing stock, rather than trying to manage it themselves.

*Lowering the cost of low-income housing.* Regulatory requirements impose high standards on housing development. Relaxing these would bring down the cost of affordable housing. When Bangkok was urbanizing, it allowed developers to adjust building density levels and unit sizes, making housing relatively affordable even in central locations. Improving business processes such as the issuance of permits can shorten the time required to complete a building project and thereby reduce costs. Germany offers an example of an efficient and streamlined permitting process that allows developers to build housing fairly quickly.

*Controlling contingent liabilities in housing finance.* Many local governments finance their low-income housing through local government financing vehicles (LGFVs), some of which are overindebted because of rapid expansion. Ensuring proper management of these financing vehicles, clear accounting for assets and liabilities, and strict control on the extent of local government guarantees on LGFV debt should prevent local government exposure to debt distress arising from low-income housing.

several large cities such as Guangzhou and Shanghai, long-term urban residents and migrants have similar access to housing,<sup>38</sup> suggesting that hukou type matters less than income.

Formal and informal rental markets provide an important source of housing, and their importance is likely to grow as mobility increases. The bulk of low-income housing is provided outside formally established government programs through collective housing (such as dormitories provided by employers), or private rental units in “urban villages” or on the urban fringe. In Shanghai, only 5.5 percent of migrant households can afford to purchase commercial housing and some 80 percent are renters, while the rest live mainly in employer-provided dormitories.<sup>39</sup> An informal residential market of so-called “small-property-rights” housing has grown rapidly, without legal protection and at odds with government policy. This is a manifestation of

market forces with distortionary administrative measures. Urban villages offer affordable housing as well as significant income to members of the village collective, many of whom are dispossessed farmers. At the same time, since urban villages are not incorporated into urban master plans, city administrators have little incentive to extend urban infrastructure and public services to urban village areas.

Expanding mortgage and housing rental markets through government insurance and support could expand homeownership. China's overall mortgage lending has grown rapidly—consumer credit in China has grown from 1.5 percent of total renminbi (RMB) lending in 1999 to 13.3 percent in June 2013<sup>40</sup>—but poor households, and particularly migrants, lack access to this credit. Private and public finance could help to make housing more affordable across China. In the United States, the establishment of the Federal Housing Administration created the

conditions for a postwar housing boom that saw homeownership rise from 44 percent of households in 1940 to 62 percent in 1960.

### Providing services to those who stay behind

In China, services in urban areas are easier to access and are of better quality than in rural areas. Notwithstanding the actions needed in urban areas, there will continue to be a need to provide quality rural services for those who remain in rural areas; otherwise rural dwellers will move to the cities to access the better social services there, rather than to pursue more productive economic opportunities.<sup>41</sup>

Needs, resources, goals, and social values differ widely throughout China. All residents of a city should be given equal services, but residents of different cities and rural areas may be given different services, and it will be important for the government to build on existing policies to address this issue. In rural education, for example, responding to demographic trends and outmigration, the Ministry of Education launched an aggressive School Merger Policy in 1999.<sup>42</sup>

According to the policy, education officials closed down small, remote schools and focused their attention on improving the teaching and facilities in larger, centralized schools. Boarding schools became important providers of education services in response to the increase in commuting time among rural children. The emphasis in rural schools now is on continuing the improvement in recruitment and retention of qualified teachers.

In rural health, the focus is on the primary care system, which is institutionally and financially fragmented and needs strengthening. The system has a host of often uncoordinated actors, including family planning agencies, maternal child health programs, township health centers for primary and secondary care, village doctors, public health agencies, and others. Funding sources for primary care are also varied and include earmarked vertical program budgets, health insurance, central and local budgets, and user fees. Coordinating these programs and improving the quality of the workforce and their incentives is key, while access to secondary and tertiary medical facilities, when needed, should be facilitated by portable health insurance policies.



## Chapter 4 Sustainability

China's impressive economic and social gains have come at the price of significant environmental degradation and increased resource use. The current urbanization path is not efficient because pollution imposes rising direct and indirect economic costs that are often not reflected in market transactions. Urban sprawl is leading to, for instance, greater energy use for transport and higher costs for energy and water supply infrastructure than in denser cities. Current trends are also not socially inclusive because—while pollution and resource scarcity affect all citizens—the poor are usually most heavily affected and least able to cope. Some also fear that the increased demand from a growing urban population for water and land could undermine China's food security and lead to unacceptably high imports of key products, which could in turn drive up global prices.

China's environmental performance is of global importance. China is now the largest emitter of greenhouse gases in the world, and in the decade up to 2010, growth in greenhouse gas emissions has accelerated (table O.2). That was a result mainly of a slowdown in the reduction of energy intensity in the economy, which fell by a remarkable 6 percent a year on average from 1980 to 2000, a rate that slowed to 2 percent in 2000–10. Beijing, Shanghai, and Tianjin have estimated per capita emissions comparable to large European and some North American cities.<sup>43</sup>

In recent decades China has invested heavily in infrastructure to support environmental management and has made considerable progress in reducing pollution and improving the energy efficiency of its economy. Rapid economic growth has continued to outpace China's ability to control pollution from existing and emerging sources, however, and more needs to be done. Moreover, there is an urgent need to prepare the groundwork for future urbanization to be conducted more sustainably than in the past. How China's cities develop in the future—either as compact dense cities or as large sprawling metropolises—will determine the magnitude

of their carbon footprint and their exposure to pollution. Decisions made today will affect China's cities and the quality of life of its urban residents for generations to come. As China reaches upper-middle- and high-income status, citizens will increasingly demand and expect a clean environment and livable cities, and proactive action is urgently needed. Toward these ends, China should consider environmental sustainability as a policy goal with the same weight as economic efficiency and social inclusion.

Raising the profile—and the effectiveness—of environmentally sustainable policies in China's future urbanization requires that China's green governance match its green ambitions. China has introduced a comprehensive set of environmental laws and regulations, but these have not brought the expected improvements in environmental quality because incentives to enforce environmental policies and complete complementary sector reforms have been lacking. Moreover, sustainability needs to be tackled at the scale in which pollution impacts are felt, which for many resources, such as air, means crossing traditional administrative boundaries and finding regional solutions.

### The cost of pollution in China's cities

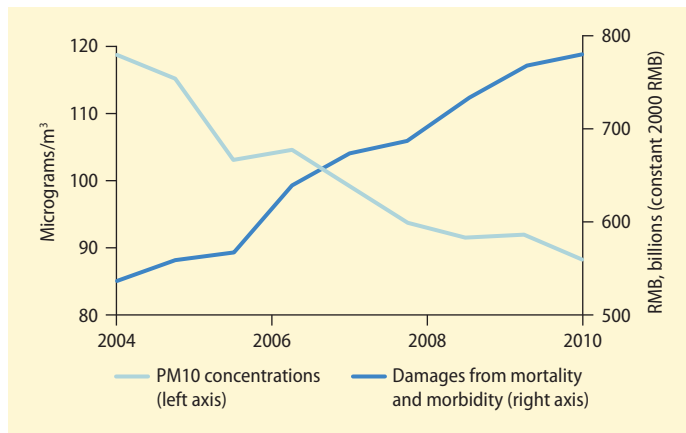
As China prepares for the next wave of urbanization, addressing environmental and resource constraints will become increasingly more urgent because much of China's pollution is concentrated in its cities, and as China's urban population grows, a greater

**TABLE O.2 China's carbon emissions and drivers of growth**  
*Average annual percentage change*

	1980–2000	2001–10
Carbon emissions	4.8	10.1
GDP growth	10.1	10.8
Energy-to-GDP intensity	–5.9	–2.1
Carbon-to-energy intensity	1.2	1.5

Source: World Bank World Development Indicators database.

**FIGURE 0.8** Air pollution declined over time . . . but the costs of air pollution have been rising. Particulate matter pollution and estimated health damages in urban China, 2004–10



Source: Renmin University, n.d. based on China Environmental Yearbooks and World Bank estimates.

Note: PM<sub>10</sub> = fine suspended particulates less than 10 microns in diameter, population weighted city averages.

number of its citizens are exposed to pollution that threatens their health and well-being. The economic and social costs of this exposure are already severe and rising.

Estimates of mortality from air pollution in China are significant. Although average annual concentrations of particulate matter (PM<sub>10</sub>) fell 25 percent between 2004 and 2010 (figure 0.8), mortality rates have been increasing, in large part because 200 million more people now live in cities compared with a decade ago. High mortality levels and other health damages have high economic costs, estimated to range from \$100 billion to more than \$300 billion a year. Moreover, the evidence from other countries suggests there may be a long-term impact for the country because small children and infants are severely affected by air pollution, which leads not only to higher rates of infant mortality, but also birth defects and impaired cognitive functions.<sup>44</sup>

Energy production is a key source of air pollution in China's cities owing to China's dependence on coal, which has remained at around 70 percent of total energy supply in the last decade. Cities host coal-reliant industries, which make up a large share of China's economic structure. Coal use has remained largely stable or even increased in some cities. Total emissions grew in this period, although

concerted efforts have been made to control particulate matter and sulfur oxides.

Water pollution, increasingly from livestock and poultry operations and other non-point agricultural sources resulting from extensive use of pesticides and chemical fertilizers, domestic sewage, and industrial point sources, contributes to China's rising digestive cancer rates (Ebenstein 2012). The Ministry of Environmental Protection (MEP) reported that 57 percent of the groundwater in 198 cities in 2012 was rated "bad" or "extremely bad," while more than 30 percent of the country's major rivers were found to be "polluted" or "seriously polluted," making their waters unfit for drinking or direct human contact.<sup>45</sup> Municipal and industrial solid waste generation increased from about 1.2 billion to 2.6 billion tons between 2003 and 2010.

## Urbanization strains China's resources

Since 1978, total energy use in China increased 6 times to fuel an economy that increased 18 times and an urban population that more than doubled in size.<sup>46</sup> Moreover, the rate with which energy use increased was unprecedented and difficult to predict. By 2005, China had already reached energy consumption levels projected only six years earlier for 2020.<sup>47</sup> Despite significant efforts, total carbon emissions continue to rise. Although subsidies have been reduced in the energy sector, some cross subsidies favoring residential consumers continue to discourage end-use efficiency. While these trends are alarming, there are some positive notes as well. China's economy has become more energy efficient, with energy intensity falling by an average of 4.7 percent a year.

With 20 percent of the world's population but only 7 percent of its freshwater, water scarcity and quality are major problems for sustainable urban development in China—if not the most pressing. Nationwide, the gap between urban water demand and supply is 6 billion cubic meters a year. Some 420 cities have insufficient water supplies; 110 of these are facing severe water shortages.<sup>48</sup> The problem is most urgent in the north, where

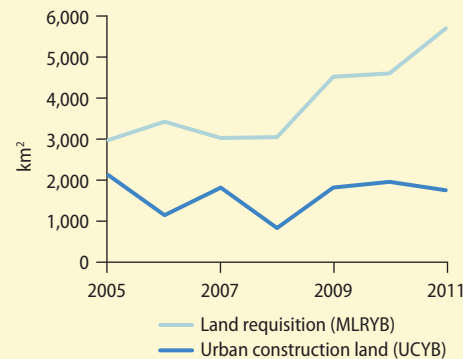


two-thirds of the cities reportedly face water shortages. Water pollution has exacerbated water scarcity, intensifying competition for water resources. The response has been to increase supply by digging deeper wells and building reservoirs or diversion infrastructure, steps that create an array of ecological risks from the loss of river flows, and that are no more than stopgap measures in the face of ever-growing demand. Low tariffs for urban water supply and wastewater reduce the incentives for demand savings and limit the financial sustainability of service provision. Only about 44 percent of urban water utilities generated positive net margins, and only 10 percent of better performing utilities generated net margins above 10 percent.<sup>49</sup>

China's urbanization has consumed significant land resources as urban boundaries are continuously shifted outward and territorial jurisdictions of cities are expanded, primarily through the expropriation of surrounding rural land and its integration into urban areas. Between 2001 and 2011, the amount of land in China classified as urban construction land increased by 17,600 square kilometers, reaching a total area of 41,805 square kilometers in 2011, an increase of 58 percent over the decade (figure O.9). About 90 percent of the demand for urban construction land was met through the expropriation of rural land, while only 10 percent was supplied from the existing stock of undeveloped urban construction land.

Moreover, only considering land classified as urban construction land gives a narrow view of the impact of urbanization on land resources, because the total rural land requisition and conversion into state-owned urban land has been significantly higher. From 2005 to 2011, a total of 27,200 square kilometers of rural land was requisitioned and converted to state ownership. That is, until 2008, roughly 3,000 square kilometers a year were requisitioned. From 2008 onward, annual rural land requisition increased sharply to around 4,460 square kilometers. Much of the new urban land was requisitioned from farmers at low levels of compensation, often not more than 15–20 percent of the prices the converted land fetched on the market. Rural land conversion potentially has implications for China's food security (box O.3). As a result

**FIGURE O.9** Land requisition is outpacing urban land use



Sources: China Ministry of Land and Resources Yearbook; China Ministry of Housing and Rural-Urban Development.

of these conversions, the availability of agricultural land is now close to the 1.8 million mu (120 million hectares), the “red line” that is considered to be the minimum necessary to ensure food security. If urbanization continues to follow current trends, an additional 34,000 square kilometers—an area about the size of the Netherlands—would be required to accommodate the growth of cities in the next decade. If this were to come from agricultural land, the net result would be a drop in the availability of agricultural land below the “red line.” A slowdown in land conversion is necessary: cities should become denser rather than larger, and greater density is also desirable for reasons of efficiency. Moreover, rural construction land is still abundant and, with more rapid migration to cities, could become the main source of new urban land.

Urban sprawl—with the rapid growth of low-density areas at the urban periphery—has led to congestion of transport arteries and contributed to pollution. Moreover, it has increased resource use and carbon emissions in three ways: longer commutes and more private motorized trips have increased urban transport fuel consumption; larger living space per person has led to higher per capita energy use for home heating, cooling, and power consumption; and infrastructure has been used less intensively than it would be in dense urban cores, lowering economies of scale and increasing the capital, operating,

### BOX 0.3 Feeding China's cities

China's urbanization is likely to strongly affect two important aspects of food security: the aggregate availability of domestically produced food, and the access of vulnerable individuals and households to food. Most urban households rely on food purchases; therefore, low-income households that spend a large share of their incomes on food can be vulnerable to increases in the availability and prices of staple foods.

Achieving domestic self-sufficiency in major food grains has been one of China's strategic policy priorities, and as a result, China has had limited dependence on global food markets to date. China's agricultural sector has performed well, shifting from relatively low-value to higher-value agriculture products, largely consistent with resource endowments and comparative advantage. Grain yields have increased continuously since 2003; however, annual yield growth is diminishing. In 2012, grain output reached a record yield of 590 million tons. Per capita grain production reached 425 kilograms, above the 400 kilogram grain security line.

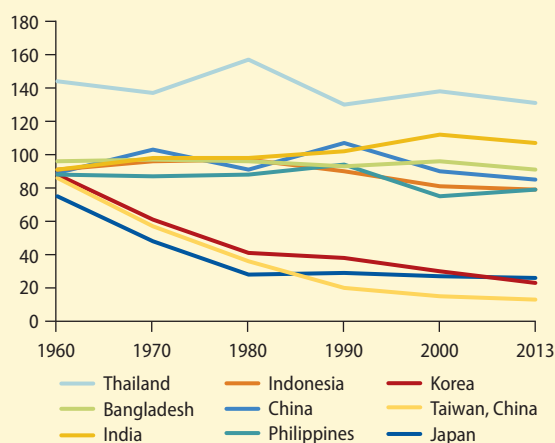
As China becomes more urbanized, it is likely that it will become more dependent over time on imports of (especially land-intensive) farm products, in particular as the comparative advantage of labor-intensive farming of grains diminishes. International comparisons reveal striking differences between countries in the extent to which food imports as a share of total consumption have evolved. Most lower-income countries have maintained close to 100 percent self-sufficiency (when rice, wheat, maize, and soybeans are considered together), but the ratio has declined sharply in the higher-income East Asian economies despite protectionist policies (figure BO.3.1).

The structural changes that are occurring in China—demographic changes in which rising wage rates in nonfarm employment are drawing labor from agriculture, changes in diets and consumption patterns, emergence of environmental supply constraints (land, water), transformation of rural factor markets, transformation of food supply chain, market and distribution systems, and agricultural technology and farm scale changes—will impact China's food production and food availability. Currently, China's food production is limited by water scarcity and, to a lesser extent, the availability of land; however, a new constraint—labor—is now on the horizon.

As China's urbanization increases, overall demand for food is likely to increase because the demand for higher-cost foods such as fruits, vegeta-

bles, and animal products rises much more rapidly with income growth than demand for basic food staples such as rice and wheat. These goods require much higher levels of intermediate and factor inputs than basic staples, particularly for livestock products given the inefficiencies of feed conversion. If

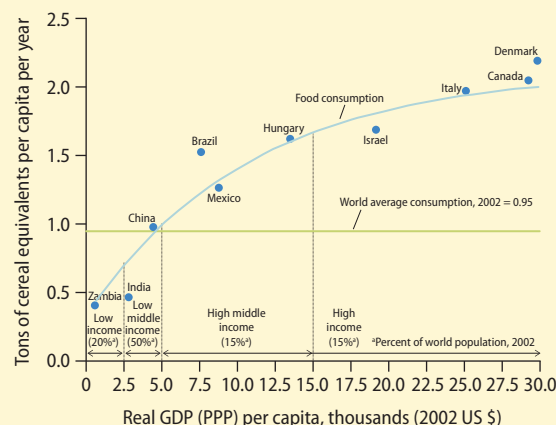
**FIGURE BO.3.1 Self-sufficiency ratios for grain in Asian countries**



Source: USDA 2013.

Note: This graph shows the total for rice, wheat, maize, and soybeans.

**FIGURE BO.3.2 Food consumption in energy equivalents and income**



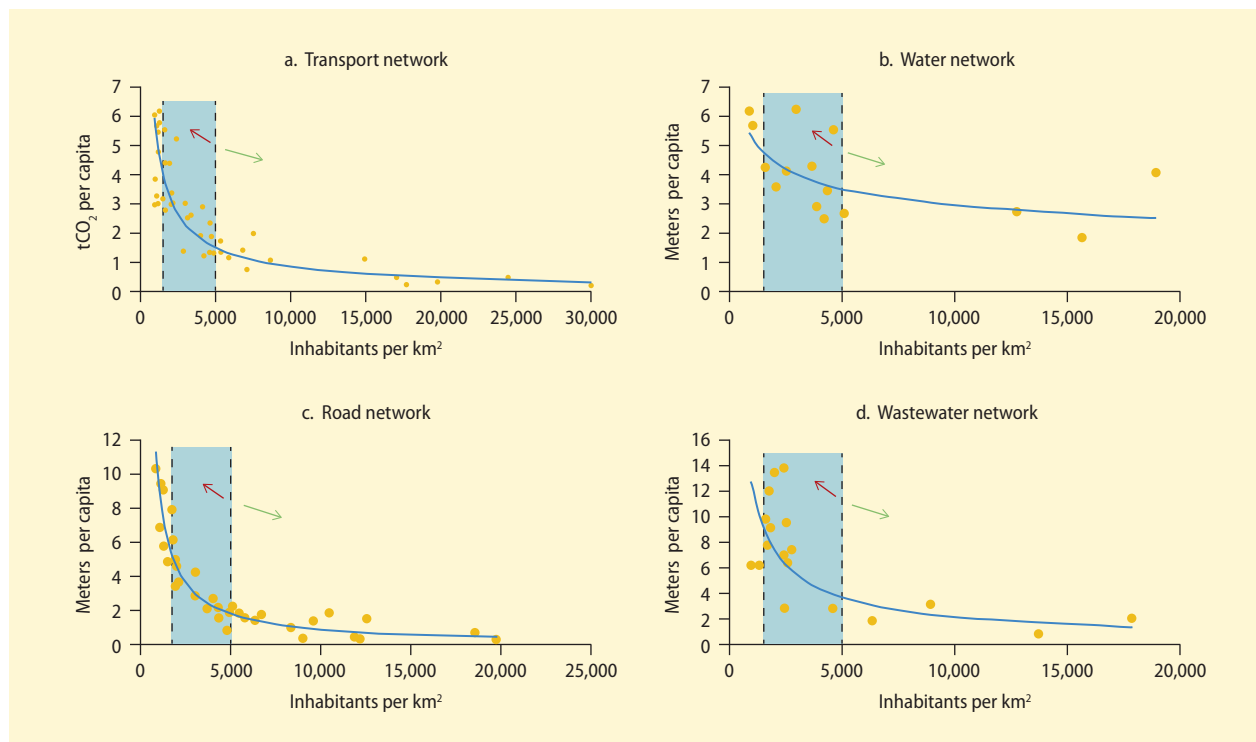
(Box continues next page)

**BOX O.3** (continued)

all types of food are converted into a common basis using food conversion ratios that take into account the efficiency of conversion of grains into livestock products, the relationship between real incomes and food demand depicted in figure BO.3.2 emerges.

China's food consumption in cereal equivalents is currently about 20 percent above the world average level. More important, demand is likely to grow considerably as China reaches middle- and high-income status.

**FIGURE O.10** Impact of urban density on carbon emissions for transport and infrastructures: road, water, and wastewater network lengths



Sources: Salat and Bourdic 2013; and Müller and others 2013.

Note: This graph represents a variety of cities in developing and developed countries.

and maintenance costs for infrastructure services (figure O.10).

### The global context of China's urban sustainability

Practically all industrial countries have passed through a phase of excessive urban pollution. London's "great smog" event in

1952 may have killed more than 10,000 people over four December days. Smog levels in Los Angeles are down 70 percent from the 1970s, and high ozone advisory days dropped from 184 to close to zero. Tokyo's campaign for cleaner air centered on the visibility of Mount Fuji: the mountain could be seen on only 20 days a year in the 1960s compared with well over 130 days today. In all cases, it took a package of regulatory

measures implemented over decades to bring the situation under control.

Given the size of China's population and economy, its structure, and the speed of its development, the country's environmental problems are on a larger scale than those experienced by other countries. But being a late developer also has advantages. China can benefit from experience and technology from elsewhere and reduce pollution faster than was possible for earlier developers. Much of the research on air pollution sources, impacts, and abatement options was developed in North America and Europe over many decades and can be deployed more quickly and cheaply in China. Some of the benefits of technology and management are already apparent, and China has also produced indigenous solutions that can be shared with countries facing similar challenges.

Green urbanization in China is of global interest. Greenhouse gases increase the probability of global climate change. North America and Europe still exceed China's cumulative historical emissions, but, according to data from the International Energy Agency, China's per capita CO<sub>2</sub> emissions from fuel combustion are still rising and are likely to reach the European Union (EU) average by 2015.

In contrast to experience elsewhere, a large share of China's pollution came initially from the relocation of dirty industries that were being phased out in developed countries. One estimate suggests that exports account for about one-third of China's energy use and likely a similar share of air pollution.<sup>50</sup> In the future, by shifting toward a growth model more reliant on services and consumption, China will be able to pollute less on behalf of other countries. On the other hand, similar shifts in polluting industries also appear to be replicated within China between coastal and inland areas.<sup>51</sup>

## Environmental regulations and governance

Recognizing that resource depletion and pollution have become costly barriers to further development, China's leaders have set

ambitious targets for controlling both. The comprehensive set of targets, laws, and regulations has not brought the desired improvements in environmental quality because most environmental policy making has favored narrow technical and engineering solutions over institutional and economic approaches. The main causes of China's environmental problems are institutional rather than technical.

The considerable inertia in China's environmental management can be addressed through a strengthened accountability and incentives framework. As a first step, regulations with strong enforcement are needed. Currently, enforcement of China's environmental regulations is often weak because local cadres face inadequate incentives to put policies into effect and to complete complementary sector reforms. Even when the regulations are enforced, their implementation is often inflexible, causing unnecessary costs. Although, government spending on environmental management has been similar to that of OECD countries and has increased over time, spending should be about 0.5 percent of GDP more than current levels.<sup>52</sup>

In addition to strengthened enforcement, China needs to ensure that the pricing of energy, water, and other resources reflects the cost of their provision. Moreover, prices should include the indirect costs imposed on health, ecosystems, and the climate by the production of resources and by their use.

Improving urban sustainability requires a multisector and, in many cases, multijurisdictional approach, which is currently underdeveloped. Structural shifts in the economy toward cleaner sectors will help in the longer term. Greening sector policies require better coordinated national and local level decisions, often across several agencies. More comprehensive planning at the city level will support sector reforms. For instance, urban sprawl—which raises the cost of public service provision and locks in wasteful energy consumption—can be avoided through integrated urban land use, transport, and energy planning that reshapes urban form.

In larger urban clusters, air and water quality management strategies must operate at a regional scale to account for all relevant pollution sources and to identify cost-effective

regional abatement plans. Building regional institutions will take time but can be started with interjurisdictional mechanisms like the “joint decision-making conference” in the Hai River Basin. Such mechanisms have been used in China and have built up the trust needed to develop interjurisdictional solutions.

The channels for citizen involvement, including through environmental nongovernmental organizations (NGOs) and the legal system, are still inadequate, in part because

of limited access to information on the performance of environmental management authorities and polluting activities of firms. Without green governance—a strengthened accountability and incentives framework—China will find it difficult to align its sector reforms with its green ambitions. The challenges are daunting but not insurmountable in the long term, and if addressed, can bring about cities that are not only great places to work but also great places to live.



# The Reform Agenda

## Chapter 5 A Strategy for Reform

China's leaders have called for a new model of urbanization that would support relatively high but more efficient growth, share the benefits of urbanization more widely, and be environmentally sustainable, while safeguarding China's food security.

### A reform package

Achieving the new model of urbanization requires a comprehensive reform package centered around four priority areas—land, hukou, the fiscal system, and the incentive system for local governments—supported by the reform of social policies and service delivery, urban planning, and environmental management. In all of these areas, China has already made considerable progress, and at the local level many ongoing experiments deserve consideration for mainstreaming. China can also build on the experience of other countries that are rapidly urbanizing, or did so in the past, such as Britain and the United States in the nineteenth century, and Germany, Japan, and Korea more recently.

Land policies determine the density and spatial efficiency of cities, which in turn drive environmental sustainability and livability. Land policies also determine the extent to which farmers can share in the wealth unlocked by higher-value use of land, which could narrow urban-rural income and wealth disparities. More efficient use of land will require stronger property rights for farmers, higher compensation for land requisition, new mechanisms for converting rural land to urban uses, more flexible use of existing urban land through better planning and zoning, and urban land allocation that is driven by market prices.

Hukou reforms are needed to promote better use of labor through the removal of

barriers to labor mobility—from rural to urban areas, but also from city to city. If people are to move to where they are most productive rather than to where they can receive better services, they should expect to receive similar public services wherever they are, while retaining their accumulated rights to social security. To achieve this, the hukou system would need to evolve into a residency system with increasingly unified rules for access to services. Over time, cities and rural areas alike should be in a position to deliver at least a minimum standard of public services to any resident, irrespective of their place of origin.

The fiscal system needs reform to accommodate the proposed changes in the land and hukou systems. Land has been a large source of government revenue in the recent decade—on average, some 5.5 percent of GDP in gross revenues and 2.5 percent after compensation and land sale preparation costs. More efficient urbanization will require governments to focus on better managing existing urban land rather than acquiring new urban land. As a result, a reduction in revenue from rural land conversion is expected. At the same time, demands on city finances will increase as local governments provide public services to migrants and their families. Fiscal reforms should therefore provide resources for municipalities to continue to grow, together with the discipline to grow efficiently.

A stronger local tax base and more regular and strictly regulated access to borrowing are critical. Rationalization of the distribution of expenditures over different levels of government—specifically, centralization of social security finances—would relieve local budgets of some spending obligations and enhance labor mobility. Over time, the intergovernmental fiscal system would have

to ensure that any local government—rural or urban—can provide the minimum standard of services that the central government seeks and the nation can afford. Local government borrowing, if properly regulated and monitored, should better match the payment for capital projects with the life of the infrastructure asset. The use of informal financing methods, such as local investment companies, should be reduced.

Changes in land, hukou, and fiscal policies would need to be underpinned by a change in the incentive structure for local government decision makers. The government personnel system that rewards local leaders' success based on national development goals already includes quality of life indicators in health, culture, education, and the environment, and important targets such as birth control and social stability, but the main focus has continued to be on the more easily measurable goal of annual GDP growth. Rebalancing the evaluation criteria toward social and environmental objectives that match the new model of urbanization will be necessary for success. Further, greater participation of China's citizens in the urbanization process would enhance accountability of local governments and ensure that policies will be more responsive to local needs, which would minimize social unrest. In some areas, China has a relatively mature system of citizen involvement; expanding this participatory approach across the spectrum of urban policies could be considered.

The main benefit of reforms will be higher-quality growth. The reforms proposed in this report—specifically land, hukou, and fiscal system reforms, and a change in the incentives for local governments to attract investment—will make the allocation of land, capital, and labor more market based. That in turn will change the distribution of economic activities across China's urban landscape. Accelerating the shift of industrial activities to secondary cities where land and labor are cheaper would provide a stronger economic basis for those cities and promote small and medium-size cities. At the same time, this shift in industrial activities would also reduce migration pressures on the largest

cities, which would increasingly specialize in high-value services and innovation and attract higher-skilled labor rather than a low-skilled industrial workforce.

Land reforms would improve the efficiency of rural and urban land use and increase the compensation rural residents receive from land conversion, thus improving the distribution of income and wealth. Land reforms will also likely lead to denser cities, which would reduce the energy intensity and car use in cities, thus improving environmental sustainability. And reduced land use for urbanization would make more land available for environmental services and agricultural production.

Hukou reforms and reforms in public services would increase the mobility of workers across China and increase their productivity and wages. It would also accelerate rural-urban migration, which combined with land reforms, would accelerate agricultural modernization and increase rural incomes, thereby reducing rural-urban income inequalities. More equal public service delivery across China would increase equality of opportunity for all China's citizens. Better access to housing finance for migrants would allow them to acquire urban property and benefit from capital gains, thus reducing growing wealth disparities.

Fiscal reforms would generate the revenues to finance a minimum package of services across China and reduce the need for land-based financing, while limiting the risk to the financial system resulting from unregulated local government borrowing. Fiscal and financial reforms would also impose more discipline on local governments, thereby reducing the wasteful development of ghost towns and empty industrial parks.

## A vision for China's new urban landscape in 2030

China's initial conditions for the next phase of urbanization are vastly different from three decades ago. China is now an upper middle-income country, the largest manufacturer and exporter in the world, and it



is on the cusp of a development stage in which efficient use of resources will be more important for growth than simply mobilizing resources. China's cities today are much larger than they were 30 years ago, with the largest rivaling the biggest agglomerations in the world—including London, New York, Seoul, and Tokyo. China's cities are now far better connected to the rest of the world and to other cities in China, due in part to a massive investment in infrastructure in the past two decades and to a long period of opening up, crowned by entry to the World Trade Organization (WTO) in 2001. These developments provide a strong basis for efficient urbanization, allowing agglomeration effects and specialization to contribute to productivity increases and growth.

As China implements the new model of urbanization, a different urban landscape will emerge. China will continue to urbanize rapidly, with urban residents accounting for almost 70 percent of the population by 2030 in a reform scenario, bringing the country's urbanization rate in line with expectations that are based on its level of income. That implies, however, that the speed of China's urbanization rate will slow in the next two decades, even though there may be an initial spurt in urban population soon after reforms are implemented, as migrant families are reunited in urban areas. Moreover, income growth will also likely slow in the next two decades (table O.3), but it will be slightly

higher, and considerably more balanced, in a reform scenario compared with business as usual. The main drivers of more rapid growth under reforms will be the higher rate at which people move from rural to urban areas and among cities, and the higher productivity in more efficient cities.

As China's labor market tightens, consumption is likely to grow faster than investment because the share of labor in the economy will rise as wage growth outpaces productivity growth. This growing demand includes consumer demand from an expanding middle class—those that earn \$10–\$100 per capita a day (at 2005 internationally comparable prices). This group now makes up almost a quarter of China's population and more than 40 percent of its urban population—although its size still lags behind that in other countries at China's current level of GDP.<sup>53</sup> Labor scarcity in rural areas will catalyze land consolidation and the rapid dissemination of new production technologies. That will increase labor productivity, and wages in rural areas will thus rise more rapidly than in urban areas, thereby reducing urban-rural income disparities. With higher incomes, the services sector is likely to overtake manufacturing as the main driver of growth, constituting more than half of GDP by 2030. Urban areas will create the scale of demand for an increasingly diverse supply of services. The services sector's share in the economy will rise

**TABLE O.3 China's urbanization scenarios**

	2010	2030 baseline	2030 reforms
Urbanization rate (percent)	52	66	70
Share of labor force in agriculture (percent)	38	17.1	11.6
GDP (trillions of 2013 US\$)	8.5		24.5
GDP (average annual growth past 5 years)	8.3	4.9	5.2
Total factor productivity <sup>a</sup> (average annual growth over past 5 years)	2.2	2.1	2.5
Consumption share of GDP (percent)	46.5	62.0	66.5
Investment share of GDP (percent)	48.8	35.5	30.9
Secondary industry share of GDP (percent)	48.8	37.2	33.7
Tertiary industry (services) share in the economy (percent)	41.8	58.5	60.6
Urban-rural income disparities (ratio)	3.8	3.3	2.6
Energy consumption per GDP (Tce/RMB 10,000)	1.41	0.73	0.64
Carbon dioxide emission per GDP (ton CO <sub>2</sub> /RMB 10,000)	3.32	1.68	1.39

Source: Based on DRC CGE Model simulations.

Note: The industry structure is based on input-output tables, hence the structure is slightly different from one reported by the Statistical Yearbook. All data are from 2010, except for the third row (GDP), which is from 2013.

a. Including gains from reallocation of labor and capital across sectors and ownership forms.

because of higher demand for services and because productivity increases in services are likely to lag behind those in manufacturing, increasing their relative price.

Under the reform scenario, by 2030, China will display a more diverse landscape of cities because urbanization will not be uniform and will reflect the comparative advantage of individual cities. In China's most developed cities, the services sector—rather than industry—will play a larger role in growth, because cities are fertile ground for the development of more sophisticated, higher value-added services. The largest cities within urban agglomerations such as Beijing, Guangzhou, and Shanghai have grown rapidly in recent years, serving as gateways to international markets, and this trend is likely to be reinforced by reforms. These agglomerations will provide the urban diversity that encourages learning in universities and business districts and that connects people to the rest of the world.

Secondary cities that are part of metropolitan areas, especially those in coastal areas, will increasingly attract land-intensive manufacturing and will offer producers the benefits of specialization and low transport costs near the larger cities with their large markets and links to international markets. China's large inland cities, most of which are currently outside major development clusters, possess human capital and amenities that will serve as a foundation for economic development. Easier access to international markets and reduced freight costs will help these cities compete with coastal cities. Hinterland cities and rural towns will allow firms and farms to exploit plant-level scale economies by providing roads for moving inputs and outputs and schools for the families of workers. They would focus on public service delivery and preparing people for opportunities elsewhere.

Exactly how this new urban landscape will take shape is impossible to predict with certainty, but if international experience is any guide, China's largest coastal cities will continue to grow more rapidly than the average of all China's cities, while the population share of small cities will likely decline. Cities of any size that are part of the main

agglomerations are likely to thrive, along with those connected to these agglomerations. Cities along China's main transport corridors will be particularly well positioned to take advantage of efficiency gains through specialization. International experience as well as China's own past suggests that public policy that fights these trends—which are driven by the choices of individuals and firms—is unlikely to succeed. Or, if such policies did succeed, it would be at the expense of efficiency and income growth.

### China can afford its new urbanization model

China can afford a more efficient, inclusive, and sustainable urbanization. Simulations from a detailed model developed for this study suggest that the overall costs of urbanization will gradually decline as a share of GDP.<sup>54</sup> These simulations assume that the costs of delivering infrastructure and social services to migrants at urban standards is additional—in other words, that spending in rural areas (where the migrants originate) does not decline as a share of GDP (table O.4). The total annual costs of all urban public services, infrastructure, and social housing would average 6.1 percent of GDP in 2013–30, with a peak of 7.3 percent in the early period (2013–17) due to migrant integration and the government's ambitious social housing program. On past trends, nearly three-quarters of this cost would be paid by the government through infrastructure development corporations and finance vehicles. Model simulations suggest that these costs are affordable for the government because additional revenues from a property tax or alternative sources of revenues will be able to cover the spending needs on aggregate without increasing total government debt to GDP.

In the reform scenario, denser cities require less investment in infrastructure—notably in roads. Lost revenues from rural-urban land conversion would be more than compensated by the introduction of a property tax on urban residential property and the appreciation of existing urban land values. Significant

**TABLE 0.4 Urbanization costs and fiscal space: Baseline and reform scenarios**

% GDP

	Baseline scenario				Reform scenario		
	2008–12	2013–17	2018–30	2013–30	2013–17	2018–30	2013–30
<b>Urbanization costs (CAPEX and OM)</b>	<b>8.6</b>	<b>7.3</b>	<b>5.6</b>	<b>6.1</b>	<b>6.8</b>	<b>4.9</b>	<b>5.4</b>
<b>Infrastructure investment</b>	<b>3.5</b>	<b>2.7</b>	<b>2.5</b>	<b>2.5</b>	<b>2.1</b>	<b>1.7</b>	<b>1.8</b>
Roads	1.9	1.4	1.2	1.3	0.9	0.7	0.7
Subways	0.5	0.6	0.6	0.6	0.6	0.6	0.6
Draining	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Sewage	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Landscaping	0.4	0.3	0.2	0.2	0.2	0.1	0.1
Garbage treatment	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Heating	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Social services</b>	<b>5.1</b>	<b>4.6</b>	<b>3.1</b>	<b>3.6</b>	<b>4.8</b>	<b>3.2</b>	<b>3.6</b>
Social housing	2.0	1.4	0.5	0.7	1.4	0.5	0.7
Education (includes labor costs)	3.1	3.2	2.6	2.8	3.3	2.7	2.8
Health	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Central and local governments</b>							
<b>Fiscal space</b>	<b>33.3</b>	<b>31.8</b>	<b>30.4</b>	<b>30.8</b>	<b>29.8</b>	<b>29.9</b>	<b>29.9</b>
Fiscal revenues	25.0	26.5	25.9	26.0	26.7	26.7	26.7
Net borrowings	8.3	5.3	4.5	4.7	3.1	3.3	3.2
<b>Total expenditure</b>	<b>31.9</b>	<b>31.1</b>	<b>29.6</b>	<b>30.0</b>	<b>30.5</b>	<b>28.3</b>	<b>28.9</b>
Recurrent primary expenditures	23.6	23.6	23.3	23.4	23.6	23.2	23.3
Capital expenditures	6.0	4.7	3.4	3.8	4.3	3.0	3.4
Interests	2.3	2.9	2.9	2.9	2.6	2.1	2.2

Source: World Bank/DRC/MOF projections done for this study.

Note: CAPEX = capital expenditures; OM = operations and maintenance.

reforms in the fiscal system will be needed to change the incentives for local government, adjust the local tax base and intergovernmental fiscal system, and provide local governments with regulated access to borrowing. The reform scenario assumes that there will

be reforms in land policies and in local government borrowing, and not the abolition of all land revenues and borrowing. Without any local borrowing or land revenues, the fiscal space would not be sufficient to cover spending for urbanization.

## Chapter 6 Reforming China's Land Management

### The context of the reforms

Land lies at the heart of China's urbanization challenges and is the highest priority for reform. To improve the efficiency of China's future urbanization, land management reform would lead to more efficient and denser cities, contain urban sprawl, and reduce the environmental impacts of urbanization. Strengthening property rights on rural land and clarifying collective ownership arrangements would also increase the compensation that accrues to farmers in land transactions, thus making urbanization more inclusive. Better use of urban land would reduce the need for land conversion and unlock new sources of revenues for cities. Reform needs to guarantee the long-term supply of land and financing for urbanization, based on transparent and voluntary market transactions and taxation. Land reform should be closely coordinated with hukou, social services, and fiscal reforms.

China has significantly modernized its land tenure framework over the past decades, although the long-standing dual tenure system of collectively owned rural land and state-owned urban land has remained unchanged. Whereas property rights on both urban and rural land have been strengthened, rural citizens still remain at a significant disadvantage because of remaining ambiguities about land ownership and property rights of the state, rural collectives, and individual farmers, and how these stakeholders interact in the process of urbanization, especially during the monopolistic conversion of rural land by local governments. Within cities, government-led allocation and land management have led to underutilization of land and a bias toward industrial land at the expense of residential and commercial land.

Reforms should aim for a more modern approach to land management in both rural and urban areas. The priorities for achieving this are clarifying, titling, and registering rural land rights; introducing new arrangements for the transfer of collective land for

urban construction purposes and rural land expropriation; developing mechanisms for better benefit sharing of land value; integrating urban-rural land use planning and land allocation and the redevelopment of "urban villages"; and modernizing urban planning and land management.

The decisions of the 3rd Plenary of the 18th Congress of China's Communist Party of November 2013 provide a framework for land reforms. The framework includes fostering a unified rural-urban construction land market, clarifying and enhancing rural land rights, and setting up new institutional arrangements for land in rural and urban areas. Reforms provide an opportunity to build on past achievements, harmonize the regulatory framework for urban and rural land, and modernize the land system to support more efficient and inclusive economic growth and urbanization.

In implementing a more market-driven approach, aside from the responsibility of planning, zoning, and registering the transactions, government should closely supervise experiments in this direction to ensure that the stronger property rights on rural land are respected and that corruption in transactions is avoided. Consultation, publicity, and transparency can also provide protection against abuse.

### Strengthening property rights

The tenure of rural land rights needs to be lengthened and automatic renewal legalized. Farmers' 30-year farmland rights remain subject to significant uncertainties in the form of involuntary transactions for agricultural and nonagriculture purposes, compulsory takings, and uncertainty over whether farmland rights can be extended upon expiration of the second 30-year term. Under China's Property Law, farmland rights may be extended when they expire. But this extension provision is weaker than the parallel provision on urban land, which allows the automatic renewal upon expiration of the current term. The different treatment of the length of tenure rights

for rural and urban land conflicts with the effort to improve the long-term tenure security in rural areas.

The 3rd Plenary Session of the 17th Central Committee (2008) stated that rights to farmland should be for “long term without change.” The 3rd Plenary Session of the 18th Central Committee (2013) reiterated and confirmed the policy direction of strengthening farmers’ property rights to land. The “long term without change” would have to be defined and clarified in the law through revisions to the Land Management Law, Property Law, and Rural Land Contracting Law. Equally important is to specify the nature of the contractual rights to farmland, including defining the right to occupy, profit, transfer, mortgage, and bequeath the land. Finally, explicit provision should prevent the reallocations of farmland within the tenure period through the collective entity.

Property rights of farmers need to be better documented through enforcement of written land leases, establishment of a register of land titles, and a system for recording land transactions. This documentation would enable enforcement of use and contract rights, help to resolve land-related disputes, and identify those whose lands are affected by land requisition. In addition, a reliable and complete inventory of land parcels would provide a foundation for monitoring land tenure security, land use planning, land allocation and conversion, taxation, and land market development. After several years of piloting various approaches in some localities, Document No. 1, 2013, now calls for a program to document and register farmers’ land rights throughout the country.

A land registration system based on unified rules, standards, and procedures in the land rights registration process should be developed over time. Along with the establishment of the land registry, unified land classification standards need to be developed and applied to all types of land. Following international best practice, the currently scattered administrative responsibilities for rights and property registration for different types of land should be consolidated into one. Additional considerations should be given to how to move from the current cumbersome

system of registering all land plots of a household on one single document toward a system where individual plots are registered separately. A registration and documentation system based on land parcels would simplify and facilitate future land transfers. Legal reform should also explicitly require registering both husband and wife as household representatives to improve gender equity in future land registration.

Reform of collective ownership of collective assets needs to complement the reform of property rights to farmland. Collective ownership has become ambiguous since the introduction of the Household Responsibility System in 1978 and subsequent policy changes strengthening household land rights. Collective ownership is often incorrectly perceived as ownership by the collective administrative entity. The Property Law has sought to clarify this relationship and authorizes the collective administrative entity, such as the administrative village, natural village, or villager group, to exercise ownership rights on behalf of the collective members. Nevertheless, collective entities retain control over farmland contracting, exercise power to take a farmer’s land, and often manage collective assets, including land and nonland assets, to generate profit for the collective entity rather than for collective members.

Legal reform should clarify that all collective assets belong to the members of the collective business organization and not to the collective administrative entity itself. Where collective property is converted into shares, those shares should be distributed to the members. Reforms should further seek to reduce intervention by the collective administrative entity in the operation of collective business organizations and to strengthen transparency in the distribution of profits made by the collective business organization.

Membership and qualifications for becoming a collective member, and procedures for terminating collective membership, need to be further clarified in the law. Because the legal criteria under which a person becomes a member of the collective are unclear, approval or disapproval of a membership application is currently subject to the collective’s discretion. One approach to clarifying

collective membership and to protect ownership rights of collective members would be to define a cutoff date after which a rural citizen moving into a community is no longer eligible to become a collective member or owner of collective assets. Such arrangements would prevent the dilution of collective assets under conditions of demographic change.

The member rights associated with collective property should also be clarified. Rights to collective assets include the rights to occupy, use, profit, transfer, mortgage, guarantee, and bequeath. The transfer (sale) of shares to collective property would allow members to leave the collective permanently. Clarification of issues around the inheritance of shares to collective assets is also needed. In some localities, women who marry into households, and children born after 1978, cannot inherit shares, and therefore cannot receive dividends when the shareholding member of the household dies. This issue may become increasingly critical as shareholding members pass away or move their residential registration outside the collective. Their shares would eventually go back to the collective instead of being retained within the household.

## Reforming the rural land expropriation system

Legally defined limits need to be placed on rural land taking by local governments for public purposes. Defining “public interest” for which the state can exercise its eminent domain power is a decision about balancing the legitimate but often competing policy goals and interests of various stakeholders. The reform of the rural land expropriation regime should follow the precedent of the Urban Takings Regulation of 2011, which defines public interest by listing all foreseeable categories of public interest. For rural land, defining public interest using the same procedure would remove the current legal dualism and inconsistency that weaken the rights of China’s rural citizens. A meaningful definition of public interest, both for urban and for rural takings, should be included in the revised Land Management Law.

Land for public infrastructure development and social purposes could still be acquired through expropriation, but controls need to be put in place to ensure that the land acquired is not used for commercial purposes, and that the scale is much less than in the past. Complementary reform is needed to fine-tune the political incentives at the local government level to decouple performance evaluation and economic growth. For example, a current mayor would face fewer incentives to convert excess quantities of land and promote investment if revenue generated from such land conversion could only be invested several years later.

Compensation for rural land conversion for commercial (nonpublic interest) purposes should be increased up to the amount of the commercial value of the land, with deductions for the costs incurred by local governments for preparing the land for non-agricultural use. Under the current regime, compensation packages are capped at 30 times the land’s average annual agricultural output value. This maximum is often insufficient for expropriated farmers to sustain their livelihoods. Here again, the reform of the rural expropriation regime could follow the principles of the Urban Takings Regulation (and rules applied in several provinces).

The protection of farmers’ procedural rights during land expropriation should be embodied in the law. China’s procedural laws for rural land expropriation are inadequate, but central policies on improving farmers’ procedural rights and the Urban Takings Regulation provide guidance for developing relevant provisions on procedural rights, including the right to notice, right to participation, and right to appeal. Clear provisions for public hearings on land taking would increase transparency and limit the scope for abuse.

The government may consider introducing the experiences from Taiwan, China, where local governments have the option to rezone rural land for urban development and can allow commercial developers to conduct land transactions directly with rural property rights holders while ensuring urban land supply and financial balances. Transactions are subject to the provision of urban master plans and include transparent



public consultation. This practice has been instrumental in limiting excesses in development, while maintaining support from farmers who enjoy large increases in the value of their converted land (box O.4). International experience with land value capture could also inform this policy reform (see chapter 8, “Reforming Urban Finance”). This model may provide an applicable approach to balance the property interests of collectives and farmers in peri-urban areas with the need for the government to provide and finance public infrastructure. A new zone-taking law could permit urban development of a commercial nature, whereby farmers affected by the change in land use benefit in two ways: (1) they receive part of the now urban land and can benefit from its development; and (2) they would be protected by stronger legal and procedural safeguards in expropriation.

## Developing rural construction land markets

Alternatives to the currently dominant method of land conversion by local governments are needed. A more market-driven approach to land conversion has several advantages, including a more efficient allocation of resources and reduced social tensions. Following strict government regulations, wasteful conversion of land would be avoided because conversion would take place only if a private developer considers conversion a profitable venture and the collective sees benefits in the transaction. The purchase and development would take place at a time and at a price supported by the market. Furthermore, social tensions and conflict with local government would be minimized, because the government would not be a party to the transaction, and the price would be set by the market. The market price would likely also be higher than the compensation usually offered in government-led conversions.

In line with plans and regulations of land use, collective organizations can use land for collective nonagricultural industrial and commercial activities, but under the current law, they cannot lease collective construction land to noncollective entities for commercial

or industrial development. Furthermore, the rights to rural homestead land are limited: with strong emphasis on collective membership, farmers only have the right to occupy and use land, but not the right to profit from it. In reality, large amounts of collective construction land have also entered the urban market illegally, particularly in China’s eastern coastal areas and large cities. Land market development and deepening in both urban and rural areas and the integration of rural and urban construction land markets will be essential to ensure land availability for urbanization, facilitate integrated rural and urban development, and gradually replace current practices of government-led land requisition and conversion toward more efficient market-based allocation of land.

There is growing consensus that collective rural construction land should be allowed to enter the urban market directly. Many localities, including Anhui, Chengdu, Chongqing, Guangdong, Jiangsu, and Zhejiang, have already experimented with innovative measures to let collective construction land be leased, transferred, or mortgaged. Because of current legal prohibitions, however, collective construction land cannot enter the urban land market formally, and such efforts remain at the level of piloting and experimenting. Building on the experiments, China could consider revisions to the Land Management Law and Property Rights Law to clarify the equal market entry of collective and state construction land. Eventually, regulations should clarify which land will be allowed to enter into the urban construction land market, in what ways, and how benefits could be shared. Collective construction land that has already entered the urban market in the past should be classified, integrated into urban master plans, and managed according to the law.

Rights to homestead land need to be strengthened and clarified. Homestead land is unique in China’s rural land property rights system. According to the law, only collective members are entitled to homestead land with one plot per household. The law does not allow transferring or leasing of rural residential land. In reality, homestead land has been leased and transferred in many regions, and reforms need to take into account the law

### BOX 0.4 Expropriations in Taiwan, China

In 1953, the Land to the Tiller Act abolished the tenancy system in Taiwan, China, through compulsory local authorities' purchase of land from landlords and resale to the tenants. By 1956, the total area of owner-operator farming had increased from less than 50 percent of total farmland in 1948 to over 85 percent. The government protected private tenure following the land reform, through legal protection, a broad publicity campaign to improve farmers' awareness of laws and government policies, and a government-led annual survey to closely monitor the implementation of the land reform program. In the subsequent process of urbanization, authorities took measures to control the use of land for urban purposes and facilitate non-farm development by farmers themselves.

Taiwan, China, takes a listing approach to define the circumstances under which private land can be expropriated. "General taking" refers to the expropriation for public interest. "Zone taking" refers to the expropriation and conversion of private farmland to nonfarm use for the development of new urban areas; renovation of old urban areas; conversion of farmland in planned urban zones into construction land or conversion of industrial areas into residential and commercial areas; development of nonurban land; rural development for improving rural public facilities and public health; and other uses in accordance with relevant laws. General and zone takings are subject to different procedural and compensation laws.

For general taking, until recently, the compensation standard was the tax assessment value of the agricultural land. Each year, the local land administration bureaus publish assessed values for farmland. This standard was replaced recently with a market value standard based on recent comparable agricultural land market transactions. The taking procedures are relatively simple and include a public hearing, public announcement of the taking decision for 30 days, written notification to the affected landowner, a 30-day filing period with the local land administration in case of dispute over compensation, appeal of the local decision to a land price review committee, and filing administrative litigation with a court.

Zone taking, in contrast, represents the *de facto* permission of the local authorities to take private property for commercial purposes with landowners

being entitled to higher compensation and better procedural safeguards than at present. Landowners can claim a monetary compensation based on the market value of the land's agricultural use or, alternatively, take back 40–50 percent of the expropriated land as offset land. Such offset land is the previous farmland that has been converted into higher value urban construction land. The landowner may also select a compensation scheme in which one part of the compensation is paid in cash and one part with offset land.

Procedurally, the local authority is required to purchase land from landowners through negotiation before launching a zone-taking procedure. If negotiations fail, the local authority may resort to zone taking. Prior to taking, the local authority must conduct public hearings to explain compensation modalities to the affected landowners. Where landowners choose compensation in the form of offset land, these owners have first choice on the location of the offset land within a designated construction area. Landowners are also given the opportunity to negotiate the exact compensation ratio (between 40 and 50 percent) to be applied.

Under zone taking, the local authority is required to set aside a portion of the expropriated land for public facilities such as schools, roads, and public utility facilities. Although there is no legal requirement with respect to the ratio of such public facility land, in practice, 40–50 percent is for public use. After deducting 40–50 percent of land as offset land, 40–50 percent as public use land, the local authority receives 10–20 percent of the expropriated land for sale to developers. To prevent irrational urbanization, the law requires that new public facilities be financed through the sale of the land acquired through zone taking and prohibits the use of other local revenues to finance such development. The local authority therefore needs to rely on the proceeds from selling the 10–20 percent share of taken land to finance the construction of all public facilities within the zone. Expropriated land is first converted and registered as state owned upon the completion of zone taking. After offset land selection, such offset land will be reregistered as privately owned land. The remaining construction land sold to developers will also be registered as the developer-owned land. In the end, only the land used for public facilities remains state owned.

Source: DRC and World Bank staff research.



and the reality. Enhancing de-facto property rights to rural homestead land is important for promoting rural-urban factor mobility and construction land market integration.

Farmers' usufruct property rights to homestead land are defined under the law, but their entitlements are confined only to the "right to occupy" and the "right to use." The "right to profit" is not defined. As part of the reform, the definition of usufruct property rights to homestead land should be harmonized with the general usufruct property rights—that is, to extend it to the right to profit. At the same time, given the accelerated urbanization of the people, especially the conversion of farmers to urban residents, the membership identities of homestead land and the nontradable nature of such land have made effective land use more difficult, and farmers find it impossible to realize the value of their homestead properties. Government could select different types of regions to conduct reform pilots on the homestead land system, to explore fee-based access to and use of homestead land as well as the trading and transfer of homestead land, and break down the boundaries of homestead land members and village communities. The goal is to gradually move toward a system of property rights entitlements in return for the right to benefits payout. Land use regulation must be strengthened under such pilot programs. In addition, as the mortgage, guarantee, and transfer of farmers' homes and homestead land are important components of farmers' property rights to homestead land, a number of pilot regions should experiment with the mortgage, guarantee, and transfer of farmers' homes and their use/rights to homestead land, and to roll out such reforms when conditions are in place. Such an approach could help harmonize farmers' home property rights with urban rights to residential property. The inequality of these rights is a major contributor to China's rural and urban income disparities.

### **Innovation in land institutions in peri-urban areas**

Integrating urban villages into the formal urban development process could increase

land supply for urban development. Integration would also provide opportunities for boosting the availability of low-income housing and for allowing collective organizations and rural residents in peri-urban areas to economically benefit from urbanization, as construction land markets are allowed to develop based on stronger land rights. As discussed, revisions of the Land Management Law and other laws are needed, along with the formulation of implementation guidelines to allow rural collective organizations in peri-urban areas to develop collective construction land to developers for urban commercial and residential development within the framework of urban master plans. Through appropriate zoning, local governments could provide incentives to build low-income housing in those areas while avoiding resettlement and demolition costs under government land taking, since collective construction land remains under collective ownership.

### **Optimizing urban land use**

China would benefit from replacing its current standards-driven urban planning system with a more dynamic system that would facilitate efficient land use and better coordination between planning and finance. Based on good international practice, the system would incorporate the following: strategic and long-term economic planning; coordination of sectoral plans and finance; consideration of the impact of proposed developments on key urban systems such as transportation, environment, public services; enhanced public and private participation; and performance monitoring. University urban planning schools, the urban planning profession, as well as key ministries would need to adopt the new system. Urban planning competitions could lead to more innovative plans that identify efficient land use patterns.

Land use in cities needs to become market based. The current bias toward industrial land and the subsidization of industrial land to attract industry risks locking China into its industrial past, creates barriers for the development of the services industry, and keeps housing prices high. Furthermore, local

government could reclaim land allocated to public entities, which covers large areas within cities, such as public spaces, and is often used inefficiently, and put part of that land into the market. How the value increases on such land should be clarified. Urban land zoning that is sensitive to demand and allocation of all land use titles by auction would in many cities lead to less land used for industry and more for commerce and housing. With rising land prices resulting from market-based allocation, land-intensive industry would move to secondary cities and rural areas, and redeveloped industrial land could be rezoned for mixed use. With the expiration of the first 40-year lease terms for industrial land, China's local governments have an opportunity to recycle inefficiently used industrial land. This land can be rezoned and rehabilitated and be made available for competitive auctioning for other than industrial purposes, thus meeting the needs for industrial upgrading and shifting land from industry to services and residential use.

Reforms in the urban land market also should introduce transparency in the secondary land market transactions. In urban areas, the government monopolizes the primary land market, whereas the market for follow-on transactions (that is, the secondary market) remains underdeveloped and opaque. Local governments generally lack the means to monitor transactions on the secondary land market. In particular, when land is converted for purposes with a higher value, the government would fail in most cases to benefit or capture the value from related land transactions. Regulations should require registration of all urban land transactions with local land registries. More complete registration would allow local governments to collect fees from transactions and to capture a share of the value increase in urban land.

Flexible zoning regulations would encourage more efficient development of urban areas and reduce the need for further land conversion (World Bank 2008) (box O.5). The floor area ratio (FAR), a measure of building density, would be better applied at the individual building plot rather than the superblock level, and a more streamlined process can be developed to allow for densification of

existing plots based on market demands and priorities, creating incentives for development within existing built-up areas instead of the urban periphery. Moreover, the planning system can be reformed to allow developers to subdivide superblocks and sell individual plots, with specific FARs and zoning regulations, to third parties. This type of transaction, driven by rising land prices, is fundamental to incremental densification.

Smaller plots and mixed land use can be encouraged in new developments. Chinese cities should move from superblocks to smaller plots with finer grain connectivity. Typical urban blocks in developed countries measure 150 meters by 150 meters and have several plots; China, however uses a much larger scale (box O.6). Reducing the size of blocks would help create more vibrant urban land markets and favor competition from smaller developers. Smaller blocks are also essential to integrate neighborhoods for higher agglomeration economies and promote infill development.

Land use optimization and intensification is required at the building, neighborhood, and metropolitan scales. At the building and block scale, traditional medium-height (five to seven floors) perimeter blocks of about 100 meters a side offer the highest potential for densification, with gross FAR (including infrastructure) usually three times higher than towers-in-a-park superblocks of 400 meters a side. At the neighborhood scale, the density of urban fabric can be balanced by a fine mesh of streets irrigating the urban fabric and by a dense distribution of public parks and amenities. At the metropolitan scale, planners need to identify the areas where infill would increase the compactness and decrease the fragmentation of the urban area. Moreover, planners can give an efficient shape to metropolitan growth by concentrating densification actions along transportation corridors and discouraging leapfrog and edge sprawl (box O.7).

A property tax would help optimize land use. In supporting report 6, a property tax is proposed as part of the fiscal reform agenda to realign local government revenues with expenditures. An additional benefit of a property tax would be the creation of incentives

### BOX 0.5 Seoul becomes a global city by recalibrating regulations and market instruments

Home to more than 10 million people, producing one-quarter of national GDP on 1 percent of its land area, Seoul is the Republic of Korea's interlocutor with the global economy. The surrounding Seoul Metropolitan Area (SMA), consisting of 29 cities (including Seoul and Incheon) and four counties, contains half the nation's population and dominates the national economy, generating around half the national GDP on 12 percent of the country's area.

Over the past 70 years, however, a tension has arisen over how best to manage the SMA. Some, concerned that rapid SMA growth would lead to regional imbalances, argued that growth should be constrained with strict regulation. Others called for free-market initiatives to promote further development, allowing the country's strongest economic base to flourish.

In time, even the strongest regulations enacted to contain Seoul's growth have lost ground to local and global market forces. Quantitative measures included regulations to restrict development in certain areas, impose fines on buildings exceeding allowable parameters, limit allocations of land to industry, limit the industrial output allowed in the SMA, prohibit vari-

ous classes of activities, and require national government approval for land development projects exceeding 1 million square meters. In the 1970s, a greenbelt strategy was employed to constrain Seoul's growth, while 14 cities were to be promoted across the country.

These controls were not successful. Investors and citizens led a rapid succession of new projects, including residential complexes, metropolitan highways, new towns, and a new international hub airport—bypassing the objective of limiting growth. Moreover, the controls hurt efficiency: over 200,000 factories in the SMA were unregistered, contributing to unmanaged urban development. And urban growth became fragmented, exacerbating congestion and environmental degradation.

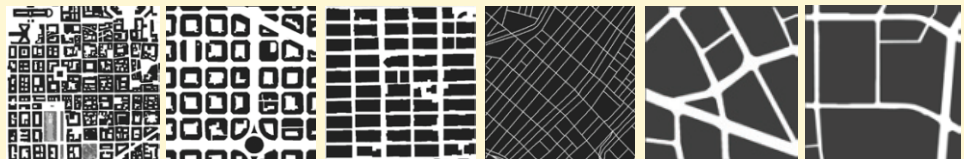
As Korea sought to position Seoul as a 21st-century world city, the government relaxed quantity limits that restricted the location of new colleges, firms, industrial estates, and housing sites. It adopted price instruments, levying a development charge on new commercial buildings. By recalibrating city management through deregulation and market instruments, Korea is making Seoul's quest to become a global city more likely to succeed.

Source: Urbanization study team.

### BOX 0.6 The lack of connectivity and fine grain networks in Chinese urban development

The following pictures illustrate the size of blocks and impacts on connectivity of a series of cities in China, Europe, and Japan. The last two images on

the right show the lack of connectivity and the increase of average distances between intersections in recent urban developments in China.





	Turin, Italy	Barcelona, Spain	Paris, France	Ginza Tokyo, Japan	Pudong Shanghai, China	Towers North Beijing, China
Intersections per km <sup>2</sup>	152	103	133	211	17	14
Distance between intersections (m)	80	130	150	43	280	400

Source: Salat 2013.

### BOX 0.7 Comparing urban densities in two areas of Shanghai

Pudong is often considered a model of high-density urban development. The two figures below compare two districts—Pudong and Puxi—located on the opposite side of the Huangpu River. Despite the higher buildings in Pudong, the gross urban density

is lower than in Puxi because of the large infrastructure (highways and parking space) and setbacks associated with large-scale buildings. The coverage ratio is only about 14 percent, and gross urban density is only 1.2.

	800m × 800m squares	
		
	HongKou—Puxi	Lujiazui—Pudong
Building type	Low-rise housing,	Towers,
Coverage ratio	Shanghai	Shanghai
	53%	14%
Gross urban density	1.9	1.2

Source: Salat 2013.

for developing underdeveloped and vacant land and for increasing land transactions. In some countries, cities have opted for a split-rate property tax to provide the incentive of lower taxes for capital investment in building improvements, and tax away the speculative value of holding undeveloped property within the urban growth area, thus promoting infill and redevelopment. Experience in several communities in Pennsylvania indicates that a split-rate property tax can be an effective tool to stimulate central city revitalization. This form of tax also is implemented in Hong Kong SAR, China; Pittsburgh, United States; Sydney Australia, as well as cities in Denmark and Finland.

### Coordinating land use planning with housing, infrastructure, and financing

It is critical that land use be coordinated with infrastructure provision that meets current needs as well as projected future demand. Higher densities in cities can drive economic growth, but they also require additional infrastructure investments to ensure that the

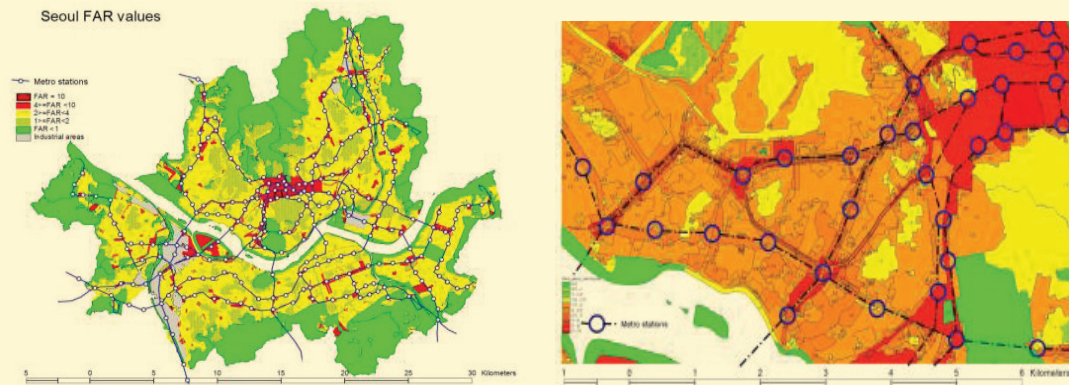
benefits from density are not overshadowed by congestion, environmental, or other costs. China has a unique historic opportunity to apply Transit Oriented Development (TOD) and to optimize and intensify land use on a large scale along major urban transport corridors. The urban rail network will reach 3,000 kilometers by 2015 and double that by 2020, with over RMB 4 trillion in cumulative investment. The high speed and express rail network is also expected to reach all major cities of more than 500,000 people by 2020.

Development can be focused along urban transport corridors. Along with public transit improvements, certain corridors could be assigned higher development intensities, and local governments could channel land conversion quotas to these areas by allowing the transfer of land conversion quotas from slower-growing areas outside the corridors. To foster more coordinated development around transport nodes, changes in zone ordinances should be simplified, allowing higher FARs, population density, and building heights around transit stations and specially designated boulevards and plots (box O.8). Land use regulations can encourage a mix of residential, commercial, and special

### BOX 0.8 Seoul's spatial strategy: Differentiation and higher densities around metro nodes

Seoul's spatial structure is compact (expansion is restricted by hills and by the northern border) and polycentric, with a large central business district (CBD) but many important subcenters. A gridlike metro system links the various subcenters and the CBD. The floor area ratio (FAR) in Seoul is linked to the location of metro stations and to the network of main streets:

- FAR of 10 in part of the CBD, 8 in the rest of the CBD and subcenters
- FAR of 0.5 to 4 in residential areas
- FARs are higher in areas around main metro nodes



Source: Bertaud 2004.

industrial uses (media and entertainment) and confer the right to adapt and reuse commercial buildings as housing, especially in boulevard and transit station areas. Government could provide developers with “additional” FARs to build affordable rental housing and to keep unit prices manageable and accessible to low-income households. Innovative land-value-capture mechanisms should be introduced to support the construction and operation of the necessary transport and other urban infrastructure.

Existing urban areas can be regenerated to provide affordable housing and minimize low-density development and sprawl. International experience suggests that suburban development generates economic benefits that peak in five to seven years. Regeneration of urban cores to provide affordable housing in established cities requires higher up-front costs because of the more complex civil works, upgrading of public spaces, and improvement of existing services required.

Once revitalized, however, these urban cores become self-sustaining because they attract additional investments for a considerably longer period of time.

Incentives can be provided to ensure that needed housing is constructed at affordable prices. Zoning policies could require or create incentives for developers to include low-income housing in new large-scale housing and mixed-use developments. The share of low-income housing is usually around 10–20 percent of the housing stock in OECD countries. Developers and property owners could be allowed to increase densities and use additional FARs to provide low-income and affordable housing. In addition, the government could provide special subsidies for the construction of affordable housing units. Several countries have used “inclusionary” or “incentive” zoning successfully; for example, Fairfax County, Virginia, United States, approved a plan to rezone an area around a subway station to increase density

substantially, and it required the developer to devote at least 5 percent of the development to affordable housing. Affordable housing can be built on vacant, abandoned, and underdeveloped government land, including parking lots around public buildings; low density structures in areas zoned for high-density development; and land around railroads, airports, and oversized roads. The rehabilitation of existing and older buildings to minimum safety standards could also provide reasonable and affordable housing for low-income people.

Integrating urban village land into urban development could boost the availability of low-income housing. As the property rights on rural land are further clarified, an opportunity may emerge for rural collectives in peri-urban areas to develop or lease collective construction land for commercial and residential development within the framework of urban master plans. Such an approach, based on ongoing experiments, would allow collectives and their members with no farm income to receive income from urban land development.



## Chapter 7 Reforming Hukou, Social Services, and Labor Market Institutions

China's urbanization faces two inequalities: a "new dualism" between local hukou and migrant populations, and the "old dualism" of urban and rural disparities. China can build a more inclusive and productive labor market, one that would help to increase the efficiency of urbanization and overcome both the new and old dualisms, by reforming the hukou system to reduce the barriers to mobility. More migration will reduce the labor surplus in the countryside more rapidly, which would increase rural wages relative to urban wages, thus reducing urban-rural inequalities. Better integration of migrants into urban areas will offer them access to better jobs and more opportunity to acquire property and thus to benefit from capital gains. Equalizing access to social services between migrants and local hukou holders in urban areas and, over time, across China will contribute to a more inclusive society.

Equalizing access to basic social services in urban areas requires the reform of the hukou system. Making social entitlements available to all workers and their families in their areas of residence would deepen the human capital base and promote a healthier workforce. It would improve intergenerational income mobility, reduce future inequalities, and alleviate social tensions.

The full benefits of a residence-based system will be realized at the national level and therefore a national, unified approach is needed. The fiscal system should allow for the financing of a basic package of social benefits across China while providing incentives for local governments to top up the package for all residents, if possible, and holding local authorities accountable for providing services to all residents. The fiscal implications of the basic package are likely to be significant, but reforms in health, education, social protection, and social housing, and cross-cutting reforms in accountability for service delivery, could contain costs and increase efficiency.

### Reforming hukou

To create a mobile and versatile labor force with equal access to a common standard of public services, the household registration system would need to move from an origin-based to a residence-based system. The hukou system and residency system can operate in parallel, as similar systems do in Japan (see box O.3). A residency registration would provide access to location-specific services such as education, health care, welfare, and affordable housing, whereas hukou could be maintained to provide rights such as access to land profits. As land reforms and pension reforms progress, the rights derived from hukou could be adjusted. In March 2011, the State Council called for a gradual rollout of the residence permit system and requested that institutions take steps to improve registration of temporary populations in the cities.

The central government would define the principles and national framework for the residence-based system and provide guidelines for local governments to follow, including the system by which local governments would grant residency to people who live in a specific locality and the sequence of entitlements that accrue upon attaining a residence permit. In the short to medium term, it may not be practical to expect common eligibility criteria (such as the number of years of residence or of social insurance contributions), but the central government should set minimum guidelines for local governments to follow and create a time-bound pathway for extending access privileges.

Local governments can define the sequencing of access to privileges and the qualifying periods to move from one step of the entitlement sequence to the next. Already, many localities have implemented localized residence permit systems with different approaches and requirements, from more liberal ones in small cities, to strict point-based systems in Guangdong and Shanghai. In the

initial phases, it is unlikely that all social entitlements of current local residents could accrue to new residents immediately upon obtaining a residence permit, but for the very fundamental rights, requirements should be very simple and low. Cities should seek to reduce the current prioritization of those with higher socioeconomic status. With time, the scope and content of basic public services would have to be standardized based on national guidelines, and the conditions and requirements to obtain a local residence permit would converge. Such convergence would be supported by broader reforms in the fiscal and taxation systems, equalization of public services, and rural-urban integration.

An information technology platform developed according to national standards would facilitate implementation of the residence system and will be particularly important for the exchange of population data across jurisdictions. The platform would provide quantitative information for making fiscal allocations, as well as supply data for monitoring and evaluation.

Additional fiscal resources and a rebalancing of central and local financing responsibilities will be needed. Cities need to be subsidized for the increased costs of providing services to migrants through reallocation of provincial resources from rural areas. Because this reallocation is likely to be achieved only gradually, a transitional subsidy to cities to entice them to deliver social services would accelerate the integration of migrants. In the medium term, fiscal system reforms of both revenue and expenditure are needed to finance national minimum standards for social services across China, which should be carefully calibrated to fit fiscal capacity and would need to be phased in. Local authorities could provide a top-up for all residents in their jurisdiction if desired, and the private sector could also help create fiscal space through high-end medical services, private third-pillar pensions, and private schools.

### Extending access to basic services to migrants within cities

The current package of social services provided to China's urban residents includes

nine years of free compulsory education, access to basic public health care services, social security (medical and old-age pensions) for formal sector workers and residents, a social assistance program, and a welfare housing system. Extending access to this package for migrants under the current modality of service delivery will require additional annual resources in urban areas of between 1.22 percent (lower bound) and 4.53 percent (upper bound) of GDP. The main factors determining the costs are assumptions on how many migrant children would join the urban system and what part of the pension costs are covered. The lower bound covers all migrants and children currently in cities and the cash costs of integrating migrants in the urban pension system. The upper bound covers all left-behind children and total accrued costs for the urban pension system. A reasonable assumption would be that the lower-bound costs would be covered by a special grant from central government, whereas the costs beyond that would have to be absorbed by reallocation of resources through changes in the intergovernmental fiscal system.

The current policy on migrant children's right to universal compulsory education is already residence based, and migrant children attend public and private (minban) schools. Equalization options could include sending migrant children in public schools to private schools with a public subsidy to cover their fees. The annual cost is in the vicinity of 0.98 percent of GDP (for the migrant children currently in the cities) and 2.27 percent of GDP (for all migrant children, including the left-behind children).

Equalizing access to health services for migrants in the cities requires improving access to public health programs and basic medical care, as well as expanding the urban health insurance scheme through conversion of migrants' current eligibility in the voluntary and subsidized national rural scheme. The annual total cost would be about 0.15–0.16 percent of GDP, depending on the assumption about the cost increase.

Rural migrants could be incorporated into either the current urban worker pension system or the newly combined urban and rural residents' pension scheme. The annual total cost is in the vicinity of 0.03 percent of GDP



(accounting for the cash flow cost) and 1.95 percent of GDP (accounting for the accrued liability cost).

Migrant workers and their families should be eligible for social assistance (dibao) payments after they acquire residency rights and meet qualifying conditions. Currently, more than 70 percent of urban and rural dibao aggregate expenditures are financed by the central government, providing a financial basis for improved access to urban dibao and other assistance programs for migrants. Assuming the incidence of dibao receipt among migrants is similar to that of urban hukou residents, the annual cost of covering these additional families is about 0.04 percent of GDP.

A policy that encourages a rental market for low-income housing would give migrants access to affordable housing. Homeownership is not fiscally possible, but neither is it economically desirable because renters, being more mobile, contribute to the efficiency of the labor market. Research has shown that economies with small rental sectors face higher migration costs and labor rigidity. Demand-side subsidies based on a means-tested targeting approach would address the housing needs of the lowest-income households. The annual total cost is around 0.02–0.11 percent of GDP, depending on eligibility assumptions.

## Equalizing access to services across China

In China, services are easier to access and are of better quality in urban areas than in rural areas. Recognizing the importance of improving services in rural areas, the national government needs to establish a basic minimum package of services that would be offered to all citizens, with the fiscal system enabling every jurisdiction to meet this standard. This minimum standard of service would also reduce the incentive to migrate for the purpose of receiving better services rather than for better employment. This basic package should be complemented by clear quality standards for various services (national or provincial), which should focus on outcomes (such as graduation rates and test scores in basic education), but which could also specify per student public expenditure, percent

of qualified teachers in each school, and other inputs. The fiscal system would have to accommodate minimum standards, which would require careful calibration so that China can afford them. It would also require a system of fiscal equalization that takes into account a locality's own revenue potential as well as expenditure needs based on the requirements for meeting the minimum standards (see chapter 8). Accountability systems should be in place to enforce these standards, and to achieve this, China could use three broad channels: government, citizen-based, and choice-based systems.

Fiscal resources should follow people. The fiscal system should be closely linked to the new modern residence system—once people have moved to a new location, registration would increase the population count used for fiscal allocations. Such a link would reduce the resistance of receiving cities to delivering services to new arrivals: in addition to a gain in the tax base, they would also receive larger transfers from the center to accommodate the delivery of the basic package. Beyond the basic package, provinces, cities, or towns may raise the standard for their jurisdiction, but they would be responsible for providing additional funding. Cities could decide to raise the standard because they are more affluent, because their residents demand different or better services and are willing to pay higher taxes, or because they wish to attract new residents. Experiments will reveal best practices, especially combined with the possibility for easier migration following hukou reform. Cities will have to seek an affordable balance that satisfies their residents and the needs of their local economy.

The urban health delivery system would need to be strengthened to cope with the expected increase in demand. This could be achieved by improving primary health services and coordination among health providers; integrating and ensuring portability of health insurance to allow citizens to choose the best treatment; strengthening health promotion and illness prevention in urban settings; and implementing effective cost containment and quality improvement measures. Provider payment reform, an effective cost containment measure and one important element of this reform, should replace

the dominant fee-for-service payment system with a combination of capitation-based and diagnosis-related group-based system, which internationally has a proven track record for containing the costs of inpatient care.

Narrowing the disparities in the quality of basic education and expanding access to senior secondary and early childhood education will be needed. Reform in financing would facilitate minimum standard setting for every level of education and ensure central transfers for equal access to and the quality of education for poor rural localities and disadvantaged children. Demand-side mechanisms that stimulate competition and allow higher levels of private provision can satisfy the selective needs of some parents. Teachers' incentives need to be realigned to improve the quality of instruction and strengthen school management to meet the needs of migrant students and parents, as well as the larger community whose children already attend public schools. Peer tutoring programs, computer-assisted learning tutoring programs, after-school support, tuition, and resource personnel targeted at migrant students and their families will further support the integration of migrant children.

Pension reforms are required to facilitate labor mobility, narrow gaps in pension benefits, and cope with population aging. In the short run, national guidelines could ease the transfer of pension rights and benefits between schemes and locations. In the long run, the urban worker pension scheme could be reformed through the introduction of a notional defined-contribution design while developing a financing strategy to resolve the legacy cost outside the reformed pension system. These reforms would lower the existing high contribution rates, provide stronger incentives for employers and employees to contribute, and realize the objective of a targeted replacement rate.

Migrant workers with labor contracts can be encouraged to join the reformed urban workers' pension scheme to reduce the government subsidies needed for the rural residents' pension scheme. To phase in reforms, pooling could proceed first at the provincial level and then be expanded to the national level, supported by an integrated

national data management system underpinning the nationally pooled and integrated system. Finally, gradual reforms in retirement age and rules for raising pensions in compensation for price and welfare increases (indexation) would ensure the adequacy of pension benefits and the sustainability of the pension system over time.

Reforming dibao and other social assistance programs requires consolidation, standardization across space, and harmonization with antipoverty interventions in poor counties and other social programs. Currently, dibao thresholds vary across China, reflecting its highly decentralized implementation. Most high- and middle-income countries apply a unified formula for determining eligibility for national welfare programs, while maintaining some flexibility, including regional cost-of-living adjustments. China could gradually move toward a more systematic approach in determining eligibility thresholds from county (city) to prefecture, from prefecture to province, and finally to a nationwide setting.

Increased service delivery sophistication and ambitious equalization goals call for greater accountability for outcomes, cost-effectiveness, and transparency. Given the scale of China's challenge to increase accountability for better results in service delivery, it will be important to make progress through three broad channels: government, citizen-based, and choice or market-based. Compared to most countries, China has traditionally relied less on citizen and choice or market-based accountability channels in the social sectors. Even within government, mechanisms with significant potential for increasing accountability are underused. Government systems can promote better performance from service providers by linking budgetary transfers to the performance of subnational governments. Human resource management and compensation systems and facility-based management initiatives could also become more performance-based channels. Regulation, accreditation, and licensing systems for providers are increasingly important tools and are expected to be core elements of the modern and diversified system of social service provision in China. Citizen-based channels for enhancing

accountability could be strengthened by providing more public information on service delivery costs and performance (an area where China already has started program-specific transparency initiatives, for instance, the publication of the dibao list) and harnessing information efforts to generate citizen oversight and feedback on service delivery performance. Another channel for citizen involvement is more direct incorporation into management and oversight institutions. Choice and market-based channels to promote accountability will require greater reliance on demand-side financing of services where appropriate and greater public purchasing of social services.

### Improving labor market institutions

Upgrading human capital of workers through on-the-job training and in learning institutions would increase geographic, occupational, and sectoral mobility and promote agglomeration effects. Promoting a more modular and competency-based technical and vocational education and training system and reforming the tertiary education system to focus on increasing the labor market relevance of higher education would bring positive returns. In addition, greater

coordination of the technical and academic education streams would allow students to move between them with due credit for competencies acquired in either system.

Strengthening labor market institutions that facilitate efficient labor market transactions, balance wage and productivity growth, and mediate labor disputes would promote mobility. Reorienting the basic function of the minimum wage from a minimum-income guarantee to an instrument of collective bargaining—more common in OECD countries—would be an important step in this direction. Further, while income taxes are low for most of the population, by international standards, the total burden of taxes and social premiums is higher than in most OECD countries, and well above East Asian regional comparators. Parametric reforms in pension systems (extending the pension age, removing legacy costs from the pension system) offer potential for reduction in pension premiums, while shifting the burden to more broad-based revenue sources. Finally, with the passage and implementation of the Labor Contract Law, employment protection in China has become higher than the average rate of protection in OECD countries. The medium- and long-term impacts of enforcing this law should be carefully monitored, so that improvements and amendments can be made as needed.

## Chapter 8 Reforming Urban Finance

### The context of the reforms

Urban finance reform is the cornerstone for efficient, inclusive, and sustainable urbanization. Fiscal and financial reforms would need to be aligned with the changing role of the state and provide local governments with incentives to pursue evolving national goals. China faces the challenging task of eliminating disparities in service levels between urban residents and migrant workers and putting in place infrastructure and social services that can accommodate around 300 million new migrants in cities in the next two decades. Over time, the fiscal system needs to finance a minimum level of services across the country. With reforms, the fiscal benefits from urbanization and the scope for raising additional revenues will be adequate to accommodate the rising expenditure needs as well as a projected decline in revenues from land conversion as China's urbanization becomes more efficient.

Reforms are needed to address underlying problems rather than to simply fill the financing gap for public services and infrastructure spending. China's urbanization has revealed several weaknesses in the fiscal and financial systems that have contributed to making Chinese economic growth less efficient and less inclusive, including an overreliance on land financing, unregulated borrowing by local governments, fiscal distortions that skew the location decisions of enterprises and people, and a lack of discipline on local government spending decisions.

Accommodating the changing role of government will be the centerpiece of the urban finance reforms. A reformed system should more clearly separate the function of government as the provider of equitable and efficient public services from the investment and production functions of other government sectors. The fiscal system will need to support the movement of people and enterprises to the places where they are most productive rather than to where they get the best tax or land deal from local government. Public finances will need to accommodate the integration of

migrants and their families in urban areas. Revenues from land conversion are likely to taper off, so new local revenue sources are needed to replace lost revenue in a manner that is neutral to the type of economic activity. Properly regulated access to borrowing will be needed to finance infrastructure investment. The financial sector will need to efficiently intermediate capital to meet local governments' needs for infrastructure finance, and at the same time impose financial discipline on local governments and avoid financial sector disruption. Finally, the private sector could play a larger role in financing and delivering infrastructure and other public services.

A comprehensive reform—rather than piecemeal changes to the system—is called for. Under the current financing system, it is difficult to separate reforms in tax and its administration, intergovernmental fiscal arrangements, land finance, urban infrastructure financing, and local debt management, and therefore it is necessary to consider how the various elements of the reform package fit together and the joint impact they may have on the economy. Some elements of the reform can be accomplished quickly, for example, by reassigning some expenditure responsibilities. Others should be phased—beginning in provincial cities and moving later to other cities. Yet others should be implemented in the longer run. In this way, the proposed comprehensive reform package could be introduced gradually.

### Reforming government sources of revenue

The fiscal system is an important incentive mechanism—and the revenue base and transfer system should be reformed to provide local governments with the resources and incentives to provide public services to all residents, while increasingly taking on the role as enabler of urban development and growth rather than as active developer of land and urban expansion. Local government

incentives to attract investments and retain enterprises would need to be rebalanced to curtail inefficient tax competition and support for unviable enterprises. Reforming the tax structure and tax-sharing system is important in this respect, but so are rules that would regulate other sources of support—including cheap land, subsidized utilities, and tax reductions. One step could be to require local governments to publish information on the support they give to enterprises, possibly through an annex in the annual budget. Countries like Chile, India,

and Korea publish annual reports on tax expenditures that reveal such support. The EU regulates the type of state support that a country is allowed to provide enterprises, limiting it to those activities that support EU-wide objectives such as regional development and research and development (box O.9).

A solid revenue base for local governments is important for efficiency and accountability. It is common in unitary states that subnational governments spend more than they raise themselves, not least because some taxes, like the value added tax (VAT),

### BOX O.9 European Union rules on investment incentives

Government financial support for corporate facility investment and expansion continues to be common practice in most parts of the world. Economic development agencies in many parts of North America and Asia can provide an attractive incentives package for potential investors. Countries in the European Union (EU) are different: European agencies are constrained in their ability to provide incentives by rules set by the EU's European Commission. There are comparatively few tax incentives, because the European Commission considers "fiscal state aid" to be harmful and therefore prohibits it in most cases. Rules on state aid are covered under Article 107 of the Treaty on the Functioning of the European Union (TFEU), which lays down a general rule that the state may *not* aid or subsidize private parties in distortion of free competition, although it may approve exceptions for specific projects addressing natural disasters or regional development.

Measures that fall within the definition of state aid are unlawful unless provided under an exemption or notified. State aid is defined under Article 107(1) of the TFEU as the transfer of member state resources that creates a selective advantage for one or more business undertakings; that has the potential to distort trade in the relevant business market; and that affects trade between the member states. Where all of these criteria are met, state financial support is unlawful unless provided under a European Commission exemption. State aid rules are defined for specific areas, including research and development (R&D) and regional aid. In the after-

math of the global financial crisis, special temporary rules regulated state aid to financial institutions. EU rules apply to a wide range of instruments, including grants; low-interest loans or interest rebates; state guarantees; the purchase of a shareholding or an alternative provision of capital on favorable terms; exemptions or reductions in taxes, social security, or other compulsory charges; or the supply of land, goods, or services at favorable prices.

The European Commission's Directorate of Competition Policy sets ceilings called the "maximum aid intensity" for the level of incentives that can be provided. For regional aid, these ceilings are based on the average GDP in each region, which means that the less affluent areas of Europe have higher ceilings, unlike the more prosperous parts of Europe where the ceiling is often zero and no incentives are allowed. Subsidies are allowed in regions with an average per capita income less than 75 percent of the EU average. Subsidies up to 30 percent aid intensity apply in those regions; aid intensity can reach 50 percent in regions with per capita income of less than 45 percent of EU average. The ceilings can also differ based on the size of the company and the size of the project. The ceilings are expressed as a percentage of either a project's capital expenditure or the payroll of any new employment generated by a project in the first two years. For R&D, the variations in the allowed aid intensities are based on the size of the market failure in specific R&D activities. They range from 100 percent for fundamental research to 50 percent for industrial research to 25 percent for experimental development.

Source: European Commission 2013; Dressler 2013.

are better administered nationally. But this means that grants from the central government are needed for the subnational government to make ends meet. A better system would ensure that a considerable portion of local expenditures are financed by local taxes under the control of local government. This system would impose financial discipline on local governments because the imposition of local taxes could be directly linked to the appointed local leadership, thus increasing their accountability to residents of the locality they administer. Further, a tax on those who benefit from locally provided services would lead local governments to align the benefits and costs of public spending. Finally, local governments are best served by a tax base that is relatively stable, because they usually have more limited access to financing than the central government does and, unlike the central government, have no role in macroeconomic stabilization policies.

A property tax on housing would provide a stable source of local government revenue that is aligned with service delivery benefits. Property taxes are a mainstay of local governments in both developing and developed economies. A property tax can fulfill two important objectives in China: it can be both a quasi-user charge for urban services and a tax on wealth holdings in real property. Property taxes are never popular with constituents, but that is part of the rationale for those taxes: if local governments want to spend more, the burden is on them to argue their case to the taxpayers. Property taxes allow local government budgets to benefit from increased land values in their jurisdiction, thus rewarding good administration by local leaders. In addition, property taxes would encourage property owners to make the best possible use of their property—for instance by renting out apartments or developing unused or underused land, thus promoting better use of the housing stock and urban land. China should aim to make property taxes an important part of local government revenues. Even so, property taxes will not be able to fully replace current land revenues: in developing countries, property taxes usually raise less than 1 percent of GDP, and even this level will be reached only over time

as administrative capacity increases. Further, transitional arrangements may be needed, which would limit revenues in the short run, including a grace period of two or three years that would allow people to adjust their holdings of real estate before the tax takes effect. The tax should be broadly based to achieve its revenue goals and incentives; the current experiments in Chongqing and Shanghai are too narrow to be of much consequence, and a national system of property taxes should be more ambitious in its goals. China is steadily moving toward legislation on property taxes while also improving the local taxation system and developing mainstream taxes for local governments. The share of property taxes will eventually increase and is expected to exceed 1 percent of GDP, as administrative capacity increases.

Other local revenue sources have considerable potential. Some cities such as Shanghai already auction car license plates, which limits car use to sustainable levels. Higher vehicle registration fees and excise taxes on fuels can be implemented with special arrangements for public transport to limit impact on public transport prices. Local income and sales taxes could be charged in the cities where jobs are located and consumption occurs.

Increasing the prices of urban services such as mass transit, solid waste collection, water, wastewater, power, and gas to full cost recovery levels would enhance service sustainability and raise revenues. Internationally, the use of charges for government services of a largely individual nature is common, and in high-income economies, those charges often cover full costs—that is, the costs of operating and maintaining the service, and a capital charge to pay for depreciation and profits. Excise taxes on fuels, electricity, and water could be imposed to include the environmental impact of their use. Lifeline pricing for the poor, who would pay less for a limited amount of service, could be used to meet the government's distributional objectives. And while full-cost pricing for mass transit is rarely achieved internationally, China could gradually increase pricing as the cost for individual private transport increases as a result of higher taxes and levies.



Alternative local revenue sources can yield considerable revenues. Revenue from the property tax in advanced economies generally ranges from 1 to 4 percent of GDP (more than 3 percent in the United States and more than 4 percent in the United Kingdom). Environmental taxation in OECD countries averages 6 percent of revenue (as high as 15 percent in Turkey) and nearly 2 percent of GDP (more than 4 percent in Denmark). Congestion charging could raise additional funds. After the introduction of Singapore's Electronic Road Pricing System in 1998, traffic levels decreased by 15 percent, and annual revenue exceeded \$50 million. The 2008 revenue from London's congestion-charging system reached \$435 million, or nearly 9 percent of the local transport authority's revenues. Property taxes and additional environmental taxation and pricing in China could raise significant additional revenue (2–5 percent of GDP annually, in line with OECD countries).

China's tax structure could be further improved to meet the government's objective on economic structure. One important step would be to replace the business tax on services with a VAT, a step that authorities have already initiated. This move would encourage the growth of a services industry, because the VAT on services can be deducted from the user's VAT tax obligations. It would also encourage enterprises to outsource services to more specialized enterprises, because there would no longer be a tax advantage for keeping services in-house. At the same time, the business tax is a major source of local government revenue, and lost revenues would need to be replaced, either through more local taxes such as the property tax, through a larger revenue share for local government, or through the grant system. In addition, scope and coverage of consumption taxes can be adjusted. Taxes on high-polluting industries and energy-intensive products as well as on some high-end consumer goods and services subject to a higher rate of tax could be further studied.

### **Reforming the revenue-sharing system**

Achieving greater clarity in the division of functional responsibility among the various

levels of government would improve efficiency, because reducing overlap could save costs and reduce unproductive coordination efforts. More broadly, clarity on expenditure assignment is required to ensure that resources are available at the level of government responsible for delivering a specific service. In China, local governments perform some functions that would be better administered by the central government, most important among them, pensions. Centralizing the administration of pensions would improve labor mobility, allow national standard setting, and address important problems related to risk pooling.

China's revenue-sharing system could be considerably improved by removing the incentive for local governments to hold on to inefficient enterprises for revenue reasons. The major shared taxes (VAT, corporate income tax, and personal income tax) are shared with the local governments based on the location of collection. This arrangement distorts the allocation of resources in two ways: it encourages local governments to keep enterprises that should move to new locations; and it disproportionately benefits large cities, because these are often the location of a firm's headquarters and frequently where the firm pays taxes. The distribution of revenue sharing among provinces could begin moving toward a formula-based system in which central transfers would be allocated among subnational governments according to objective measures of need rather than the location of tax collection. A start could be made by changing the way the VAT is shared with local governments, from one based on the location of the VAT collection to a system that recognizes the place of consumption. Countries with a shared VAT usually follow one of two practices: either they do not explicitly share the VAT with subnational governments, or they share the tax on an objective basis such as population (Germany) or consumption (Japan). The lost revenues in some of the higher-income provinces would be replaced by increased local taxes. Over time, a uniform sharing rate for all shared taxes could be introduced.

Even with enhanced local government revenues, transfers will be needed to fill the

gap between expenditure responsibilities and the local government's own and shared revenues. The transfer system should ensure the capacity of local governments and encourage them to deliver on national priorities. China's current transfer system has been increasingly effective: transfers have been growing rapidly, and have increasingly been allocated to poorer provinces, for purposes of national priorities. At the same time, with some 200 specific grants to local governments, the system is complex and expensive to administer and undermines local government accountability and autonomy. In contrast to specific grants, the general grant, which is intended to equalize revenue capacity among localities and ensure basic service delivery, accounts for a little less than half of total transfers. The current transfer system is also less responsive to changing circumstances, especially to the movement of people to a new locality, and the central government has therefore started to provide additional grants to local governments to deliver services to migrants. In the short run, China could consider consolidating many of the specific grants into a limited number of sectoral block grants that would need to be linked to the central government's broad objectives and be supported by a system of performance indicators and review.

In the medium term, China could distribute grants using a formula based on fiscal capacity and expenditure needs. Such systems are used in many OECD countries, with Australia managing a sophisticated system for determining expenditure needs. This system would fit China's objective to provide a minimum standard of public services across the country over time. Expenditure needs would be defined by the costs of the minimum standard, and converting the current tax sharing and grants system into a formula-based grants system would considerably alter the outcomes for individual local governments. Therefore, this change should be implemented gradually and aligned with the introduction of new local taxing powers. For example, local governments could be assigned a "target share" based on objective criteria of expenditure needs and revenue capacity, but they would receive this share only incrementally, starting from their current share in the grant pool.

Subprovincial finance would need to be reformed to ensure resources get to where they are needed. Adjustments in central-provincial fiscal relations alone do not ensure that adequate resources would be available to accommodate the budgetary impacts of urbanization. In fact, adjusting intraprovincial inequalities in fiscal resources will likely have greater impact than interprovincial disparities. Subprovincial revenue-sharing arrangements vary widely from province to province with little mandatory controls set in place by the central government—a feature that is usually observed in federal countries but not in unitary ones.

## Reforming land finance

Revenues can be generated from existing urban land by introducing new means of capturing value from land development. Reallocation of land from industrial use to housing or commercial use promises higher revenues, given the shortage and higher prices of the latter two. Furthermore, betterment taxes can be imposed on those that see the value of their property rise because of infrastructure development. Also, auctioning the development rights for urban land, separate from the land lease, could raise revenues and accelerate urban renewal. Finally, a VAT on land, properly restructured, could capture some of the capital gains of land transactions in which local government is not directly engaged (box O.10).

Regulatory rules need to ensure that land financing can continuously play a role in financing urbanization and that fiscal risks are better managed. The first priority would be establishing uniform reporting requirements for subnational land ownership, land sales, contributions of land to public-private ventures, land transactions between different types of subnational institutions, and revenue generated by land sales. Second, the "golden rule" of public finance should be applied to subnational land financing—that is, land asset sale proceeds should be used only to finance investment. Third, borrowings backed by land collateral may require regulation to set minimum collateral or loan ratios and to prescribe land valuation principles. Fourth, transfer of surplus land to



### BOX 0.10 Land value capture

Value capture allows the government to capture at least part of the increase in land value resulting from land improvements, for instance infrastructure expansion. A prerequisite is that infrastructure must generate sufficient value to be captured. China has been successful in capturing increments in land value, but the key challenge is to set a rule to allow all people to share the development outcomes as well as the risks. The rule should be economically justifiable, incentive compatible, and acceptable to the public. A number of value-capture instruments and other financial mechanisms are being applied internationally (Smolka and Amborski 2007; Peterson 2008; Miller and Hale 2011). The most prevalent and effective of these include:

*Property taxes:* Annual imposition of taxes on the value of urban land and buildings. These taxes are among the main revenue sources for local governments around the globe.

*Special assessment districts:* New and special levies on properties that will benefit from the provision of new or upgraded infrastructure services (examples in the United States are 17 percent of the first phase of the Portland streetcar system; 50 percent of the capital costs of South Lake Union streetcar system in Seattle; and 28 percent of the cost of the new New York Avenue Metrorail station in Washington, DC).

*Tax increment financing:* This approach dedicates future tax increments within a certain defined

district to finance debt issued to pay for a project, which theoretically will create the conditions for future gains (used primarily in U.S. cities).

*Transit-oriented development or joint development:* Given that transit infrastructure plays a critical role in the end value of development projects, the capture of profits from activities associated with real estate development in and around transit stations may allow a transit agency to deliver an operating ratio in excess of 100 percent (as in the case of Hong Kong SAR, China, MTRC). The approach that MTRC uses is described as the “Rail + Property model.” Joint development, similarly, can be described as a real estate development project that involves coordination between multiple parties to develop sites near transit, usually on publicly owned land (examples are the Land Transport Authority and SMRT in Singapore, BART in the San Francisco Bay Area, and the Transport for London Crossrail project).

*Developer charges or development impact fees:* A one-time and up-front charge requiring developers to make cash or in-kind contributions to on- and off-site infrastructure in return for permission to develop or build on land. These may be stipulated through subdivision/development agreements via some norm or expectation, or they may be negotiated on an individual basis. The charges defray the cost of expanding and extending public services in a particular area. For example, in Broward County, Florida, the local government implemented a transit-oriented concurrency system.

other government units or enterprises, private developers, or public-private partnerships should be prohibited except on a fully disclosed contract basis.

### Strengthening public financial management

Financial management needs to be improved and transparency increased. Formulating and implementing urban plans in a fiscally sound manner would benefit from a medium-term expenditure framework system, which could strengthen capital spending by facilitating multiyear funding programs and by incorporating maintenance and operating costs of investments into expenditure projections.

Independent audits of subnational financial accounts, periodic public disclosures of key fiscal data, exposure of hidden liabilities and guarantees, and moving off-budget liabilities onto the budget would all increase fiscal transparency. Finally, establishing a chief financial officer (CFO) for local governments would centralize the accountability for local government finances in one office, clarify authority on financial management matters, and halt the decentralized and uncoordinated issuance of local government debt. Ideally, the CFO should come from the department that manages the public purse or from its supervisor's office (the mayor's office). The CFO's office would coordinate with the budget department, the treasury department, the investment administrator (Development

and Reform Commission), and other government agencies on the borrowing strategy and plan. A debt issuance plan and a budget plan would be submitted to the local People's Congress for approval and disclosed to the public. The central government would need to play a major role in enforcing compliance with the framework for local borrowing.

### Promoting public-private partnerships

China has already developed a policy framework for procuring services from the private sector—a positive signal for private providers of public services. More can be done, however, to improve policies and incentives for the private provision of public services. China still has scope to tap into private investment in the construction of urban infrastructure and the delivery of urban services, and a policy and legal framework should be developed to fully capture the benefits of public-private partnerships (PPPs). Since 1990, China has had more than 1,000 PPP transactions in infrastructure (transport, water, energy) for a total value of US\$166 billion;<sup>55</sup> yet Brazil and India have had much larger private investments in infrastructure during the same period—\$325 billion and \$273 billion, respectively. To simplify the project approval system and facilitate prudent decision making at the local level, PPP laws and regulations could be unified at the national level to provide uniform guidance about approval processes across sectors and regions and contractual dispute resolution. Governments should make policies and create the incentives for participation by the private sector and also develop a system for guiding and regulating the partnerships. Legal safeguards represented by effective application of the rule of law, regulatory oversight, and dispute resolution systems would encourage private participation.

China may shift the focus of PPP contracts from capital financing toward service provision by bundling investments for asset creation with operation and maintenance requirements over a long period of time (20 years, for example). PPPs for most types of urban infrastructure and service delivery will depend on local government payments over

the lifetime of the contract. In these cases, local governments should be allowed to make multiyear financial commitments. Future financial contributions to PPPs need to be kept to a fiscally sustainable level, and the best way to do that is to ensure they are kept within the expected, future level of recurrent revenue.

Expanding PPPs will increase governments' contingent liabilities, and careful risk assessment and proper risk sharing is needed. The rules governing PPPs should ensure that officials in charge are given incentives and have information and the capability to take account of the costs and risks of contingent liabilities. PPP contract arrangements should clarify risk-sharing arrangements. To strengthen institutional capacity, special PPP units may be established at the local level, while risks arising from fiscal commitments should be managed independently. Local governments could introduce a competitive mechanism along with innovative modes of operation to promote openness, transparency, and efficiency. To open competition in the infrastructure sector, public utility agencies should be restructured with transparent financial cost reporting, subsidies received from the budget, and the quantity and quality of services.

### Improving the policy framework for debt finance

Stable and sustainable debt finance remain critical for China's urbanization, as long-lived assets such as infrastructure can best be paid over time, because it is an efficient means to match payment for an asset with its lifespan. However, local government debt has triggered macroeconomic crises in other countries in the past, including Argentina, Brazil, and the Russian Federation. Therefore, allowing local governments to borrow requires a rigorous regulatory framework, which, together with financial markets, should discipline subnational borrowing to ensure sustainability. China's capital markets are still evolving; thus it is important to establish a framework to regulate subnational government borrowing, while promoting a

competitive and diversified subnational credit market.

China should impose fiscal rules and debt limits on borrowers so as to manage, *ex ante*, the risks of systemic defaults. Many countries allow local governments to borrow against general budget revenues or dedicated revenue streams (revenue bonds), either directly by the local government or through a special entity created to operate a service. A basic approach adopted by many countries is the “golden rule”—borrowing is allowed only for long-term public capital investments. Debt limits should be imposed on individual municipalities and collectively for all local governments. The threshold for debt indicators must take into account the total fiscal space available for the public sector, at national and subnational levels. Borrowings by entities that provide essential public services would also be subject to sector-specific limits with respect to debt service capacity. In addition, rigorous creditworthiness assessment by credit-rating agencies needs to be a precondition for local government access to the capital market. Among other things, this assessment would require full disclosure of independently audited public financial accounts, thereby strengthening the role of markets in fiscal monitoring and surveillance.

An insolvency framework is required to make a no-bailout commitment by the central government credible and to set clear rules for debt workout if a local government becomes over-indebted. A sound framework should reduce the moral hazard of subnational defaults, discourage free riders, bind all local governments to pursue sustainable fiscal policies, and extend their short-term horizon to minimize the impact of unsustainable fiscal policy on future generations. Local government finance vehicles that finance and implement public infrastructure projects could be transformed into special-purpose entities, while pure financing vehicles can be dissolved once local governments have formal and open access to markets. These special-purpose entities should divest their commercial activities, in line with the direction of refocusing the government on essential public services, and be reformed to become transparent and financially stronger. They would follow

international good practices on corporate governance and financial auditing and reporting. The fiscal relationship between the budget and the special-purpose entities should be disclosed to the public. Because their borrowings constitute contingent liabilities of local governments, regulations on the purpose, procedures, and limits of borrowing need to be developed. Finally, while an overall local government debt level of 25–30 percent of GDP is not excessive, various localities or local government financing vehicles have experienced debt service pressures and may need a debt workout under clear rules to be established.

Developing competitive and diversified funding sources for infrastructure financing will help lower financing costs. Aside from land revenue, China’s infrastructure financing has been dominated by commercial and government policy banks—the shortcoming being the potential mismatch between the terms of commercial banks’ liabilities and assets. In the short run, commercial and policy banks will continue to provide large amounts of financing to local governments and financially viable special-purpose “public service companies.” In the medium term, the development of a local government bonds market is feasible and desirable. The regulatory and institutional frameworks for all sources of finance need to be harmonized to create a level playing field. This will discourage shadow banking, improve the quality of local government debt financing, support sound financial innovation, and ensure transparency, market-based price formation, and protect investors’ rights across the whole spectrum of financial instruments. All these aspects would foster long-term debt market development and enhance financial system stability and the efficient channeling of savings into long-term financing for urban infrastructure on a sustainable basis.

A coherent set of securities regulations is required to develop a subnational bond market. Securities regulations and the institutional infrastructure for bond issuance and trading, such as regulation of credit-rating agencies, broker-dealers, underwriters, and auditors, are similar to those for sovereign and corporate bonds. China needs to build a reliable yield curve for the government bond

market, standardize the accounting rules for public sectors, and improve fiscal transparency. China has already experimented with local government bonds: the central government has issued bonds on behalf of some local governments, and six provinces and municipalities have issued bonds at their own discretion. Broadening the direct access of local governments to the local government bond market should proceed as rapidly as additional provinces and municipalities can obtain credit ratings to demonstrate their creditworthiness and to develop the technical capacity to manage and issue debt. Having the Ministry of Finance issue local government bonds on behalf of local governments could be phased out or substantially changed by establishing equal rules as those for direct municipal issuance (such as creditworthiness, transparency, credit rating, no implicit guarantee, and the like).

Bank lending to local governments should be regulated in a way that reinforces local government budget discipline and fiscal transparency. Commercial bank lending is normally bound by general prudential rules, which, if applied to local governments, would restrict local governments' opportunity to borrow. Such rules include exposure limits, which limit a bank's loan exposure to a single client; concentration limits, which limit a bank's exposure to a certain type of client such as all local governments taken together; and insider lending restrictions, which limit lending to the owners or co-owners of the bank. China has such rules in place, but the authorities would need to ensure effective enforcement. In addition to these norms, many countries have found innovative measures to reinforce discipline. For instance, after experiencing widespread subnational defaults, several countries including Brazil banned subnational ownership of financial institutions altogether. In China, direct local government ownership is limited, but influence is exercised through key personnel decisions in banks—a system that China needs to review to ensure independent decisions on lending to local governments. In Mexico, competitive lender selection and transaction ratings were required for large-scale long-term financing. Although

these requirements are not mandatory, bank lending to nonrated subnational governments would need to have a high capital adequacy ratio.

Shadow banking would need to be regulated to limit the availability of easy money to local governments. In recent years, local government financing vehicles have increasingly relied on funding from shadow banking's wealth management products and trust fund loans. These vehicles enabled local governments to obtain off-budget financing, but their benefits as flexible financing vehicles started to be outweighed by the low level of transparency, the potential impact on contingent liabilities for local governments, and the risks to investors and ultimately the banks that manage much of the shadow banking. To regularize shadow banking, all asset management products should be subject to the same fundamental regulatory standards. Regulatory policy for all collective investment products should be coordinated among government agencies, including the China Banking Regulatory Commission, the China Securities Regulatory Commission, and the China Insurance Regulatory Commission. A plan for reforming the legal and regulatory framework of shadow banking would have to be formulated, including short-term amendments of regulations and long-term amendments of primary legislation. Investments in wealth management products, trust funds, or other collective investment schemes should not be protected by implicit guarantees.

The role of policy banks in the provision of long-term finance should be strengthened to complement the shortage of supply for long-term market-based financing. Policy banks within the legal and regulatory framework could play a positive role in supporting the use of long-term capital market instruments through the issuance of innovative financial instruments that would support the growth of fixed-income markets; provide guarantees for local government bonds; and purchase a limited portion of new local government bond issues, thus serving as a market maker by buying or selling bonds as needed by other investors.

## Chapter 9 Promoting Greener Urbanization

### The context of the reforms

A sustainable city is one where environmental objectives are placed on an equal footing with economic growth and social inclusion, and sector policies are aligned with these strategic objectives. More sustainable cities are also more efficient: incorporating the losses from environmental damage into economic decisions will lead to more efficient outcomes. Further, as China becomes more prosperous, its population will increasingly demand a clean and healthy living environment, and livability will become a key factor in the locational decisions of foreign investors. Managing environmental pressures is essential to realizing denser, more efficient cities in which agglomeration effects are fully captured. More sustainable cities are more equitable, as environmental damage is predominantly inflicted on the less affluent.

The most important task for achieving greener urbanization is to strengthen green governance—the institutions, incentives, and instruments that enable effective environmental management. Moreover, inter-jurisdictional approaches are needed because some challenges like air and water pollution transcend jurisdictional boundaries. Applying principles of green governance in sector policies would facilitate reforms, some difficult, that are needed to achieve resource-efficient cities with low pollution. Facilitated by land, fiscal, and social reforms, needed urban infrastructure reforms across urban planning, transport, energy, buildings, water, and solid waste range from the mundane—such as better landfill management—to the monumental: dramatically switching energy away from coal toward natural gas and renewable energy.

### Strengthening green governance

Stronger incentives are needed to elevate green objectives to the level of economic growth and social goals for local government officials. Just as reduction in energy intensity has been a strict performance criterion for

several years, greater weight can be given to other environmental criteria, including making them binding targets. Because conditions vary greatly across cities, benchmarks need to be locally appropriate, focusing on basic pollution reduction in cities dominated by heavy industries, and emphasizing broader quality-of-life issues in already greener cities. Inclusion of these targets in the system for evaluating local officials would reinforce their importance. Moreover, longer tenure for local officials would also encourage urban management that focuses on the longer term, within which results on green objectives can be achieved.

Greater authority and human resources are needed for environmental enforcement. China's environmental management institutions are often understaffed and lack sufficient authority vis-à-vis local governments responsible for development. To improve environmental enforcement, China could consider a system in which the Ministry of Environmental Protection (MEP) would be responsible for enforcing national laws and regulations and would exercise stronger oversight over local environmental protection bureaus (EPBs). At all levels, environmental management institutions would need greater authority and independence when dealing with other ministries, local governments, state-owned enterprises, and private companies. To avoid conflicts of interest, EPBs should be funded from the general budget, independent of the collection of pollution fees and fines.

Environmental policies currently favor regulatory measures and targets, but in the future sharper and more market-oriented instruments can be used, and the cost of natural resources and environmental services can be made explicit even if funded out of general revenue. Raising prices to cost-recovery rates is most urgent in water supply, sanitation, and waste management. Cross-subsidies in the energy sector, which mainly favor residential consumers and discourage end use efficiency, could be reduced to avoid benefit leakage to the nonpoor or replaced with



targeted support to protect the poor from price increases.<sup>56</sup> Pricing for private vehicle transport can increasingly cover social costs including climate change impacts. The choice of carbon-pricing instruments (such as carbon taxes versus a cap and trade system) will influence the established energy efficiency and renewable energy policy framework. Strong energy policy coordination is needed to ensure consistency. The outcome needs to give a credible signal to investors, producers, and consumers that there will be a long-term, stable policy of increasing the price on pollution and harmful use of natural resources.

More channels for public participation and involvement of the judiciary would allow citizens affected by environmental problems to help the government monitor, enforce, and shape environmental policies. While environmental enforcement agencies have limited resources in all countries, most rely on assistance from the public, especially through environmental NGOs, not only for monitoring and environmental impact assessment, but also policy development. Other countries also allow the use of public complaint mechanisms and legal proceedings to hold polluters to account. Expanding China's experiments with environmental courts could be an effective step forward, including allowing third parties to sue polluters. Overloading the judicial system can be avoided by strengthening other mechanisms of environmental dispute resolution (such as specialized panels or tribunals) and through adequate safeguards to avoid frivolous lawsuits. To facilitate citizen involvement, promising new efforts in disclosing environmental information could be expanded. Polluting facilities should be held responsible for accurately reporting harmful emissions, along the lines of the U.S. Toxic Release Inventory or the European Union's Pollutant Emission Register. Currently there are too many exceptions that restrict disclosure.

Energy analysis could be incorporated into different stages of urban planning to optimize energy use. Rather than focusing solely on building-level or sector-based improvements, piloting systematic analysis of demand and energy resources in a city, and also at the neighborhood level, can lead to management

mechanisms that strengthen coordination and reduce the cost of energy investments and to policies to promote least-cost clean energy solutions. A number of planning and priority-setting tools, such as energy mapping and marginal abatement cost analysis for low-carbon cities, could help municipal governments apply low-carbon principles, even at the neighborhood scale.

## Greening across jurisdictional boundaries

Air quality management is making progress but regional solutions are needed to address the most severely polluted airsheds. Air pollution management continues to be the responsibility of individual local administrations, without sound mechanisms for coordination across boundaries. Regional institutions, perhaps modeled on the Southern California Air Quality District or similar agencies in Europe, would be better suited to design and implement abatement policies. Such institutions should be given real authority (either regulatory or by allowing them to use the court system for enforcement), which may require provincial or national government leadership. In addition, China's state-of-the-art air quality management technical capacity in public and academic institutions could be better used to conduct not only policy analysis but also comprehensive impact evaluation and cost-benefit analysis where many abatement programs currently fall short. Large-scale pilots, such as in the Jing-Jin-Ji (Beijing-Tianjin-Hebei) region, could help develop institutional and technical approaches for better air quality management.

Water quality management will need to be strengthened to resolve tensions between urban and rural water demand, especially in China's water-scarce north. Regional pilots to develop watershed-level governance of water rights and pollution allowances using advanced water consumption monitoring approaches show promise. They could be improved by strengthening the authority of watershed management institutions, first by replicating successful river-basin level "joint conference" mechanisms that

have coordinated integrated environment and water management plans at local levels. Watershed authorities could facilitate greater use of ecosystems payments, under which downstream users compensate upstream farmers or industrial users to maintain water quality. Water rights trading, which has been used successfully in other water-scarce regions such as the western United States and Israel, could also be piloted. Both require interjurisdictional coordination of financial flows, appropriate financial controls, and oversight.

## Greening sector policies

### Providing sustainable urban transportation

Despite modernization of the vehicle fleet and massive transport investments, mitigating the sector's increasing contribution to air pollution and urban congestion is needed. Improving traffic demand management to reduce the growth in private car use and promote a shift to public and nonmotorized transport are two key priorities. Most important is to charge drivers the costs in full of using private vehicles, and that covers the environmental and social costs, which include road pricing or congestion charging, and registration and parking fees (such as higher fees for polluting vehicles). Fuel costs (higher than in the United States but lower than in the European Union) could be gradually increased.

Fee revenues can be invested in more efficient and convenient public transit to replace trips in private cars. Subsidies for public transit will likely still be required, but they are justified by the public health damages and congestion costs they avoid.<sup>57</sup> Urban land use planning and zoning that promotes transit-oriented development and nonmotorized transport (walking and biking) will encourage modal shifts. In China's existing and emerging metropolitan areas, transport—like air pollution—needs to be managed regionally. Metropolitan transit authorities that address coordination issues are common in many cities globally.

Emission reduction measures targeting the most polluting vehicles are needed. So-called

“yellow-label” cars, which account for 13.4 percent of the total vehicle fleet, are responsible for 81.9 percent of particulate matter, 58.2 percent of nitrogen oxides (NO<sub>x</sub>), 56.8 percent of hydrocarbons (HC), and 52.5 percent of carbon monoxides (CO) emitted. The phase-out of yellow-label cars should be accelerated using a market-based approach. The program to trade in old cars for new cars should be continued. The scope of subsidies to energy-efficient and green cars should be broadened. Collecting emission fees on vehicles and applying differential toll rates for roads, bridges, and highways should be studied and potentially made into policies. Consumers buying and producers manufacturing vehicles with stricter emission standards should be given incentives. Incentives for phasing out yellow-label cars should be implemented; for example, business operators that replace their yellow-label cars could receive rewards in lieu of subsidies. The supply of diesel and gasoline with lower sulfur levels should be increased. Institutions should be given greater authority to enforce emissions standards.

### Cleaner energy

Globally, no other modern cities rely on coal for their energy needs as much as many Chinese cities do, and reducing its use should be the centerpiece of urban energy strategies. While shifting the economic structure to industries that are less energy intensive and more high value added and service oriented can help over the long term, reducing energy demand is a priority. The scaling up of cost-effective local clean energy production and importation of cleaner energy from outside city boundaries can be key elements of this strategy in the short and medium term. Cleaner natural gas can be a viable alternative to coal as production and imports continue to be scaled up. Conversion can be accelerated with more competition in upstream development and greater investment in transmission, distribution, and storage by introducing third-party access to the gas market, continuing pricing reforms, and introducing modern sector regulation. Given current gas supply constraints, it is important

to prioritize gas usage in the residential, heating, and commercial sectors where it will have the largest environmental and economic benefits. These three user types would require slightly less than 200 billion cubic meters by 2030 to achieve universal residential access and about 60 percent gas-based centralized heating supply, compared with total consumption of 130 billion cubic meters in 2011. Because the power sector and large-scale energy consumers will rely on coal for longer, strict enforcement of emissions control standards and efficiency improvements are needed.

In the longer term, China's cities need to increasingly rely on renewable energy sources. Supply will come from large-scale production outside city limits, which will require the removal of barriers related to pricing and grid access for commercial renewable energy producers. Over time, establishing efficient mechanisms for regulating, metering, and financing distributed power generation from renewable sources and natural gas distribution will promote their use. China's coal-reliant district heating sector contributes significantly to China's wintertime air pollution and requires urgent attention. In addition to switching to gas, the current area-based billing system for district heating services contradicts China's concerted energy conservation policies. Pricing and consumption-based billing reforms supported by national regulations that sharpen regulatory tools such as licensing and enforcement could facilitate improvements across China's northern provinces. Building retrofit programs, which are increasing in scale in China, could accommodate district heating sector reform by setting a mandatory deadline for the introduction of consumption-based billing after retrofitting or by considering building-level metering for buildings with reasonable energy performance.

### **Rebalancing markets and mandates to reduce energy use in industry**

Improving energy efficiency in industry has been largely successful, but additional progress that is still urgently needed will become increasingly harder to achieve without

rebalancing administrative measures with market-based approaches. As demand growth for heavy industrial goods slows, companies may find cost-reducing investments in energy efficiency more attractive. Raising energy-related taxes and defining a carbon-pricing strategy (by the 13th Five-Year Plan) would motivate enterprises to seize efficiency opportunities for their own business interests. Associated revenues could be recycled to provide stable, multiyear financing of energy efficiency programs. The energy savings agreement system has been effective and can be continued, but allowing enterprises to achieve targets either through their own improvement or by trading energy savings certificates from other companies would be more efficient. Third-party technical service providers for energy efficiency audits, new fixed asset energy assessments, and similar projects can be fostered as part of a greater energy efficiency services industry that would offer better financing and customized business models, including energy services performance contracting in enterprises. Cities must continue to be innovation drivers in energy efficiency policies and programs, encouraging the incubation of energy efficiency services through knowledge exchanges, local associations, promotion, and market development.

### **Serving the people in more efficient and cleaner buildings**

The public sector should lead by example by addressing energy efficiency in the stock of public buildings. Procurement of energy savings performance contracting for public institutions would promote the market for energy efficient and green buildings and products, lowering costs over time. Monitoring, rating, and publicly disclosing building energy performance can be effective motivational tools. Energy performance targets for residential and commercial buildings should be set to define "low-energy building" standards. Time-bound targets would set clear expectations for performance improvement, encouraging innovation in the marketplace and guiding refinement of building energy efficiency codes and standards. In addition



to using stricter codes to set “the floor,” successfully achieving advanced green building ambitions will require a larger effort in developing capacity across the supply chain (from design to materials to construction). Finally, to reduce the use of harmful building materials in China, improved monitoring and enforcement of standards are required, together with a labeling system possibly modeled after Germany’s “Blue Angel” system.

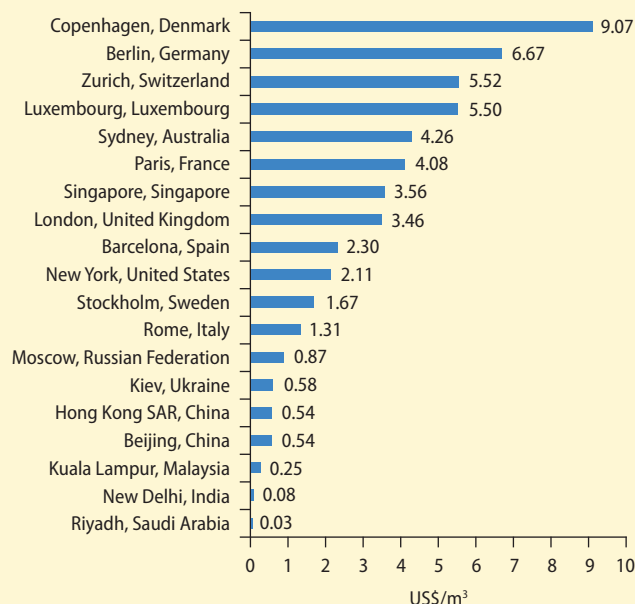
### Integrating water supply and pollution management

Reducing urban water demand and strengthening the financial health of the water and sanitation sectors are two of the most important tasks for accommodating greater numbers of residents and businesses in cities with water quality and scarcity problems. China’s water and wastewater tariffs are low by international comparison (figure O.11). Setting cost-recovering tariffs and completing water metering will encourage water-saving behavior and generate resources to sustainably fund water and wastewater management. Supportive tariff policies should be complemented with reform of the water utility governance. Integrating drainage and treatment services, piloting water boards in larger cities, and consolidating smaller utilities in nearby cities, possibly through concessions, are needed to achieve scale economies and improve management. While water treatment and wastewater standards are essential, one-size-fits-all regulations result in oversized infrastructure and raise compliance costs that some weaker cities find difficult to meet. A recent study of 655 utilities and local governments estimates that 85 percent of water treatment plants are seriously oversized and that the maximum daily water supply was less than 50 percent of production capacity of facilities.<sup>58</sup>

### Getting the fundamentals right in solid waste management

Inadequate cost recovery hinders expansion and improvement of solid waste collection, recycling, and disposal systems. About RMB 200 billion nationally will be needed

**FIGURE O.11 Water and wastewater tariffs**



Source: GWI 2011.

annually in the coming years, increasing to more than RMB 400 billion, to manage waste projections for 2030. Yet, waste service charges make up only about 10 percent of real costs, which is concerning for a sector with high marginal operating costs. Subsidies should (partially) be phased out over a period of five to ten years while payment mechanisms are introduced (that is, combined with other utility charges) to create incentives to reduce waste, recycle more, and operate systems more efficiently and effectively. Recycling in China is widespread but informal. Formalization could yield revenue to finance waste management but would threaten the livelihoods of low-income collectors of recyclable materials and thus requires careful calibration. With sector reforms to establish good fundamentals, product stewardship programs could be introduced so that manufacturers take responsibility for life-cycle waste generation including packaging materials and final disposal. This program could start with voluntary schemes leading to public-private cooperation, as in other countries.

Waste management facilities need to be integrated into land use planning, making greater use of environmental impact assessments and permitting as regulatory tools. For instance, contaminant hydrogeology needs to be considered in landfill site selection and design, but data are often lacking. Furthermore, testing, treatment, and disposal of fly ash from incinerators needs to be improved and unsanitary landfills rehabilitated to minimize long-term environmental hazards and enable a return of the land to productive uses. Operating waste management facilities can be challenging for smaller towns and cities. They can seek scale economies by cooperating with adjacent jurisdictions to develop more efficient and well-operated waste management facilities such as landfills or incinerators.

### **Strengthening the controls of chemicals and hazardous materials**

Through legislation, China should implement declaration, hazard identification, and environmental risk assessment procedures for the production, storage, transportation, sales, use, and import and export of chemical substances and their goods and products. Hazardous and toxic chemical substances should be identified and labeled as hazardous, and their use should be discouraged, limited, or phased out, or they should be substituted by green alternatives. Other measures, such as process control, risk management, and contamination control should also be enforced to mitigate the risks associated with chemicals and to reduce the discharge of hazardous and toxic chemical substances into the environment.

## Chapter 10 Ensuring Food Security

China has established a comprehensive food policy framework with minimum grain purchasing prices at the core, supported by temporary grain reserves, direct food subsidies, grain stock adjustments, and international trade. This framework, along with China's institutional reforms and productivity growth in the agricultural sector over the past decades, has been critical to China's food grain security. But these policies have not addressed problems related to distortions in grain prices, policy inefficiencies, obsolete grain circulation and reserve systems, and weak food safety nets, so that they need further improvement to meet the challenges of urbanization.

### Setting China's food security objectives

Food self sufficiency may be desirable for a country with a population of 1.3 billion people, but in view of the structural changes in agricultural production and in food consumption that have taken place over the past decades, as well as the escalating environmental and resource constraints, China's current objective of food security in all food categories is neither feasible nor necessary. Instead, China should redefine its food security objectives based on the principles of efficiency, openness, and sustainability. Taking environmental capacity and resource constraints into account, China should strive to unlock the potential for increased grain production by improving productivity and market efficiency, thereby projecting a clear and transparent picture of China's needs for grain imports and exports. China should adjust its food security objective toward maintaining self-sufficiency in food grains while allowing for more imports of nonfood grains and other agricultural products. More emphasis should be placed on food quality and safety, agricultural sustainability, and protection policies for low-income groups. Stronger emphasis should also be placed on improving the environmental sustainability of China's

domestic livestock sector through better protection and management of China's grassland resources. The fine tuning of China's food security objectives needs to be complemented by policy reforms, investments in agricultural water resources management, and rural land and labor market reforms.

### Enhancing domestic grain production capacity

China has raised agricultural productivity successfully in the past. From 2004–11, total factor productivity grew at a rate of 2 percent annually for all major grain crops and at 3 percent annually for the major vegetable crops. If China is to increase domestic grain production capacity, ensuring continuous productivity growth in agriculture is a priority. Compared to many other countries, China's potential for increasing labor and land productivity is significant. The potential of productivity growth can be captured through promoting economies of scale in agriculture, primarily by increasing the scale of farming operations, and through continued investments in research and development.

The process through which labor and land productivity can grow and farmland can be consolidated needs to be carefully coordinated, and the pace of change carefully controlled. Specifically, the government's role will be (1) to improve policies that allow rural migrants to become urban citizens, thereby stimulating more permanent migration to urban areas, and (2) to create the conditions for consolidated agricultural operations and improved labor productivity in rural areas. The government will need to rationalize the rural land rights system, develop rural land markets, and create incentives for a market-based consolidation of farmland to allow modern medium- and large-scale entities, such as commercial grain producers, larger family farms, and specialized cooperatives to emerge.

Steady productivity growth in grain production requires continued technological

advancements in agriculture. The key drivers for technological progress are increased public spending on agricultural research and development, integrated programs to promote advanced yield-enhancement technologies, mechanization in grain production, capacity building of farm producers, adoption of modern biotechnology, and expedited breeding of new, improved crop varieties. Investments will also be needed for (1) transforming low- and medium-yield farmland into land of higher productivity, (2) the expansion or rehabilitation of irrigation infrastructure, (3) improving on-farm water use efficiency through better technology and with better water-pricing policies, and (4) the development of water users' associations that can help improve water use efficiency in irrigation areas.

### Improving agricultural sustainability

Current practices of overfertilization need to be changed to reduce environmental costs and to ensure that agricultural resources and the environment are managed in more sustainable ways. Audits on heavy metal contamination in major grain-producing regions can provide the necessary baseline information, while environmental risk assessments can help identify key target regions for action. The classification of key regions according to function can be used to determine potential treatments based on the severity of contamination, and crop mixes can be adjusted accordingly. China should set sound, science-based criteria for tillage on land contaminated by heavy metals. For areas where contamination is severe and tillage should not continue in the future, ecological compensation schemes can be considered to support farmers' jobs and incomes. The progress that has been made on reverting farmland back to forests should be carefully managed in order to prevent the reclamation of already retired farmland. The scope of the slopeland conversion program should be further expanded to also include severely desertified areas. A special subsidy program for land quality protection should be implemented to support

farmers who opt to leave their land fallow, readjust their land mix, or limit the use of pesticides and chemical fertilizers.

### Enhancing international cooperation and trade

Following China's WTO accession, progressive and predictable import growth has been shown to create win-win results. For example, China's growth of soybean imports has driven global soybean production, particularly in the Americas, and promoted global trade. The benefits for China include meeting growing domestic demand and saving land and water resources. Building on these experiences, China could strengthen cooperation with major grain-producing nations by signing medium- and long-term grain trade agreements with such countries, and creating stable and diversified import avenues. China could also leverage its comparative advantages and expand agricultural development aid and investments in neighboring countries and in South America and Africa, and actively participate in global and regional food security governance. China should focus on agricultural technology transfer, and investments in processing, storage, transportation, and trade, ensuring socially responsible and sustainable investments. While such investments may not result immediately in more agricultural products flowing to China, they will increase other countries' grain production capacity and improve global grain supply, which in turn will improve the external environment of food security for China.

### Reforming grain price formation mechanisms

China's grain price mechanism has resulted in market distortions and a heavy fiscal burden for the government, and it requires reform. China should allow grain prices to fluctuate freely during normal periods and secure a food supply for low-income groups through food subsidy programs. Only in times of natural disaster or external shocks should the government intervene and release

the state's emergency grain reserves. China's grain producer price should be replaced by a target price system. Moving away from direct government buying in the market to price subsidies linked to a target price (price benchmark) should be considered. This would separate price formation from government subsidies, the benefits of which would include gains to farmers and less market distortion. Such a policy has been adopted by many countries in their transition from price support to direct subsidies. While conducting price reform, China needs to quicken the pace of building a food safety net for vulnerable income groups. Food price inflation and benchmarks for social relief and benefits need to be better linked. For specifically vulnerable groups, such as households in extreme poverty, a direct food supply system should be established.

### **Improving the efficiency of grain producer subsidies**

China's existing grain subsidy policy should be maintained to help stabilize farmer's income expectations. Subsidy levels should be adjusted regularly to counter the erosion of farmers' gains because of rising production costs. Current agricultural subsidies are still comfortably below the WTO-mandated caps, and there is room to grow further. But China's subsidy policy also needs reform to meet the new food security objectives. Subsidies should be better linked to yields of grain crops, and incremental subsidies should favor the main grain-producing regions and producers. China may also create a special

subsidy program linked to environmental protection to create incentives for farmers to opt for retiring farmland or reducing output levels.

### **Reforming China's grain reserves and circulation system**

The government should carefully distinguish between strategic grain reserves and grain buffer stocks. Strategic reserves are built primarily to withstand systemic grain supply shocks and such reserves should be modest. Buffer stocks would be used mainly to balance grain supply and demand between seasons and different regions and should be concentrated in major grain consumption regions, especially city clusters. The share of processed grains should be increased and the role of local governments in building grain reserves should be strengthened. China may also create incentives for grain processing and circulation enterprises to contribute to grain reserves. And finally, China needs to improve its network of modern grain logistics, which run through major interprovincial corridors and connects major grain-producing regions, distribution centers, and transportation hubs to and from cities and city clusters. The focus should be on consolidating existing grain logistics resources, creating a network of critical grain logistics hubs, and strengthening the connections between such hubs and railway, waterway, and highway transportation infrastructure. Warehousing services should be made more specialized and market-based, and grain warehousing could be professionalized and privatized.

## Chapter 11 Timing, Sequencing, and Risks

This report has laid out the directions for a comprehensive urbanization strategy for China that aims to guide China's inexorable urbanization toward an outcome that improves the quality of life for China's citizens. To use economic resources efficiently, and maximize the benefits of urbanization, is a leading consideration. It is complemented by the need to make urbanization sustainable in the face of environmental constraints and the scarcity of natural resources that threaten the balance between humans and nature, perhaps irreversibly. And the objective of equity and fairness for all—the need for inclusiveness—must be imperative for a harmonious strategy that has the interests of all citizens in mind. But the issues of efficiency, inclusion, and sustainability cannot be dealt with separately: they are closely interwoven. By its very nature, the agenda spelled out in this study is comprehensive and all-encompassing; yet the ability of any government to design, introduce, and implement reforms is restricted by capacity and time and the measure of change and reform that society and the economy can agree upon and absorb simultaneously. With these constraints in mind, authorities will need to set priorities and carefully think through the sequence and timeline of implementing the proposed policies.

### Timing and sequencing

Reforms in land, fiscal, and finance systems are at the core of the proposed strategy—their implementation is important and urgent. They support urbanization but are also part of the overall reform strategy as spelled out in *China 2030*, the report that the DRC and the World Bank published in the spring of 2013. That report advocates a decisive move from state to market, which will be the backbone for China's shift to quality, instead of quantity, of growth.

Land reform that addresses distortions in the land market, especially in peri-urban areas, stands out as a promising point of departure and would lay the basis for other reforms. It would make land on the urban fringe open for competitive usage, contain

unsustainable urban sprawl, and help safeguard the rights of farmers, thus reducing a major source of social tension. While government prepares for stronger property rights for farmers, it may wish to tighten annual conversion quotas in the meantime, because most cities have sufficient land available for their needs in the short term. Land reform is also the basis for reforming the urban planning system to integrate land use with housing and infrastructure planning to arrive at a comprehensive spatial development strategy with the objective of creating livable cities.

Currently, cities in China finance large parts of their expenditures through peri-urban land conversion, and sales and reform of the land market will eliminate this opportunity. It will therefore be necessary to introduce far-reaching fiscal reforms to strengthen the balance sheet of municipalities with new sources of revenue either through direct local levies and taxes or through central government transfers. Equally urgent, government would need to focus on local borrowing of all kinds, first and foremost to assess whether the situation requires action, and the just-completed National Audit Office audit of local government debt is a strong basis for such an assessment. Instances of unsustainable borrowing would need to be addressed. Formal access to borrowing will have to wait until a full regulatory framework is in place, which should follow the strengthening of local government revenue sources. A decision on a temporary fiscal subsidy for integrating migrants into urban areas would accelerate the implementation of a residency system and could be made early on, because the fiscal resources are already available.

Other systemic changes proposed in policy areas in this report could be implemented over time, but presenting a comprehensive plan for implementing the reforms would lend credibility to urbanization. That is especially true for the sustainability agenda that can build on China's impressive set of environmental laws and regulations and where the most important task is to strengthen the institutions, incentives, and instruments that



enable environmentally sound urban development. Greater authority and human resources are needed for environmental enforcement, and more market-based instruments should be used so that the costs of using natural resources and polluting the environment are explicitly priced. These broad-based policy considerations should be adopted immediately. But their implementation will require focus and persistence over a long period.

## Risks

The introduction of a property tax might affect property values, with possible knock-on effects on banks and local finances. This risk seems limited, however. First, the proposed property tax, at 1 percent of property values, is modest compared with the current annual increase in value of some 8 percent—with double-digit increases in the large cities. Second, even if prices were affected, banks are well protected against price corrections, because the value to loan ratio has been regulated, and thus their buffers seem more than adequate for any eventuality. An announcement of the tax may cause an increase in the supply of housing, notably of second properties currently held for investment, which is intended and desirable.

The affordability of a property tax may raise concerns for some. Property prices in China are very high compared with current incomes, especially for those who have lived on fixed incomes for some time, such as pensioners. Even with a low rate, the property tax could take up a large share of current income for some homeowners. From an efficiency point of view, anyone who cannot afford the property tax would have to sell their home and move to less expensive parts of the city, making room for those who can afford it. That, however, may be socially unacceptable. Other countries take care of these risks at the low end of the income strata with exemptions, perhaps some kind of homestead exemption, although too high an exemption may reduce the revenues from the tax too much. Phasing in the tax at low rates initially could also be considered, in part because wages in cities are likely to adjust in light of the tax, and people could adjust their living arrangements, for example, by renting

out parts of their apartments to generate income. People with more than one apartment for investment purposes are more likely to sell their additional properties, which would improve the housing market. The alternative to a property tax—such as taxing property values or the value increasing only at the time of transactions—would also solve the problem of affordability, but would distort the property market, and the tax would lose its basic function as a charge for urban services on those who enjoy them.

There is a risk that allowing rural construction land to be sold directly for development could lead to rapid and uncoordinated development. Zoning restrictions would normally prevent this, but local governments may also be keen to expand the city and rezone rural land aggressively. Stronger property rights for farmers should prevent a rush—because prices are likely to be higher—but it may be prudent for China to carefully scale up the successful pilots before setting nationwide policy.

Some fear that stronger rights for rural landholders will stop urbanization effectively, because land will become too expensive to convert, but this is not so. The territorial expansion of cities may slow down, but that should not be confused with slower urbanization, which, as this study has argued, can progress on existing land through densification and redevelopment of existing land. Also, local governments can still convert land, when the higher price they have to pay for rural land is warranted by its urban use.

Finally, there is a risk that in reforming, hukou migrants will move to receive better benefits and services rather than for productive reasons. Previous evidence in China does not seem to support this concern, however, except perhaps for the largest cities. Internationally, there seems little evidence of “benefit migration,” but within countries, people do want to move to cities for better public services such as education. That would imply that for a transitional period the requirements for residency in large cities may have to be more stringent than in other places—but with a clear timetable for phase-out. In the medium term, removing mobility restrictions and adjusting the tax structure so that



those who benefit are also taxed—through a property tax, for example—would yield an optimal outcome.

## Institutions and governance of the reform agenda

A comprehensive urbanization strategy requires interactions among many actors, at the central and local levels, and coordination between ministries and agencies will be of crucial importance. Urbanization done properly needs to be built on a “Whole of Government” approach at all levels. At the central level, cooperation and coordination between ministries have been notoriously difficult, and ministries tend to develop sector strategies largely independent of each other. Looking to the broader reform agenda, urbanization reforms should be included in the top agenda of the Central Leading Group for Reforms. The Leading Group should also coordinate the formulation and piloting of reform policies at the national level.

China will need to continue to rely on its decentralized administrative structure to implement reforms although a rebalancing of the roles of central and local governments may be required, with the central government taking greater responsibility for policies with national implications such as the basic social security package. To provide incentives for behavioral change within local governments, the central government, after setting the overall development direction, will need to make more effective use of its two main mechanisms for guiding the actions of local governments—the fiscal system and the government personnel system that rewards local leaders’ success based on national development goals.

To meet the GDP goals favored under the personnel system, and with considerable technical capacity and ample funds derived from land revenue, local governments have taken the role of implementers of urbanization using public infrastructure construction as a way to boost short-term growth in GDP and jobs and to meet annual targets. In the future, to promote efficient, inclusive, and sustainable development, the role

of government at all levels needs to change to allow for the greater involvement of markets. That does not imply a diminished role for government, but rather a different one, in which government steps back from being the main implementer of urbanization to becoming the enabler. The proposed fiscal system reforms, if coupled with greater incentives to promote inclusion and sustainability through more balanced performance targets and longer tenures, would allow local governments to shift their primary focus from constructing infrastructure to creating new policies and practices at the local level that address more complex and intractable problems such as air pollution control. Local government can also take a more active role in regulating development, including in ensuring that local and regional objectives for environmental quality and social inclusion are met.

The rigidity of China’s provincial and local administrative structure—on the one hand a strength because it promotes local innovation and initiative—is also a weakness because the intense competition between provinces and cities inhibits effective regional cooperation. In some areas such as the provision of trunk transport infrastructure, regional competition has been overcome by the central government taking a stronger implementation role, but in others, such as management of water and air resources, the lack of regional planning and cooperation has led to an escalation of negative impacts. Regional solutions that stretch beyond provincial and municipal boundaries will be needed to better manage metropolitan areas in order to capture agglomeration benefits and manage externalities.

Finally, greater participation of China’s citizens in the urbanization process would enhance accountability of local governments and ensure that policies are responsive to local needs. In some areas, China has a relatively mature system of citizen involvement—examples are local elections, consultation processes for environmental impact assessments, and China’s long-established complaints system. But in many cases, the usefulness of citizen involvement is diminished by the lack of access to information. Especially in the field of environment, greater transparency

and disclosure of pollution information, including compliance data, would enhance citizens' ability to engage constructively and meaningfully.

## Notes

1. From 2000 to 2010, urban natural increase, net migration, and urban reclassification accounted for about 15, 43, and 42 percent of urban growth, respectively.
2. ADB 2012a; Rosenthal and Strange 2003; Black and Henderson 1999; Lucas 1993.
3. World Bank 2009.
4. Glaeser and Joshi-Ghani 2014.
5. Campos 2012.
6. Black and Henderson 1999; Lucas 1993; Rosenthal and Strange 2003.
7. Desmet and Fafchamps 2006.
8. World Bank 2013.
9. Conventional investment numbers are measured as "fixed capital formation," which in China is available only at the national level. At the city level, China publishes data on "Fixed Asset Investment," which covers investment in existing assets, including land. This measure tends to drive up ICORs when asset prices rise more rapidly than capital goods prices. Thus, city-level ICORs are not comparable with national or international ones.
10. Authors' estimates based on NBS data: [www.stats.gov.cn/english/Statisticaldata](http://www.stats.gov.cn/english/Statisticaldata).
11. This paragraph largely draws from the NBS Migrant Survey, December 2012.
12. DRC 2014.
13. DRC 2014.
14. Hort and Kuhnle 2000; Kwon 2007; Knight, Li, and Song 2006.
15. Cai and Henderson 2013.
16. Huang, Wang, and Qiu 2012.
17. Huang, Wang, and Qiu 2012.
18. Deininger and Jin 2008.
19. Bank staff estimates of the correlation between urban land price increases and density using CEIC data.
20. This extraordinarily high share of labor reflects in part the lack of mechanization in agriculture (see chapter 4), but it may also result from a low remuneration for agricultural land.
21. In comparable international prices.
22. Authors' calculations based on NBS 2013.
23. China Development Research Foundation 2010.
24. Gan and others 2013.
25. Davies and others 2007. Note that the data from the China survey are not necessarily comparable to the numbers in this paper.
26. Caselli and Coleman 2001.
27. Knight, Li, and Song 2006.
28. Interprovincial migration in China rose from 25 percent of all migration in 2000 to 32 percent by 2010; in the United States, it constituted nearly 50 percent from 1947 to 2012.
29. Page 2011.
30. Gallagher 2013.
31. Liu 2008; Wang 2010.
32. In March 2011, the State Council (2012) drew up *A Notice on Actively and Stably Pushing Forward the Hukou System Reform*. The full text was released in March 2012.
33. Zhang and Tao 2012; Zhang 2012.
34. Barrett, Joyce, and Maitre 2013 and Dustmann, Frattini, and Halls 2010.
35. Meng and others 2012.
36. Man, Zheng, and Ren 2011.
37. Man, Zheng, and Ren 2011.
38. Li 2012; Huang and Jiang 2009; Logan, Fang, and Zhang 2010; Zhang and Chen 2014.
39. <http://www.labour-daily.cn/web/NewLabourElectronic/newpdf/PdfNews.aspx?Calendar=2011-9-24>.
40. PBOC 2013.
41. Lall, Timmins, and Yu (2009) evaluated the relative importance of wage differences and public services in migrants' decisions to move in Brazil. Their findings showed a distinction in preferences according to income level: for relatively well-off people, basic public services were not important in the decision to move, but for the poor, differences in access to basic public services did matter.
42. Liu, Park, and Zhao 2010.
43. Sugar, Kennedy, and Leman 2012.
44. Currie and Vogl 2012; Currie and Neidell 2005; Padula and others 2013.
45. MEP 2013.
46. NBS database.
47. DRC and ERI 2009.
48. OECD 2009.
49. World Bank 2011.
50. Weber and others 2008.
51. Feng and others 2013.
52. World Bank and DRC 2013.
53. Based on income.
54. See supporting report 6, "Financing Urbanization," for details of the model and simulations.
55. World Bank Institute and PPIAF 2012.
56. Ruggeri-Laderchi, Olivier, and Trimble 2013.

57. Few public transport systems are unsubsidized. However, subsidies can be lower if individual car use is made more costly through taxes and levies.
58. World Bank and DRC 2013.

## References

- ADB (Asian Development Bank). 2012a. *Advancing Regional Cooperation and Integration in Asia and the Pacific, Annual Report*. Manila: ADB.
- Bairoch, Paul, and Gary Goertz. 1986. "Factors of Urbanization in the Nineteenth Century Developed Countries: A Descriptive and Econometric Analysis." *Urban Studies* 23: 285–305.
- Bertaud, A. 2004. "The spatial organization of cities." This article can be accessed online at: [http://alainbertaud.com/wp-content/uploads/2013/06/AB\\_The\\_spatial\\_organization\\_of\\_cities\\_Version\\_31.pdf](http://alainbertaud.com/wp-content/uploads/2013/06/AB_The_spatial_organization_of_cities_Version_31.pdf).
- Black, Duncan, and J. Vernon Henderson. 1999. "A Theory of Urban Growth." *Journal of Political Economy* 107 (2): 252–84.
- Cai, W, and J. V. Henderson. 2013. Distorted capital markets in China: The bias towards political cities and state owned firms." Background paper for China Urbanization Study.
- Campos, Cecilia. 2012. "The Geographical Concentration of Industries." United Kingdom Office for National Statistics. July 20, 2012. Available online: [http://www.ons.gov.uk/ons/dcp171766\\_272232.pdf](http://www.ons.gov.uk/ons/dcp171766_272232.pdf).
- Caselli, Francesco, and Wilbur John Coleman. 2001. "The U.S. Structural Transformation and Regional Convergence: A Reinterpretation." *Journal of Political Economy* 109 (3): 584–616.
- CEIC Data. n.d. *China Premium Database. A product of ISI Emerging Markets*. New York. [www.ceicdata.com](http://www.ceicdata.com).
- Cheng, Zhen, Jingkun Jiang, Oscar Fajardo, Shuxiao Wang, and Jiming Hao. 2013. "Characteristics and Health Impacts of Particulate Matter Pollution in China (2001–2011)." *Atmospheric Environment* 65: 186–94.
- China Development Research Foundation. 2010. *China's Urbanization Strategy*. 2010 China Development Report coordinated by the China Development Research Foundation and authored by the NDRC and Chinese Academy of Social Sciences.
- China Ministry of Housing and Rural-Urban Development. Various years. *China Urban Construction Statistical Yearbook*. Beijing: China Planning Press.
- China Ministry of Land and Resources. Various years. *Land and Resources Statistical Yearbook*. Beijing: Geological Press.
- Council for Economic Planning and Development (Taiwan). Various Years. *Taiwan Statistical Data Book*. Taipei: Council for Economic Planning and Development. Available online at <http://www.ndc.gov.tw/encontent/m1.aspx?sNo=0001453>.
- Currie, Janet, and Matthew Neidell. 2005. "Air Pollution and Infant Health: What Can We Learn from California's Recent Experience?" *Quarterly Journal of Economics* 120 (3): 1003–30.
- Currie, Janet, and Tom Vogl. 2012. "Early-Life Health and Adult Circumstance in Developing Countries." NBER Working Paper 18371. National Bureau of Economic Research, Cambridge, MA.
- Davies, James B., Susanna Sandström, Anthony Shorrocks, and Edward N. Wolff. 2007. "Estimating the Level and Distribution of Global Household Wealth." WIDER Research Paper 2007/77. United Nations University, Helsinki.
- Deininger, Klaus, and Songqing Jin. 2008. "Land Sales and Rental Markets in Transition: Evidence from Rural Vietnam." *Oxford Bulletin of Economics and Statistics* 70 (1): 67–101.
- Desmet, Klaus, and Marcel Fafchamps. 2006. "Employment Concentration across U.S. Counties." *Regional Science and Urban Economics* 36 (4): 482–509.
- DRC (Development Research Center) of the State Council. 2010. "China's urbanization: prospects, strategies, and policies." China Development Press, Beijing.
- . 2014. Background paper for Urban China. Beijing: China Development Research Center.
- DRC (Development Research Center of the State Council of China) and ERI (Energy Research Institute at National Development and Reform Commission of China, Institute of Nuclear and New Energy Technology at Tsinghua University). 2009. *2050 China Energy and CO<sub>2</sub> Emission Report*. Beijing: Science Press.
- Dressler, Andreas. 2013. "The Shifting Landscape of Business Incentives in Europe." *Site Selection* magazine, January 2013. <http://www.siteselection.com/ssinternational/2013/jan/europe.cfm>, accessed October 6, 2013.

- Dustmann, Christian, Tommaso Frattini, and Caroline Halls. 2010. "Assessing the Fiscal Costs and Benefits of A8 Migration to the UK." *Fiscal Studies* (Institute for Fiscal Studies) 31(1), pages 1–41.
- Ebenstein, A. 2012. "The Consequences of Industrialization: Evidence from Water Pollution and Digestive Cancers in China." *Review of Economics and Statistics*, 94(1):186–201.
- European Commission. 2013. Competition Directorate, State Aid. Brussels. [http://ec.europa.eu/competition/state\\_aid/overview/index\\_en.html](http://ec.europa.eu/competition/state_aid/overview/index_en.html).
- Feng, Kuishuang, Steven J. Davis, Laixiang Suna, Xin Lie, Dabo Guan, Weidong Liu, Zhu Liu, and Klaus Hubacek. 2013. "Outsourcing CO<sub>2</sub> within China." *Proceedings of the National Academy of Sciences* 110 (28): 11654–59.
- Gallagher, M. 2013. "Social Cohesion, Urbanization, and Labor Conflict." Background paper for this report.
- Gan, Li, Zhichao Yin, Nan Jia, Shu Xu, Shuang Ma, and Lu Zheng. 2013. *Research Report of China Household Finance Survey 2012*. London: Springer.
- Glaeser, Edward L., and Abha Joshi-Ghani. 2014. "Overview—The Urban Imperative: Toward Shared Prosperity." Policy Research Working Paper 6875, World Bank, Washington, DC.
- GWl (Global Water Intelligence). 2011. "Global Water Market Intelligence." Available online: <http://www.globalwaterintel.com/market-intelligence-reports/>.
- Hort, Sven E. O., and Stein Kuhnle. 2000. "The Coming of East and South-east Asian Welfare States." *Journal of European Social Policy* 10 (2): 162–84.
- Huang, Jikun, Xiaobing Wang, and Huanguang Qiu. 2012. "Small-scale Farmers in China in the Face of Modernisation and Globalization." International Institute for Environment and Development, London. Available online: <http://pubs.iied.org/pdfs/16515IIED.pdf>.
- Huang, Youqin, and Leiwen Jiang. 2009. "Housing Inequality in Transitional Beijing." *International Journal of Urban and Regional Research* 33 (4): 936–56.
- Knight, John, Shi Li, and Lina Song. 2006. "The Rural-Urban Divide and the Evolution of Political Economy in China." In *Human Development in the Era of Globalization: Essays in Honor of Keith B. Griffin*, edited by James Boyce, Stephen Cullenberg, and Prasanta Pattanaik. Northampton, MA: Edward Elgar.
- Kwon, Huck-ju. 2007. "Transforming the Developmental Welfare States in East Asia." DESA Working Paper 40. United Nations Department of Economic and Social Affairs, Geneva.
- Lall, Somik V., C. Timmins, and S. Yu. 2009. "Connecting Lagging and Leading Regions: The Role of Labor Mobility." *Brookings-Wharton Papers on Urban Affairs*: 151–74.
- Li, Si-Ming. 2012. "Housing inequalities under market deepening: The case of Guangzhou, China," *Environment and Planning* 44: 2852–66.
- Liu, X., A. Park, and Y. Zhao. 2010. "Explaining Rising Returns to Education in Urban China in the 1990s." Access this report: <http://home.ust.hk/~albertpark/papers/explainingreturns.pdf>.
- Liu, Linping. 2008. "Interaction and Attitude: Migrant Peasant Workers in the Eyes of Urban Citizens: A Survey of the Guangzhou Citizens." *Journal of Sun-Yat Sen University* 2: 183–92.
- Logan, J. R., Y. Fang, and Z. Zhang. 2010. "The Winners in China's Urban Housing Reform." *Housing Studies* 25 (1): 101–17.
- Lucas, R. E. 1993. "Making a Miracle." *Econometrica* 61: 251–72.
- Man, Joyce Yanyun, Siqi Zheng, and Rongrong Ren. 2011. "Housing Policy and Housing Markets: Trends, Patterns, and Affordability." In *China's Housing Reform and Outcomes*, edited by Joyce Yanyun Man. Cambridge, MA: Lincoln Institute of Land Policy.
- Meng, Qun, Ling Xu, Yaoguang Zhang, Juncheng Qian, Min Cai, Ying Xin, Jun Gao, Ke Xu, J. Ties Boerma, and Sarah L. Barber. 2012. "Trends in Access to Health Services and Financial Protection in China between 2003 and 2011: A Cross-sectional Study." *The Lancet* 379 (9818): 805–14.
- MEP (Ministry of Environmental Protection). 2013. "2012 Environmental Conditions Report (2012 zhongguo huanjing zhuangkuang gongbao)." Beijing, China. Available online: <http://www.mep.gov.cn/gkml/hbb/qt/201306/W020130604382172090857.pdf>.
- Milanovic, Branko L. 2013. "All the Ginis Dataset." World Bank, <http://go.worldbank.org/9VCQW66LA0>.
- MOF (Minister of Finance), China. Annual Budget Reports, various years: [www.mof.gov.cn](http://www.mof.gov.cn).
- Müller, D.B., G. Liu, A.N. Løvik, R. Modaresi, S. Pauliuk, F.S. Steinhoff, and H. Brattebø. 2013. "Carbon Emissions of Infrastructure

- Development.” *Environmental Science & Technology* 47 (20): 11, 739–46.
- NBS (National Bureau of Statistics). 2012. “National Monitoring Survey Report for Rural Migrant Workers 2012.” [http://www.stats.gov.cn/tjfx/jdfx/t20130527\\_402899251.htm](http://www.stats.gov.cn/tjfx/jdfx/t20130527_402899251.htm).
- . 2013. *China Statistical Yearbook*. Beijing: China Statistics Press.
- OECD (Organisation for Economic Co-operation and Development). 2009. “Urban Trends and Policy in China.” OECD Regional Development Working Papers 2009/1, OECD, Paris.
- Padula, Amy M., Ira B. Tager, Suzan L. Carmichael, S. Katharine Hammond, Wei Yang, Frederick Lurmann, and Gary M. Shaw. 2013. “Traffic-Related Air Pollution and Selected Birth Defects in the San Joaquin Valley of California.” *Birth Defects Research Part A: Clinical and Molecular Teratology* 97 (11): 730–35.
- Page, Jeremy. 2011. “Land Dispute in China Town Sparks Revolt.” *Wall Street Journal*, December 15.
- PRC (People’s Bank of China). 2013. *Statistical Report on Uses of Loans by Financial Institutions, H1 2013*. Beijing. [www.pbc.gov.cn/image\\_public/UserFiles/english/upload/File/hi.PDF](http://www.pbc.gov.cn/image_public/UserFiles/english/upload/File/hi.PDF).
- Peterson, George E. 2008. “Land Leasing and Land Sale as an Infrastructure Financing Option.” In *Financing Cities*, edited by George E. Peterson and Patricia Clarke Annez. A copublication of the World Bank and Sage Publications (India Pvt Ltd), Washington, DC and New Delhi.
- Renmin University. n.d. *3E Database*. Beijing.
- Rosenthal, Stuart S., and William C. Strange. 2003. “Geography, Industrial Organization, and Agglomeration.” *Review of Economics and Statistics* 85 (2): 377–93.
- Ruggeri-Laderchi, Caterina, Ann Olivier, and Chris Trimble. 2013. *Balancing Act: Cutting Energy Subsidies while Protecting Affordability*. Washington DC: World Bank.
- Salat, Serge. 2013. “Chinese Urban Forms and Energy.” Background paper for this report.
- Salat, Serge, and Loeiz Bourdic. 2013. “Urban Complexity, Efficiency and Resilience.” In *Energy Efficiency—A Bridge to Low Carbon Economy*, edited by Zoran Morvaj.
- Smolka and Amborski 2007. Published online: <http://www.intechopen.com/books/energy-efficiency-a-bridge-to-low-carbon-economy>.
- State Council (Government of China). 2012. *A Notice on Actively and Stably Pushing Forward the Hukou System Reform*. Beijing.
- Statistics Bureau of the Japan Ministry of Internal Affairs and Communications. Various years. *Japan Statistical Yearbook*. Tokyo: Statistics Bureau: online at <http://www.stat.go.jp/english/data/nenkan/>.
- Sugar, Lorraine, Christopher Kennedy, and Edward Leman. 2012. “Greenhouse Gas Emissions from Chinese Cities.” *Journal of Industrial Ecology* 16 (4): 552–63.
- USDA (United States Department of Agriculture). 2013. “Production, Supply, and Distribution Online.” Available at: <http://apps.fas.usda.gov/psdonline/psdDownload.aspx>.
- Wang, Jiashun. 2010. “A Study on the Attitudes toward the Immigrants by Urban Residents with Regional Disparities Based on the 2005 National Comprehensive Social Survey Data.” *Chinese Journal of Sociology* 30 (6): 156–74.
- Weber, C. L., G. P. Peters, D. Guan, and K. Hubacek. 2008. “The Contribution of Chinese Exports to Climate Change.” *Energy Policy* 36 (9): 3572–77.
- World Bank. 2008. *China Urban Land Use*. Washington, DC: World Bank.
- . 2009. *World Development Report 2009*. Washington, DC: World Bank.
- . 2011. Analysis of 699 Utilities Performance over 2004–2009. Unpublished. World Bank, Washington, DC.
- . 2013. *Planning, Connecting, and Financing Cities—Now*. Washington, DC: World Bank.
- . 2014. *World Development Indicators*. Washington, DC: World Bank. Available online at: <http://data.worldbank.org/data-catalog/world-development-indicators>
- World Bank and DRC (Development Research Council of the State Council). 2013. *China 2030: Building a Modern, Harmonious, and Creative Society*. Washington, DC: World Bank.
- World Bank Institute and PPIAF (Public-Private Infrastructure Advisory Facility). 2012. “Public-Private Partnerships Reference Guide Version 1.0.” The World Bank, Washington, DC.
- Zhang, Li. 2012. “Economic Migration and Urban Citizenship in China: The Role of Points Systems.” *Population and Development Review* 38 (3): 503–33.
- Zhang, Li, and Li Tao. 2012. “Barriers to the Acquisition of Urban Hukou in Chinese Cities.” *Environment and Planning A* 44: 2883–900.
- Zhang, Yina, and Jie Chen. 2014. “The Changing Prevalence of Housing Overcrowding in Post-Reform China: The Case of Shanghai, 2000–2010.” *Habitat International* 42 (2): 214–23.

## Part II

# Supporting Reports





# Urbanization and Economic Growth

## Introduction

China's rapid urbanization and sustained high economic growth are largely attributable to its policies and reforms. In 1978, less than one-fifth of China's 975 million people lived in cities. But over the past three decades, about half a billion people moved from rural areas to urban areas, seeking work in manufacturing and services as China developed its special economic zones and export-oriented industries. This urban transformation has been mostly successful. Real per capita income increased 16 times from 1978 to 2012, lifting half a billion people out of poverty.

Although strikingly successful, China's urbanization now stands at a crossroads, as its economic transformation is incomplete. Urbanization that worked in the past will not work in the future because the dividends from China's transformation are declining, and China's economic growth model is showing signs of fatigue—in three ways.

First, the productivity gains from a structural transformation in labor markets and capital accumulation are set to decline gradually. The returns from reallocating factors of production across sectors—and even across ownership forms—have declined

considerably, while the growth attributable to total factor productivity (TFP) (not associated with factor reallocation) has declined. Such a decline is consistent with the moderations of growth in other rapidly developing economies. The next transition, from industry to services, is typically slower and generates less growth—because the initial productivity differences between industry and services are not as high as those between agriculture and industry.

Second, the global environment has changed, and exports can no longer drive economic growth. Domestic demand has to become the main driver of growth. Nor can a relatively small middle class—such as China's—sustain consumption growth sufficient to offset declining export demand. So, domestic demand will depend more on investment. And lately, much investment has been financed by credit, which is not sustainable.

Third, growth's dividends are offset by rising economic and social costs associated with the country's rapid transformation—the costs of increasing inefficiency, social division, and unsustainable resource use. The cities—now housing more than 700 million people—can expect up to 250 million more migrants over the next two decades. *Hukou*—the household registration system—forces many migrants

to leave their families behind, holding back labor migration and wage convergence. The urbanization of land has been faster than the migration of new residents, so average urban densities have fallen. And China's environmental transformation, unprecedented in its scale, has done severe damage, with both local and global implications.

A new urbanization trajectory that enhances economic forces of agglomeration, specialization, and mobility is needed to support economic growth on both the supply and demand sides. While reallocations of labor *across* space and sectors in some parts of China will continue to drive some economic growth, productivity increases will have to come more from improvements and advances *within* industries and sectors. As China's industries advance closer to the production possibility frontier, growth's dividends will increasingly be associated with the ability to take advantage of higher economic concentration (agglomeration), increased economies of scale (specialization), and more efficient allocation of factors of production (mobility).

On the supply side, greater economic concentration and specialization allow firms to benefit from economies of scale, thus facilitating industrial upgrading and technological convergence. Enhanced mobility and connectivity contributes to knowledge sharing, labor matching, and ultimately growth of human capital and employment. On the demand side, a more inclusive urbanization will expand the urban middle class, which will demand better services and lifestyles, in turn boosting domestic demand. These forces have already fundamentally changed China's economic landscape over the past three decades, but these forces could be used better if not undermined by frictions in factor markets.

Distortions in factor markets have led China's urbanization astray. China relies heavily on product markets for efficient allocations of goods and private services, but the transition to a market economy is incomplete, and many distortions remain in the factor markets for land, labor, and capital. Instead of supporting China's urbanization path, numerous administrative constraints and distortions have undermined it. The

urbanization of families has lagged behind the urbanization of jobs, while the urbanization of land has happened faster than the urbanization of people. China's unbalanced intergovernmental fiscal system has left many local governments dependent on resources from land conversions, prompting urban sprawl that does not allow fully unlocking agglomeration economies. This situation has lowered economic concentration, slowed income convergence, delayed a transition to a service-based economy, and undermined the growth of household consumption.

A new urbanization trajectory to strengthen agglomeration, specialization, and mobility will require comprehensive reforms in land, labor, and capital markets. The role of the government will have to change, giving market forces a greater role in allocation of factors of production, particularly land and capital, and getting out of the provision of goods that the private market is better at providing. Adjustments in the hukou system will be required to integrate migrants into urban life. Distorted incentives of local governments have made them direct participants in driving the economic growth by sustaining high public investment growth rather than efficient providers of public social services for all residents. Implementing these policies will not be easy, but it will be essential to complete China's transition to a market economy and further strengthen its foundations for growth.

The payoff will be a more efficient, inclusive, and sustainable growth model. China's new urbanization trajectory will not slow the moderation of economic growth that is likely over the next decades. But more efficient urbanization will improve the quality of growth and support growth even as China exhausts its demographic dividends. And in the absence of policy reforms, growth is likely to slow even more. A higher concentration of people will promote scale economies, market expansion, job creation with a deepening division of labor, and higher living standards. In addition, more inclusive urbanization will broaden the middle class—and this middle class will support consumption growth as urban lifestyles tend to be associated with higher consumption of durables and services. And more sustainable urbanization will

promote industrial upgrading and a transition to advanced industrial and service sectors.

## Urbanization and growth at a crossroads

### China's first stage of urbanization has been good for growth

China's urban transformation over the past three decades has increased incomes, raised living standards, and made China the world's largest manufacturer and exporter. Real per capita incomes increased 16 times from 1978 to 2012, and half a billion people were lifted out of poverty. And as workers shifted to urban employment with higher productivity and with labor productivity rising across sectors through large investments, real output per worker increased by a factor of 12. For three decades, China's economy grew at an annual average of 10 percent to become the world's second largest.

This spatial transformation of China from overwhelmingly rural to increasingly urban reflects the sectoral transformation of the economy as people moved from farming and allied rural activity into much higher productivity industrial and service jobs in urban areas. In 1978, nearly 70 million people were employed in the secondary industry, and by 2011, the number had risen to 225 million, with annual growth of 3.6 percent. Employment in the service industry increased from 49 million people to 273 million people, for average annual growth of 5.3 percent. These two transformations—the spatial and the sectoral—are two sides of the same coin. Largely successful, they resulted in higher incomes and higher resource use (figure 1.1).

As in many other countries, this transformation has been good for economic growth, but more urbanization does not always mean more economic growth. In the early stages of urbanization, productivity increases come from shifting resources from lower productivity rural activities to more productive urban-based sectors. Differences in relative wages have been one of the key drivers of migration to cities in China. But higher wages in cities are often offset by higher costs of housing and greater congestion. The same is true for

firms: the higher productivity of increased agglomeration can be undermined by higher costs of real estate and labor. Cross-country regressions of gross domestic product (GDP) per capita and urbanization rate suggest that urbanization is a very strong indicator of all aspects of productivity growth over the long run. But that does not establish causality. Indeed, academic studies find no econometric evidence to indicate that more urbanization results in more economic or productivity growth (box 1.1).

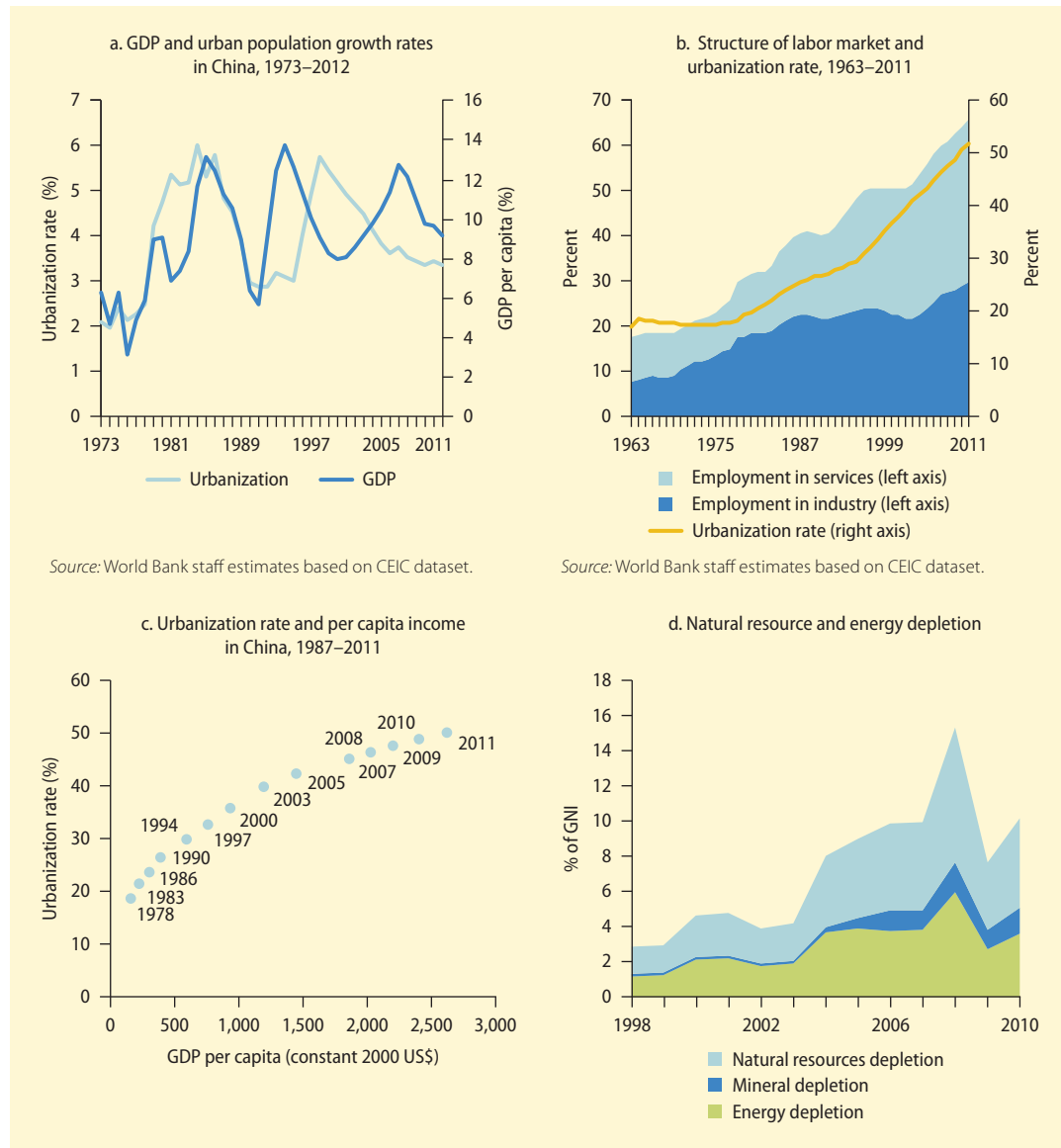
After 1978, with the opening of markets and other reforms, China began to see sizable economic benefits from its spatial transformation. Between 1979 and 1997, the flow of labor from agriculture to nonfarm sectors contributed about one-fifth of GDP growth, making it the single most important driver of economic growth in China since the reforms (Cai and Wang 1999). Sustained high economic growth rates after 1978 are largely attributable to China's policies and reforms.

First, China reformed agriculture. A household responsibility system for farmers and mechanization unleashed efficiency gains in agriculture and released excess labor in the rural sector. In 1978, 33 man-days were needed to produce one mu of rice, wheat, and corn. By 1985, only 18 man-days were needed, halving labor needs in seven years. By 2011, the labor used had dropped to 7 man-days per mu of land. Thus, great liberation of rural productive forces drove the rural economy, enabling rural enterprises to flourish and small towns to develop.

Second, China gradually relaxed constraints on internal migration. In 1984, the restriction on rural residents' settlement in townships was loosened. The restriction on settling in cities, especially small cities, was alleviated in 1997. In the early 2000s, reforms of hukou were introduced at local levels. Zhejiang Province eliminated the quota for moving from rural to urban areas and the quota on people changing from agricultural to nonagricultural status. And Shijiazhuang City of Hebei Province became the first provincial capital city to eliminate restrictions on urban resident registration.

Third, China industrialized, adopting modern manufacturing technologies and

**FIGURE 1.1** China's impressive economic growth has been accompanied by a massive population shift into urban areas



Source: World Bank staff estimates based on CEIC dataset.

Source: World Bank staff estimates based on CEIC dataset.

Source: World Bank Development Data Platform.

Source: World Bank staff estimates based on sources and methods in World Bank 2011.

Note: GNI = gross national income.

opening access to global markets. It introduced preferential policies for foreign capital, including tax rebates and exemptions. And it established special economic zones and opened up coastal cities. The opening of markets and adoption of new technologies enabled firms to capture economies of scale through concentration, specialization, and technological upgrading—changes reflected

in China's global integration through trade in goods, investment, and technologies. The first cities to become more specialized were in China's coastal provinces, close to waterways with access to international waters. China's export volumes in world foreign trade rose from 0.8 percent in 1978 to 11.0 percent in 2012, making China the world's largest exporter.

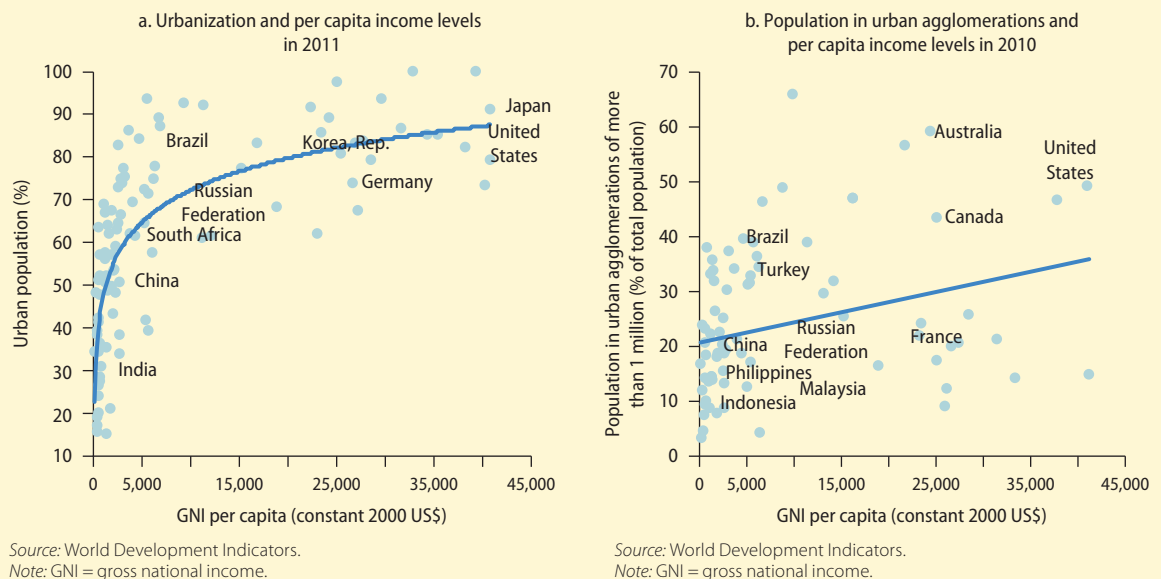
### BOX 1.1 Urbanization and economic growth

Today, the world's largest 300 metropolitan areas account for more than half of global economic growth (Brookings Institution 2012). Globally, urbanization is a relatively recent phenomenon. In 1800, only 3 percent of the world's population lived in cities; in 1900, the rate was just 13 percent (with a total urban population of 220 million). By 1950, the urban population reached 730 million, or 29 percent of the world's population. And by 2007, more than half of the world's population resided in cities. By 2030, the urbanization rate is likely to surpass 60

percent (5 billion urban residents), and by 2050, 67 percent (6.3 billion urban residents).

An increase in the urbanization rate has coincided with economic growth. Cross-country data show that a rising urbanization rate and economic prosperity are positively correlated over time (figure B1.1.1). In fact, almost no country has reached income levels of more than \$10,000 before reaching an urban population of about 60 percent. Urbanization is inextricably linked to economic transformation; but more urbanization does not always mean more economic growth.

**FIGURE B1.1.1 Urbanization is inextricably linked to economic growth**



Cross-country regressions of GDP per capita and urbanization suggest that urbanization is a very strong indicator of all aspects of productivity growth over the long run. But that does not establish causality. In fact, academic studies find no econometric evidence that would indicate that more urbanization results in more economic or productivity growth (Henderson 2003). It is argued that urbanization is a byproduct of structural transformation out of agriculture into effective development of the manufacturing sector.

However, for countries at any income level that are still at the urbanization stage, there may be a level of urbanization that promotes productivity growth.

In fact, some countries do not grow with urbanization. In such cases, urbanization is mainly driven by push rather than pull factors (for instance, by a negative productivity shock in agriculture). Of course, the gap between urban and rural public service availability may also be a force driving the rural population into the city.

Changing the social security system, broadening access to higher education, and demobilizing the military further accelerated the urbanization process. Migrant workers' participation in the urban basic pension plan

and health insurance has accelerated since 2006.<sup>1</sup> Broadening access to higher education also supported an increase in urban population. University graduates from rural areas were able to become urban residents, and the

number of graduates grew from 165,000 in 1978 to 7 million in 2013. A large portion of demobilized military personnel also contributed to China's higher urbanization rate. Based on service of three years (two years for soldiers, but longer for cadres or soldiers from the People's Volunteer Army), about 1 million military personnel are demobilized and transferred to civilian jobs annually.

These policies made Chinese cities centers of economic and social activity. The boom in township businesses generated a large number of nonfarm jobs in urban areas. From 1985 to 1993, the number of township businesses quadrupled from 6.1 million to 24.5 million (National Bureau of Statistics of China 1994). And in 1992, Deng Xiaoping's southern tour further consolidated China's transformation into a market-based economy and affirmed cities as the centers of a market economy.

Since the mid-1990s, China's unprecedented urban growth has been increasing at an annual rate of more than 1 percentage point. The large city clusters in the eastern region developed rapidly, as did cities in the central and western regions. City clusters took shape in the Pearl River Delta, Yangtze River Delta, Beijing-Tianjin-Hebei, and Changsha-Zhuzhou-Xiantan. The ability of cities to absorb and support population growth and to provide public and social services improved rapidly.

China's successful transformation also stems from its ability to adjust urbanization policies to address emerging challenges and opportunities. And after 2002, urbanization policy gradually shifted its focus from quantity to quality. The 10th Five-Year Plan, introduced in 2001, stated that China would pursue urbanization in diverse ways and coordinate development between cities and small towns.

### **But a spatial transformation alone is insufficient for China to become a high-income country**

The conditions for the next phase of urbanization are very different from three decades ago. China is already an upper-middle-income country, the world's largest manufac-

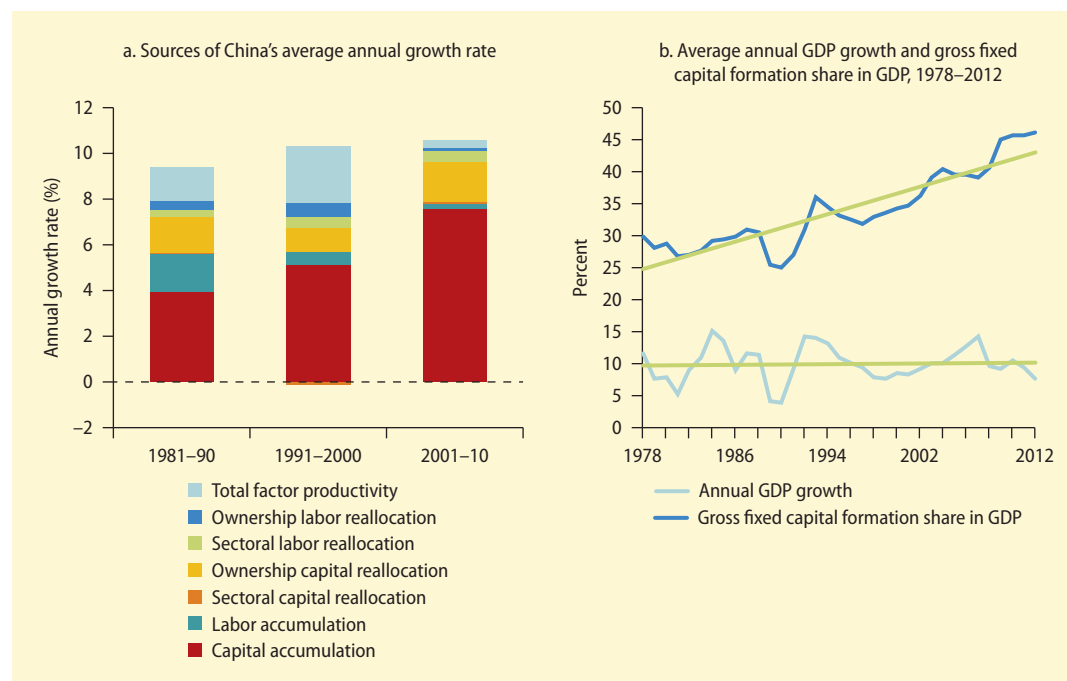
turer and exporter. And it is on the cusp of a development stage in which efficiently using resources is more important for growth than simply mobilizing resources. To reach high-income status by 2020, China will require sustained growth of at least 7 percent a year. Although China's achievements show that such targets are not unrealistic—in the past three decades China doubled its real income four times—the dividends from first-generation economic reforms are declining. The growth dividends from factor reallocation are almost exhausted. Urbanization that worked in the past, driven mainly by structural reallocations of labor from rural to urban activities, will not produce growth sufficient for China to become a high-income country.

With the dividends of spatial transformation diminishing, the growth strategy is losing its relevance. Productivity gains from reallocating factors of production across sectors, and even across ownership forms, have declined (figure 1.2). And in recent decades, capital accumulation has become the dominant engine of growth. The share of investment in GDP has almost doubled over the past three decades. A decline in total factor productivity growth in China is consistent with the moderations of growth in other rapidly developing economies.<sup>2</sup> The next transition from industry to services typically is slower and generates less growth, because in the initial stages, productivity differences between industry and services are not as high as those between agriculture and industry.

To be sure, three other Asian economies—Japan, the Republic of Korea, and Taiwan, China—all relied on high investment rates over an extended period to reach high income. But China's capital stock per capita remains significantly lower than that in advanced countries. And continuing capital accumulation, although sizable, will contribute less and less to growth as the capital-labor ratio rises. A rise in China's incremental capital-output ratio (ICOR)<sup>3</sup>—from an average of 3.6 over 1991–2011 to 4.7 over 2009–11—indicates that this process may already have begun (table 1.1 and figure 1.3). A rise in ICORs was especially pronounced after the introduction of local government



**FIGURE 1.2** Growth is increasingly dependent on capital accumulation as productivity from reallocation of labor and capital is declining



Source: Based on research by Bulman and Kraay 2013.

Source: World Bank staff calculations based on CEIC dataset.

stimulus measures in 2009 and 2010. Furthermore, ICORs have increased consistently across all city sizes in China (although returns on capital remain higher in larger cities than in others).

Changes in the global external environment have made domestic demand the main engine of growth. But a fairly small middle class, such as China's, cannot sustain consumption growth sufficient to offset declining export demand. From 2000 to 2012, consumption declined from 46 percent of GDP to 36 percent. So, domestic demand depends more on investment. And much investment has been financed by credit. As a result, debt levels in China have reached levels that are high by emerging market standards.

China is about to go through a wrenching change as the labor force that grew faster than the overall population ages. Over the next two decades, China's old-age dependency ratio is expected to double (World Bank and DRC 2013). The old-age dependency ratio will reach the current level in Norway and the Netherlands by 2030 (between 22 percent

**TABLE 1.1** Incremental capital-output ratio in China and other economies, various periods

	Gross fixed capital formation, % of GDP	Average annual GDP growth, %	Incremental capital-output ratio
China, 1991–2011	36.7	10.4	3.6
China, 2009–11	45.4	9.6	4.7
China, 2012	46.1	7.8	5.4
Japan, 1961–70	32.6	10.2	3.2
Republic of Korea, 1981–90	29.6	9.2	3.2
Taiwan, China, 1981–90	21.9	8.0	2.7

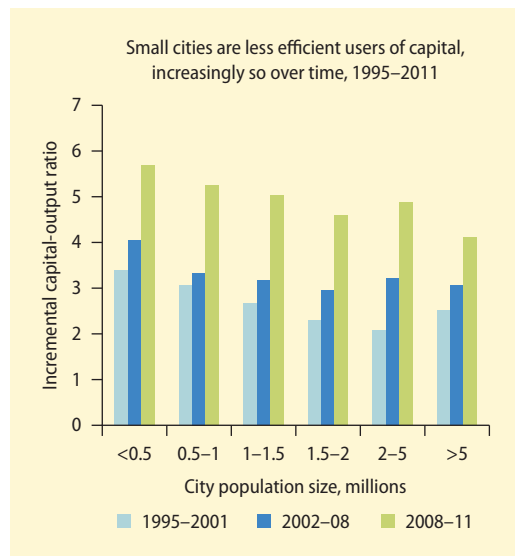
Source: World Bank staff calculations based on Data Development Platform; CEIC dataset.

Note: GDP = gross domestic product.

and 23 percent).<sup>4</sup> Meanwhile, China's labor force is projected to start shrinking as soon as 2015. In addition, rural surplus labor has declined significantly (figure 1.4). And the contribution to growth of reallocation of labor from agriculture to industry is declining as China gradually approaches the Lewis turning point (box 1.2).<sup>5</sup> Moreover, the natural increase in urban population in the past decade is estimated at only 9 percent. About 36 percent of that increase has come from the



**FIGURE 1.3** Small cities are less efficient users of capital, increasingly so over time, 1995–2011



Source: World Bank staff calculations based on Data Development Platform; CEIC dataset.

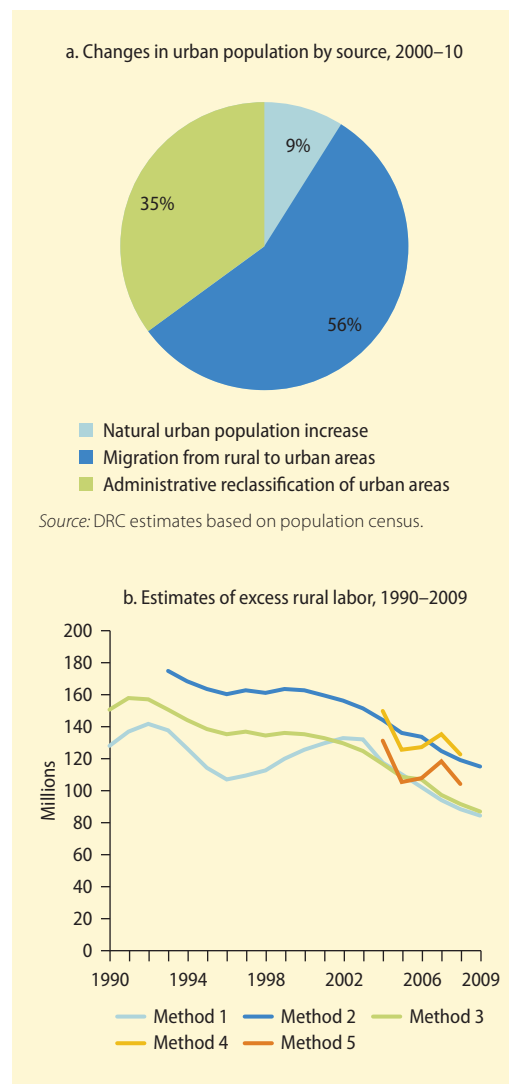
reclassification of certain rural areas as urban areas.<sup>6</sup> Such rapid urban sprawl has contributed to congestion and reduced economic efficiency.

### A new urbanization trajectory has to address stresses related to urban sprawl, inequality, and environmental damage

With more than 700 million urban residents, China has become the world's largest urban nation in human history. Between 1978 and 2012, China's urban population increased by more than a half billion people—more than twice as many as in India in the same period. Its urban population is expected to increase by about 250 million more over the next two decades. The scale of China's transformation and the stresses related to concentration, inequality, and resource use create inefficiencies and are costly to growth, with both local and global implications.

First, urban sprawl undermines productivity gains from agglomeration and specialization as production and the population spread. Traffic congestion and the

**FIGURE 1.4** Changes in labor force and urban population



Source: Han 2009.

Note: The formula for calculating rural surplus labor (RSL) is  $RSL = \text{farming labor} - \text{actual demand for farming labor}$ . Method 1: farmer profit maximization; Method 2: industry differences; Method 3: resource-based labor demand; Method 4: labor to effective arable land ratio; Method 5: agricultural technology needs.

accompanying pollution in cities also push up the cost of production and the cost of living in cities. Estimates suggest that traffic-congestion costs account for 12.5 percent of the per capita income of Beijing residents and 9.1 percent of the per capita income of Shanghai residents.

Second, the first stage of urbanization is typically associated with an increase in

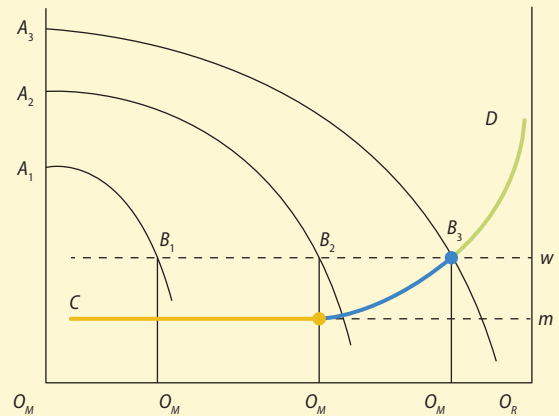
### BOX 1.2 The Lewis turning point

A simple dual economy model developed by Lewis (1954) can characterize stages of economic development. In the first phase, the countryside provides the labor force for the industrial sector without any constraints. The marginal productivity of traditional agriculture is close to zero. With plentiful surplus labor in the countryside, the modern economic sector can recruit a great number of laborers with a pay level a little higher than the income of the traditional agricultural sector. The most significant feature of this phase is massive migration of the labor force without much change in pay. (In figure B1.2.1 is the supply curve of rural labor,  $O_M O_R$  is the total labor in the economy,  $w$  is the pay level of the urban sector, and  $m$  is the surviving pay level in the countryside. The  $B_1 B_2$  segment is the first phase of development.)

The second phase of economic development features a limited supply of labor from the countryside. In this phase, because of the continued migration of the labor force and higher marginal productivity compared with the average output of the agricultural sector, the industrial sector must offer a higher pay to attract labor (see the  $B_2 B_3$  segment).

In the third phase, the pay in the city and the countryside are generally the same, the dual sector structure has disappeared, and the rural and urban

FIGURE B1.2.1 Lewis model



Source: Lewis 1954.

economies are highly integrated. In this phase, the surplus labor force from the countryside is completely absorbed, and the marginal productivities of the agricultural and modern economic sectors are equal. The transition point from the first phase to the second is generally known as the Lewis turning point.

income inequality that undermines growth of consumption and services, but China's inequality has increased to levels many consider unacceptable. One key reason is the dual structure of the household registration system, which separates urban residents based on their place of birth. While China's urbanization rate has exceeded 50 percent, not all urban residents have urban hukous. Those without urban hukous are unable to enjoy the same set of public services as those with urban hukous. According to estimates from the sixth population census, of the 670 million urban and township residents registered in 2010, the registered nonfarm population measured only 356 million, or 26.7 percent of the total, or 23 percentage points less than the urbanization rate. Four in ten urban residents have no access to the same package of public services and social participation

(including grassroots democratic voting) as the others with nonfarm hukous. This dual system has also undermined the growth of the middle class and creates social tensions (box 1.3).

Third, the industry-led growth has been intensive in energy, primary commodities, and resources and damaging to the environment. Unsustainable resource use has imposed large economic costs even if these are not revealed by market transactions; the costs include increased premature mortality, degraded urban environments, sharply increased congestion, and reduced urban livability. Although an industry-led transformation typically results in excessive resource use and environmental pollution, the size of China's industrial agglomeration and specialization has made the impact unusually devastating. Recent estimates by China's environment

### BOX 1.3 Increasing social tensions

Social service agencies at the local level are struggling to meet the demands of rising migrant populations. And migrant workers often lack formal channels to make their voices heard, resulting in tensions between migrants and local governments. Many local residents worry that if migrants receive the same treatment as they do, their benefits might be reduced. This uneasiness can lead to social tensions, especially in places with a high proportion of migrants. For instance, there are 6.4 million migrants in Suzhou, about the same as the number of the local people; the number of migrants in Dongguan city is 6.5 million, four times the number of local people.

Consider Zengcheng. On the evening of June 10, 2011, in Xintang Town of Zengcheng District, Guangdong Province, a large riot broke out when a city inspector beat a pregnant peddler named Wang

Lianmei because she refused to pay a “protection fee.” In the afternoon and evening of June 12, tens of thousands of people gathered on the super highway to protest.

Now consider Zhili. On October 26, 2011, in Zhili Town of Wuxing District, Huzhou City of Zhejiang Province, more than 600 couples gathered in front of the town government building to protest against the “children’s clothes tax,” and many more surrounded and watched. The situation deteriorated the next day as riots broke out and some supermarkets were looted, thousands of automobiles were sabotaged, and more than 20 police cars were burnt. On October 28, the town government suspended the tax, fired the tax collectors involved in the incident, and the situation was brought under control.

ministry show that pollution cost the economy at least 2.5 percent of GDP in 2010. China’s dependence on imports has also increased, especially in energy.<sup>7</sup> Resource depletion and pollution not only pose threats to China’s strategic priorities such as food security, energy, and environmental security—they also tarnish China’s international image.

That is why the new urbanization trajectory has to support three mutually related transformations: it has to become more productive, more inclusive, and more sustainable. More efficient urbanization will help sustain economic growth as excess labor and demographic dividends become exhausted. A concentration of population is conducive to taking advantage of economies of scale, expanding markets, deepening divisions of labor and job creation, and improving living standards. More inclusive urbanization will result in a broader middle class that will support consumption growth, as urban lifestyles tend to be associated with higher consumption of durables and services. More sustainable urbanization will promote the adoption of more energy-efficient technologies, accelerate industrial upgrading, and spur the transition from industry to service sectors.

Urbanization can be made more efficient by unlocking productivity and economic growth potential through more efficient allocation of labor, capital, and land. It can be made inclusive by providing equal access to basic public services and creating more equal opportunities for all citizens, which will empower the middle class, a new driver of China’s domestic demand. And it can be made more sustainable by promoting faster industrial upgrading to technologies and industries that are less resource intensive and more energy efficient.

### Agglomeration, specialization, and mobility

As in the first stage of urbanization, reallocations of labor across space and sectors in some parts of China will continue to drive some economic growth, but productivity increases will be associated more with improvements and advances within industries and sectors. As China’s industries advance closer to the production possibility frontier, economic growth will increasingly be associated with the ability to take advantage of higher economic concentration (agglomeration), greater

**TABLE 1.2** Growth's drivers on the new urbanization trajectory

	Supply side	Demand side
Drivers	Productivity (A), human (H) and physical capital (K), and labor (L) $Y = f(A, H, K, L)$	Consumption (C), investment (I), and government spending (G), <i>Net Exports (NX)</i> $Y = C + I + G + NX$
<b>1. Agglomeration</b>		
Higher economic concentration: high spatial proximity of firms and consumers	Supports knowledge sharing, labor matching, and pooling; promotes accumulation of human capital	Supports consumption of urban amenities and more efficient distribution of public goods and services (education)
<b>2. Specialization</b>		
Economies of scale	Leads to higher productivity	External competitiveness supported by export demand Requires industrial upgrading
<b>3. Mobility and connectivity</b>		
Efficient allocation of factors of production	Supports an increase in TFP through more efficient allocation of factors of production (capital and labor)	Requires investment in infrastructure

Source: Adapted from World Bank 2009.

Note: TFP = total factor productivity.

economies of scale (specialization), and more efficient allocation of factors of production (mobility).

This new urbanization trajectory—enhancing economic forces of agglomeration, specialization, and mobility—will continue to support economic growth on both the supply and demand sides (table 1.2). On the supply side, higher degrees of economic concentration and specialization will allow firms to benefit from economies of scale, thus facilitating industrial upgrading and technological convergence. Enhanced mobility and connectivity will facilitate knowledge sharing, labor matching, and ultimately the growth of employment and human capital. On the demand side, a more inclusive urbanization will expand the urban middle class, which will demand better services and lifestyles, which in turn will boost domestic demand. These forces have already changed China's economic landscape over the past three decades—but more is to come.

### **Agglomeration and specialization will support industrial upgrading and technological convergence**

Economies of scale are one of the key reasons for rapidly growing industries and services to locate in cities. Cities offer higher concentrations of economic activity, allowing firms to

exploit economies of scale arising from being near other producers of the same or similar products (localization economies) and from being close to producers of a wide range of products and services (urbanization economies) (table 1.3).<sup>8</sup> Geographical concentration of firms helps in sharing input suppliers, matching employment skills, and learning from each other (box 1.4; see also Lucas 1988; Moretti 2004). In the United States, almost all product innovations originate in metropolitan areas. Large and diverse cities act as nurseries for firms to try out a variety of innovative products, and once the technological process is developed, it is transferred to specialized cities for mass production (World Bank 2009). Thus, increased agglomeration and specialization of high-skilled industries and services facilitates industrial upgrading and technological convergence.

Industrial clusters of global importance have facilitated the agglomeration and specialization of Chinese firms. In the past, the central planning system favored a diversified production pattern in most cities. But over time, while the largest cities have remained diversified, market forces have made many Chinese cities more specialized to take advantage of economies of scale. Cities that were closer to waterways with access to international markets were the first to become more specialized by exploiting the lower

**TABLE 1.3 The 12 types of economies of scale**

Type of economy of scale			Example
Internal	1. Pecuniary		Being able to purchase intermediate inputs at volume discounts
	Technological Dynamic technological	2. Static technological	Average costs falling because of fixed costs of operating a plant
		3. Learning to operate a plant more efficiently over time	
External or agglomeration	Localization	Static	
		4. Shopping	Shoppers being attracted to places where there are many sellers
		5. Adam Smith specialization	Outsourcing allowing both the upstream input suppliers and downstream suppliers to profit from productivity gains because of specialization
		6. Marshall labor pooling	Workers with industry-specific skills being attracted to a location where there is a greater concentration
	Dynamic	7. Marshall-Arrow-Romer learning by doing	Reduction in costs arising from repeated and continuous production activity over time and spilling over between firms in the same place
		8. Jane Jacobs innovation	The more that different things are done locally creating more opportunity for observing and adapting ideas from others
	Urbanization	Static	
		9. Marshall labor pooling	Workers in an industry bringing innovations to firms in other industries (similar to number 6, but the benefit arises from the diversity of industries in one location)
		10. Adam Smith division of labor	Main difference being that the division of labor is made possible by the existence of many different buying industries in the same place (similar to number 5)
	Dynamic	11. Romer endogenous growth	The larger the market, the higher the profit; the more attractive the location to firms, the more jobs; the more labor pools, the larger the market
		12. Pure agglomeration	Spreading fixed costs of infrastructure over more taxpayers; diseconomies arising from congestion and pollution

Source: World Bank 2009.

costs of logistics in export-oriented manufacturing industries (box 1.5). Since the early 1980s, Chinese firms have developed industrial clusters for knitted woolens, footwear, electronics, textiles, and other products. In Zhejiang Province, industrial clusters for textiles and apparel formed; in Hangzhou, women's wear; in Wenzhou, men's wear; and in Ningbo, socks. Today, geographic clustering is more pronounced in high-skill and technology industries.

The Herschman-Herfindahl Index of industrial concentration across provinces shows that the production of computer peripherals is about two times more concentrated than the production of textiles.<sup>9</sup> For advanced services (the service sector excluding hotels and restaurants, wholesale trade, and catering), the concentration is even higher. For instance, the concentration of research and development is about two times higher than the concentration of manufacturing. Services tend to require less land, and the service industry can have higher

concentration of employment than manufacturing and is more likely to benefit from agglomeration and urbanization economies.

China's economic activity has become more concentrated in the largest metropolitan areas. In 2010, China's 10 largest metropolitan areas accounted for slightly more than one-fifth of urban GDP and more than one-half of total exports originating in urban areas. Economic activity also has become more concentrated regionally—in 2010, more than 50 percent of China's urban GDP and more than 85 percent of exports originated in urban areas of coastal provinces.

Agglomeration and specialization have made Chinese firms more productive and competitive. A study by Lin, Li, and Yang (2011) of the textile industry on China's south and west coasts in 2000–05 found that agglomeration plays a significant role in TFP, with a nonlinear positive relation between agglomeration and productivity. Research by Ke and Yu (2014) shows that variations in industrial agglomeration explain two-thirds

**BOX 1.4 Microfoundations of agglomeration economies: Sharing, matching, and learning**

At the end of the 19th century, the economist Alfred Marshall noted that income sharing, labor market pooling, and knowledge spillover are the three major reasons for the agglomeration effect (Marshall 1890; Duranton and Puga 2004).

*Sharing.* There are many exclusive, undivided, and crowded facilities for shared use. The city is like a club for sharing such public goods and facilities. Producers can have access to a wider range of inputs and benefit from economies of scale and lower costs. The sharing of intermediate inputs allows suppliers to provide highly specific products and services according to the demands of the customers. The pooling capacity of a city comes not only from diversified income sharing but also from risk sharing.

*Matching.* Salop (1979) established a labor-matching model and put it into the framework of urban economics. There are two sources for economic agglomeration in the matching model. One source is the externality of matching: the increasing number of matching can improve the expected quality of matching (Helsley and Strange 1990). The other source is that in a competitive labor market, there is a correlation between the number of job vacancies of enterprise and the number of unemployed people.

That correlation intensifies labor market competition and reduces the fixed cost of enterprises. In a larger market, production factors can match better. Enterprises can choose inputs and special skills as they need and meet the demands of a specific market; in the meantime, in a place of abundant enterprises, labor is more likely to find suitable employers. When a worker gets more professional and specific skills, producers can find special talents more easily in large cities.

*Learning.* Lucas (1988) noted that the advantage of a city in learning is embodied not only in its cutting-edge technologies, but also in its acquisition of skills, knowledge creation, accumulation, and proliferation. The agglomeration can accelerate the dissemination of knowledge and help workers, entrepreneurs, and different enterprises learn from each other. In the process of discussion and communication, many ideas and thoughts came into being, and information and knowledge scattered. Knowledge-, information-, and technology-intensive industries are mostly concentrated in cities, especially in large metropolises. The larger the city, the higher the population density, the more diversified and concentrated information, the more frequently people communicate, and the faster productivity grows (Ciccone and Hall 1996).

of different experiences in the TFP growth across cities at the prefectural level and about one-half of the variations across cities at the provincial and subprovincial levels. Moreover, China's largest cities (tier 1 cities) have higher TFP. A survey of 12,400 Chinese manufacturing firms in 120 cities also finds that firms in the largest cities have higher productivity (figure 1.5; see also World Bank 2006).

Economies of scale from agglomeration tend to vary across industries and city sizes—smaller cities tend to specialize in mature industries, larger cities in services and high-skill industries.<sup>10</sup> Improved infrastructure and transportation allow firms to become more specialized to exploit economies of scale not associated with agglomeration. These internal economies of scale arise

because firms can purchase intermediate inputs at volume discounts, because the fixed costs of operating a plant lower the average costs of production, and because managers learn to operate a plant more efficiently. And as cities become larger, they benefit less from industrial agglomeration and can face severe agglomeration diseconomies as residents in bigger cities are burdened with congestion and higher living costs for housing, food, and public services (Muth 1969; Fujita and Ogawa 1982; Henderson 2002).

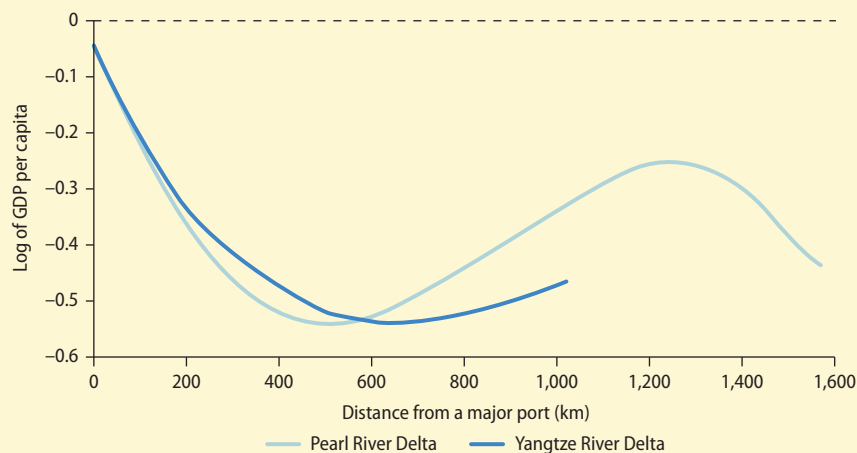
Maturing industries, especially in manufacturing, started to move out of the largest cities in China over the past decade (figure 1.6). Manufacturing has also started to shift out of prefecture-level cities and into counties, where the share of national manufacturing employment grew from 41 percent to 50

### BOX 1.5 Agglomeration economies are attenuated by distance

The economies from agglomeration can drive the development of both industry and services. In a highly open economy, being close to a major coastal port means being close to the international market, and being close to a big regional city means being close to the domestic market. Therefore, the geographical location of a city is an important factor in its development.

Figure B1.5.1 clearly demonstrates that within the metropolitan area of the Pearl River Delta, as the distance from Hong Kong SAR, China, grows, the GDP per capita of cities goes first lower, then higher, and then lower again. The GDP-per-capita curve is basically the same shape as the market-potential curve of the economic geography (Fujita and Thisse 1996).

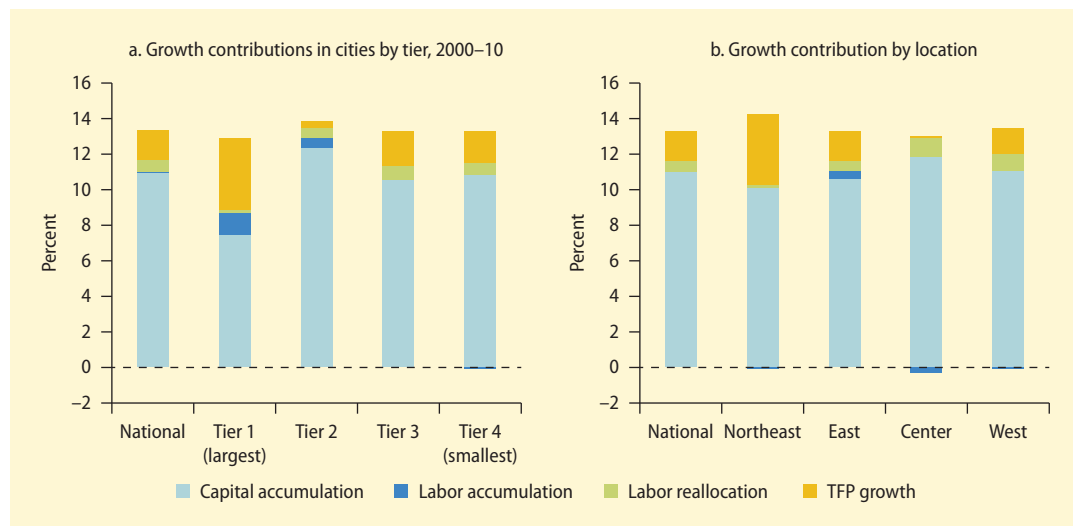
**FIGURE B1.5.1** Distance to major ports and economic development level of cities within a metropolitan area



Source: Ming Lu 2013.

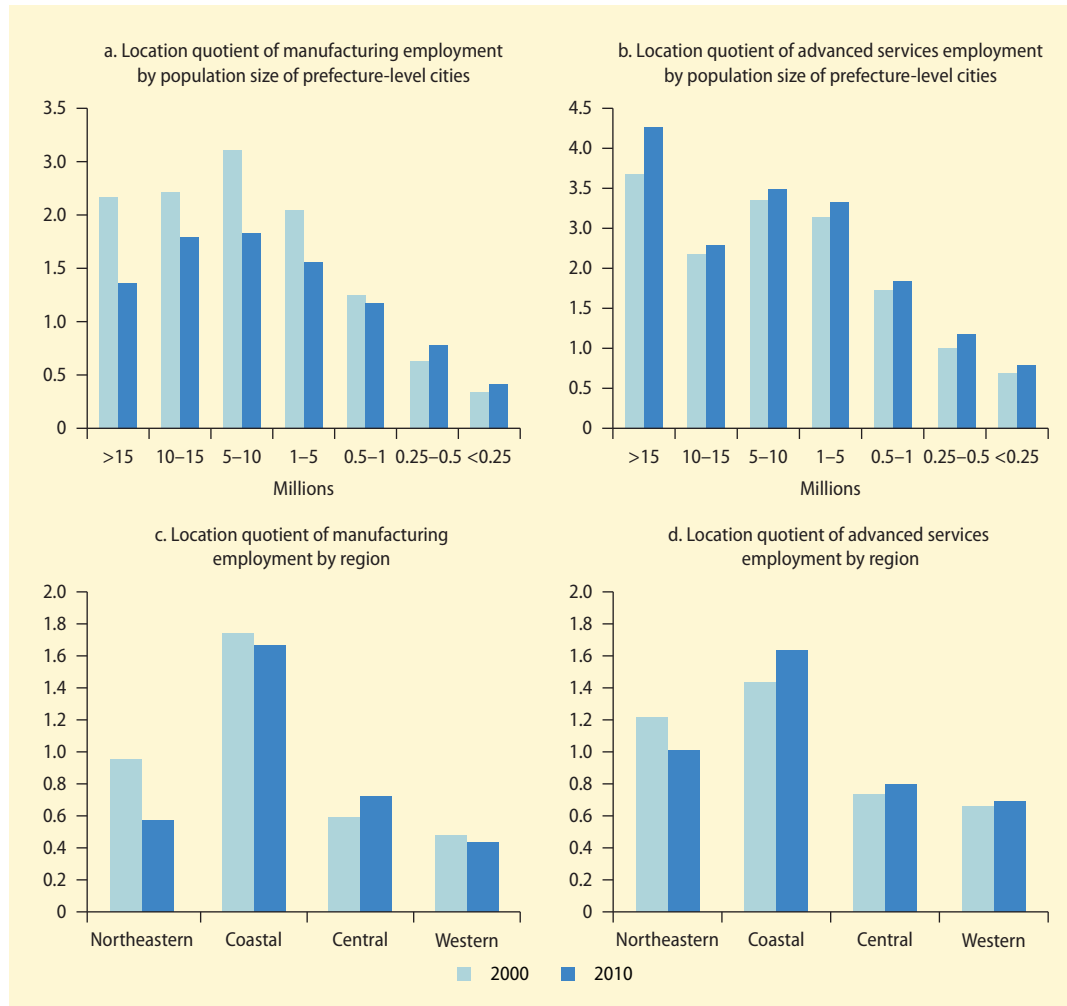
Note: km = kilometers.

**FIGURE 1.5** Total factor productivity has been highest in tier 1 and northeastern cities



Source: World Bank staff estimates.



**FIGURE 1.6** Changing patterns of specialization in manufacturing and advanced services

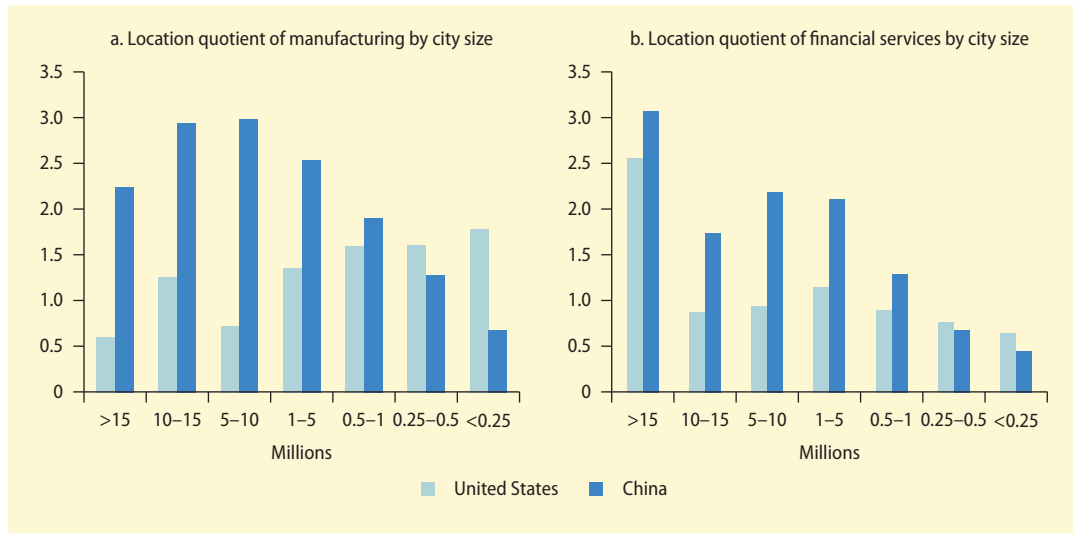
Source: World Bank staff calculations based on the 2000 and 2010 population censuses.

Note: Advanced services are all services except wholesale and retail trade and hotels and restaurants. The location quotient for any sector  $i$  in any city  $j$  is defined as  $\pi_{ij}/\Pi_i$  with  $\pi_{ij} = x_{ij}/\sum_j x_{ij}$  and  $\Pi_i = X_i/\sum_j X_i$ , where  $x_{ij}$  is the amount of activity in sector  $i$  in city  $j$  and  $X_i$  is the amount of activity in sector  $i$  in China as a whole.

percent from 2000 to 2010. As a result, services account for a higher share of economic activity in the larger cities. In 2011, services accounted for 66 percent of GDP in the largest cities (15 million or more people), but only about 33 percent in smaller cities (with fewer than 1 million people). Assembling integrated computers has become less concentrated. Producing steel, which benefits from economies of scale, remains fairly evenly dispersed across provinces. That is explained in part by a legacy of central planning and state ownership. Before the 1980s, remote inland sites were favored for key sectors, such as iron and

steel production, and spatial clustering was discouraged (Fan and Scott 2003). The rising prices of land and housing also influence the choice of location of industries (Fan and Shao 2011).

Agglomeration and specialization could better support China's transformation toward high-skilled manufacturing and services. But the process in China has been slower than in other countries (figure 1.7). Although the transition of manufacturing out of largest cities in China has started, the process is still slow relative to specialization patterns of cities in the United States and

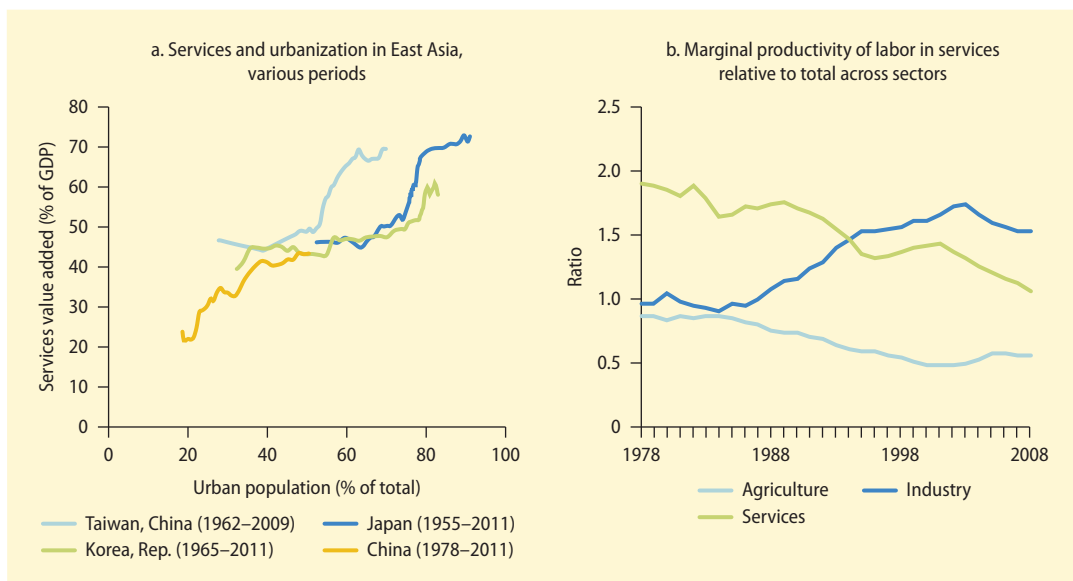
**FIGURE 1.7** Despite recent trends, a large share of manufacturing remains in large and medium-size cities

Source: World Bank Staff calculations based on the 2010 population census, CEIC (China), and Bureau of Economic Activity (United States).

Korea where predominantly smaller cities are specializing in manufacturing (Henderson 1997, 2001). Chinese cities—both large and medium size—have high localization of financial services, whereas only the largest cities in the United States have very high localization of financial services. For China's

larger cities, manufacturing will continue to move out, but services need to grow.

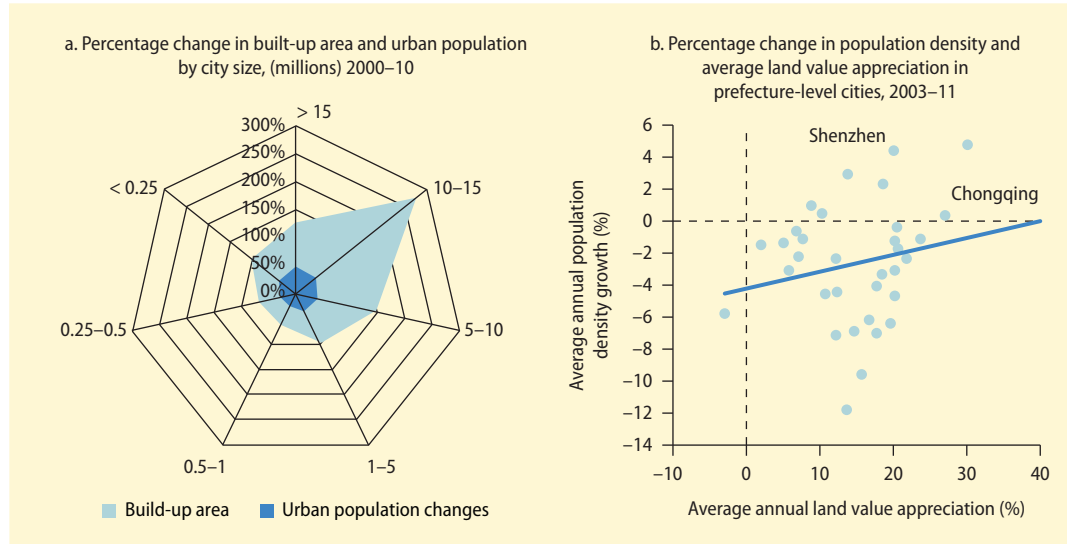
Even with urbanization, the share of services in GDP was only about 40 percent in 2011. But relative to other East Asian countries, China is not an outlier (figure 1.8).<sup>11</sup> Going forward, if China wants to become a

**FIGURE 1.8** To become a high-income country, China will have to develop services quickly, but the marginal product of labor in services continues to decline

Source: World Bank staff calculations based on World Bank Development Data Platform.

Source: World Bank staff calculations.

**FIGURE 1.9** Population densities of Chinese cities have fallen over the past decade as the urbanization of land was faster than the urbanization of people



Source: World Bank staff calculations based on the 2000 and 2010 population censuses and CEIC (China).  
Note: Weighted average.

high-income country like Korea and Japan, it will have to develop services quickly from here on. Yet the value added per employee in services continues to lag behind the levels in industry.<sup>12</sup> Moreover, marginal productivity of labor in services, relative to aggregate labor productivity, has declined over the past three decades.

Low-population densities of cities have undermined forces of agglomeration. China's geographic concentration of economic activity remains substantially lower than in the United States, where the largest 10 metropolitan areas account for about 38 percent of GDP, compared with only about half that in China. Population densities of Chinese cities are also lower relative to benchmarks in advanced countries. Moreover, China's population densities have continued to decline as increases in the built-up area were faster than increases in the urban population over the past decade (figure 1.9). In part, too much land has been converted from rural to urban land because the state is able to expropriate it and avoid paying the fair market cost. Local governments have relied on land leases to finance both capital and recurrent spending.<sup>13</sup> For 35 cities in China, faster increases in

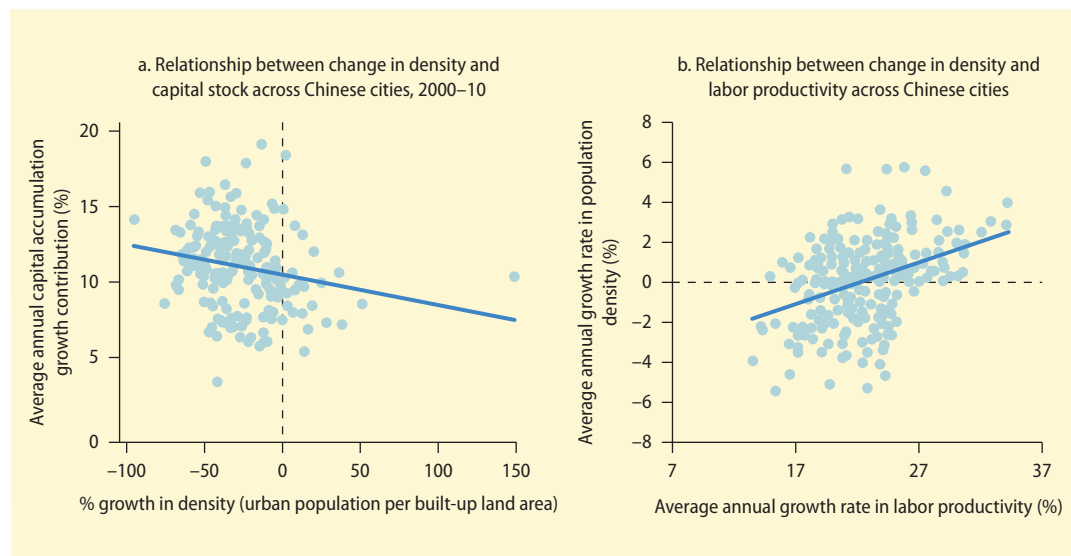
urban land prices are correlated with greater increases in density, so low land prices lead to urban sprawl. Chongqing and Shenzhen, both in the upper right quadrant, have led China's experimentation with rural land compensation reforms. These reforms increased barriers to rural land expropriation while also increasing farmer land compensation, thereby leading to higher urban land prices, less sprawl, and more efficient land use.

Falling densities have implications for economic growth. As densities fall, sustained growth requires even higher capital accumulation to offset declining productivity. Over the past decade in cities where economic densities have been falling, growth has tended to be supported more by capital accumulation than by productivity growth (figure 1.10).

### Mobility and connectivity will support employment growth

Labor migration driven by economic forces is good for economic growth and employment growth. Productivity increases from economies of scale in cities allow firms to offer higher wages—one of the key drivers of labor reallocation from rural to urban

**FIGURE 1.10** In places where economic densities are falling, growth is supported by capital accumulation rather than by productivity increases



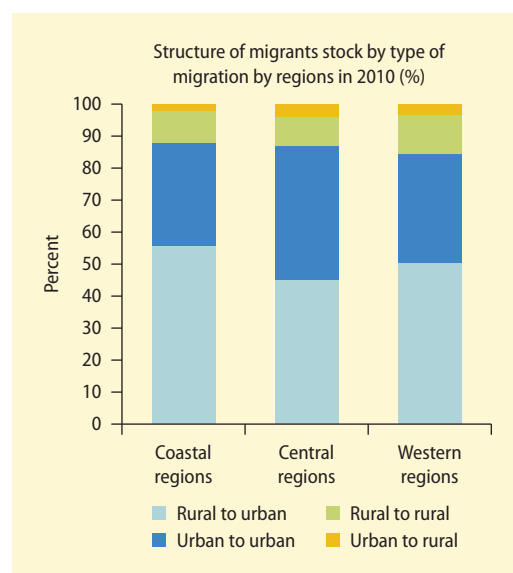
Source: World Bank and DRC staff calculations based on the 2000 and 2010 population censuses and CEIC (China).  
 Note: Data for 286 cities in population density and the average annual growth rate of labor productivity (1990–2012).

areas. Higher wages in Chinese cities pulled new migrants while disadvantageous economic opportunities in rural areas pushed new migrants into cities. Between 2000 and 2010 alone, 117 million Chinese moved from rural to urban areas to seek better employment opportunities. And coastal regions, the engines of China's growth, accounted for more than half of migrant inflows (table 1.4 and figure 1.11). Indeed, urban-rural migration has been the key factor in China's growth and urbanization.

It is estimated that labor migration has contributed to more than 20 percent of GDP growth during the past three decades (Yan and Li 2007). With high individual mobility, migrants have transformed the Chinese economy, providing the key input for

China's industrialization. They accounted for 58 percent of employment in the secondary industry, 52 percent in the tertiary industry, and 80 percent in the construction industry

**FIGURE 1.11** Structure of migrants stock by type of migration by regions in 2010, %

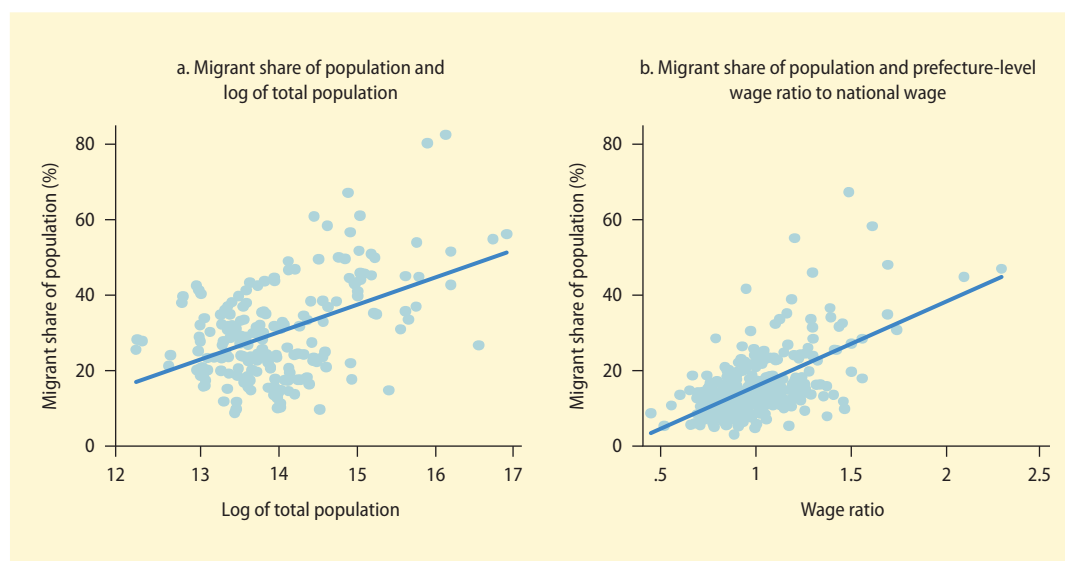


**TABLE 1.4** Structure of migrants stock by receiving and sending region, 2010

	From coastal regions, %	From central regions, %	From western regions, %
Coastal regions	41.1	12.2	7.6
Central regions	1.0	18.2	0.5
Western regions	1.0	0.9	17.5

Source: World Bank staff estimates based on the 2010 population census.

Source: World Bank staff estimates based on the 2010 population census.

**FIGURE 1.12** Migrants go to larger cities, where wages are higher

Source: World Bank staff estimates based on the 2010 population census.

(National Bureau of Statistics of China 2013). In 2010, China's coastal regions accounted for about two-thirds of total migrants, of which more than two-thirds were migrants from other coastal regions.

The majority of labor migrants are absorbed by the largest cities that have larger potential for agglomeration economies. Over the past decade, China's larger cities have attracted more migrants (figure 1.12), and cross-county migrants go where wages are higher.

Migrant workers supported sectors that were developing faster. Since 2004, more than half of employees in the secondary

industry have been migrant workers. And as the importance of services increased, the share of migrants working in these sectors also increased (table 1.5).

Better physical infrastructure, especially highways, has promoted connectivity and facilitated the mobility of labor. In the early years of the reform and opening, road transportation was a weak link. In 1978, the country had only 890,000 kilometers of highways, with zero kilometers of expressway and 10,000 kilometers of class II highways and above. In the late 1980s and early 1990s, the central government explicitly made developing the traffic system strategic

**TABLE 1.5** Migrant worker employment by sector, 2004–12

Sector	2004	2008	2009	2010	2011	2012
Manufacturing	30.3	37.2	36.1	36.7	36	35.7
Construction industry	22.9	13.8	15.2	16.1	17.7	18.4
Transportation, warehousing, and postal services	—	6.4	6.8	6.9	6.6	6.6
Wholesale and retail businesses	4.6	9.0	10.0	10.0	10.1	9.8
Accommodation and catering services	6.7	5.5	6.0	6.0	5.3	5.2
Neighborhood services and other services	10.4	12.2	12.7	12.7	12.2	12.2
Other professions	—	15.9	13.2	11.6	12.1	12.1
Total	100	100	100	100	100	100

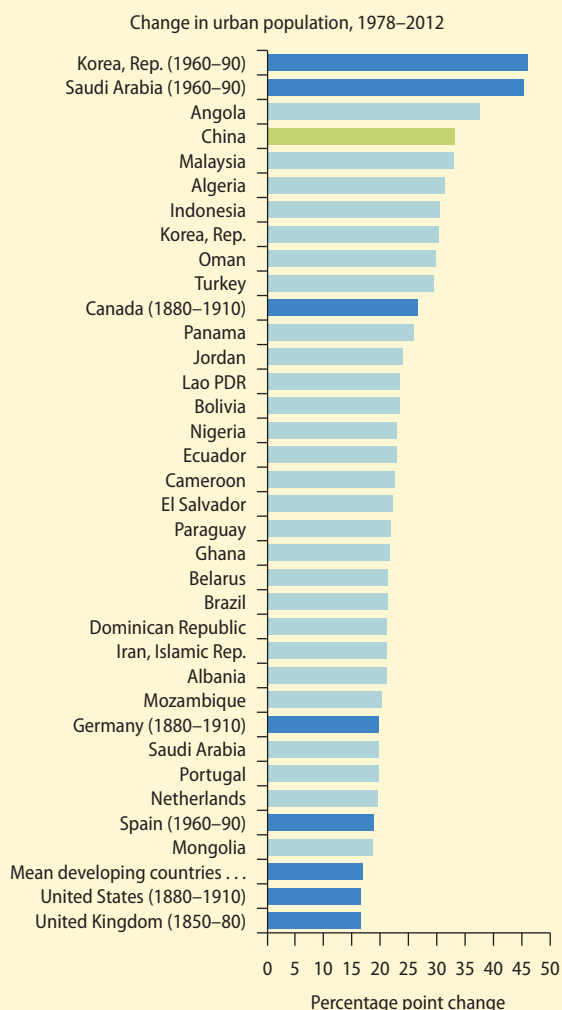
Source: Data for 2004 are from Liqun and Laiyun (2006); data for 2008–12 are from National Bureau of Statistics of China (2012).

Note: — = not available.

### BOX 1.6 Is China's urbanization pattern unique? A global perspective

The recent increase in China's urbanization rate—32 percentage points over 1978 to 2012—is about twice the average for developing countries in the same period. But rapidly rising urbanizations have occurred in Korea, Malaysia, and other countries (figure B1.6.1). And, in a slightly longer perspective, the 45 years that it took China to rise from an urbanization rate of about 17 percent in 1968 to more than 50 percent in 2013 is comparable to the time it took the Soviet Union to rise from 17 percent in 1917 to 50 percent in 1961.

**FIGURE B1.6.1** Percentage point changes in urban population shares between 1978 and 2012



Source: World Bank staff calculations based on World Development Indicators and Bairoch and Goertz 1986.

and urgent for the national economy, an historic opportunity for the grand development of the road network.

Better communication facilities also improved connectivity by providing information about employment opportunities. In 1978, only 734,000 rural households across the country had telephones, rising to 1.5 million in 1990, 51.7 million in 2000, and 938.8 million in 2011. Almost everyone had a phone.

Better education reduced social barriers to labor mobility. By 2000, the coverage of nine-year compulsory education was 85 percent, with enrollment rates of 99 percent in primary schools and 88 percent in junior high schools. In 1986, a quarter of the rural labor was illiterate or semiliterate, dropping to 16.9 percent in 1995, 9.5 percent in 2005, and 7.9 percent in 2009.

But in comparison with other countries at similar levels of development, labor mobility appears to be constrained. China's urbanization role is still below the 70 percent that is more typical for a country with China's per capita income. Its urban population growth—3 percent to 4 percent annually—is also below the 5 percent to 6 percent observed in other developing countries during their rapid growth (box 1.6). Other indicators suggest that urbanization is restrained: excess employment in agriculture remains significant, not all rural migrants are formally registered in urban areas, and the urban-rural wage gap remains large. China's reforms are entering their 35th year, and constrained labor migration has resulted in a larger urban-rural gap today than in 1978. In 2009, the rural surplus labor in China was between 85 million and 115 million people, about 19 percent of rural jobholders.

Restrained labor mobility is bad for growth—it slows productivity increases and income convergence. In the United States, labor mobility has led to the near elimination of interregional and urban-rural wage differences. Rural-urban migration in the United States helped equalize agricultural and non-agricultural wages, which had a disproportionate effect on poorer agricultural states, leading to regional convergence. The North-South labor income ratio fell from 2.4:1.0 to

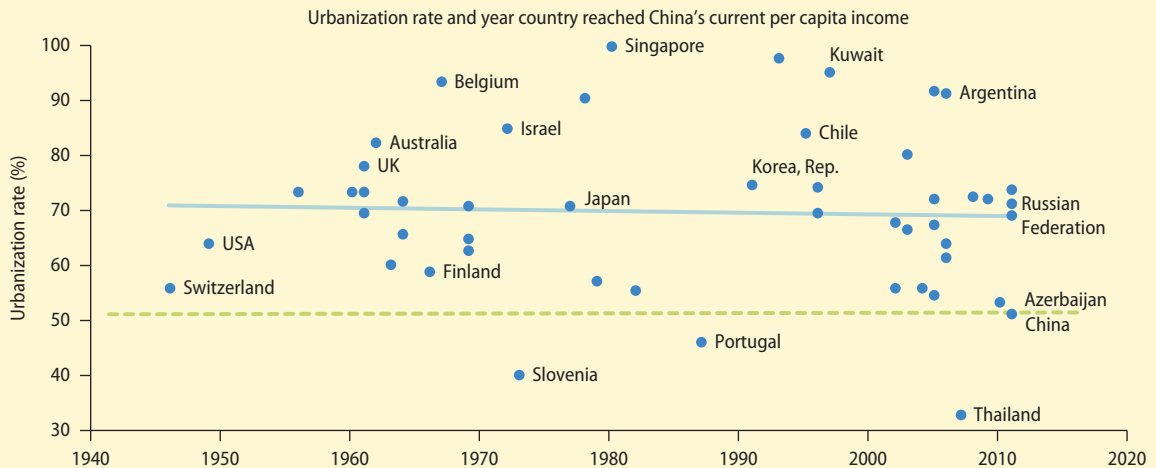
(Box continues next page)

**BOX 1.6** (continued)

And compared with economies at similar incomes, China has a significantly lower urbanization rate (figure B1.6.2). The average urbanization rate of coun-

tries with similar incomes is about 70 percent. Only Portugal, Slovenia, and Thailand had lower urbanization rates than China at comparable incomes.

**FIGURE B1.6.2 Urbanization rate and year country reached China's current per capita income**



Source: Maddison World Economic History database; World Development Indicators; United Nations World Urbanization Prospects: The 2011 Revision; U.S. Census Bureau website; Zhuo 2013.

Note: China's per capita income is at \$8,825 in international dollars.

1.1:1.0 as the urbanization rate rose from 28 percent to 74 percent (Caselli and Coleman 2001). Similarly, Korea's rapid urbanization eliminated the urban-rural wage gap by 1994, just 33 years after General Park Chung-hee initiated Korea's rapid industrialization.

Increasing mobility and connectivity between rural and urban and across cities will support employment growth, which slowed in the past decade (figure 1.13). In 2010, cities with a population below 1 million accounted for about one-third of urban employment, but average employment growth in these cities was less than 5 percent over the past decade, on average about one-quarter of that in larger cities.

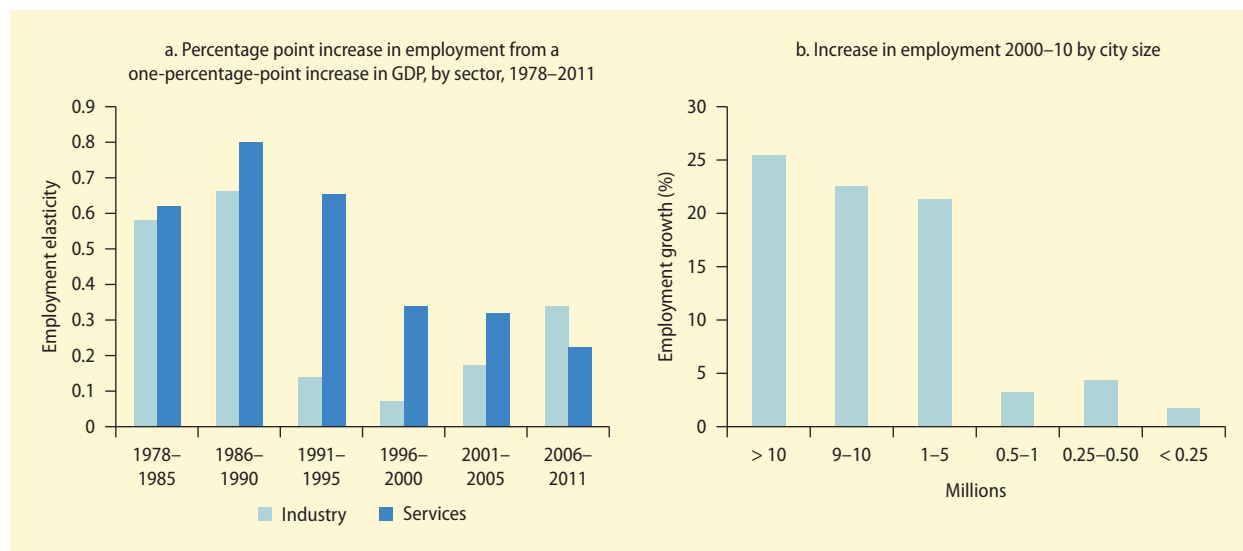
### The emerging urban middle class will demand better services and lifestyles

Middle-class citizens are important for economic growth, particularly during the tran-

sition from a middle-income country to a high-income country. And cities promote the emerging urban middle class and domestic consumption. But households' high-income inequality, low-income share of GDP, and high savings rate have constrained China's middle class.

Countries that have developed their middle class have transitioned from export-led growth to consumption-led growth while relying on innovation and service-sector development, reducing the risk of getting stuck in a middle-income trap (Gill and others 2007). On the supply side, middle-class values of hard work, meritocracy, saving, and education enable rapid physical and human capital accumulation (Kharas 2010). Since the 14th century, a middle class has been the source of entrepreneurship and innovation, as well as the small businesses upon which modern economies thrive (Acemoglu and Zilibotti 1997). On the demand side,



**FIGURE 1.13 Increased mobility and connectivity will support employment growth**

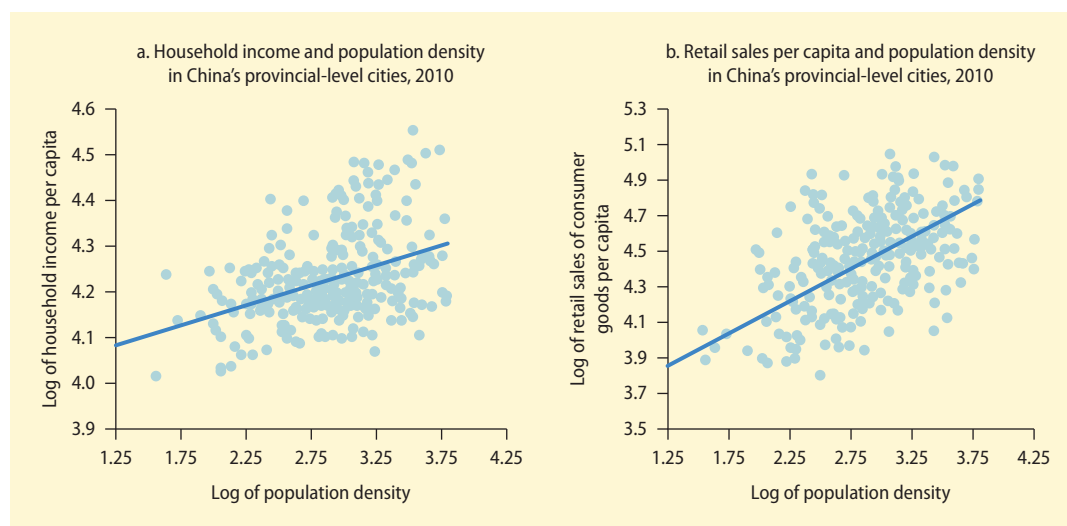
Source: DRC staff calculations.

Source: Estimates based on the 2000 and 2010 population censuses.

a middle class enjoys stable housing, job security, health, and educational opportunities—and has discretionary income to spend on leisure, leading to a “new consumerism” (Schor 1999). Middle-class consumers pay extra for quality, encouraging value-added branding and product differentiation. There is a kink in demand curves at purchasing power parity (PPP) \$6,000, after which

income elasticities of demand for consumer durables and services become greater than one (Nomura International 2009).

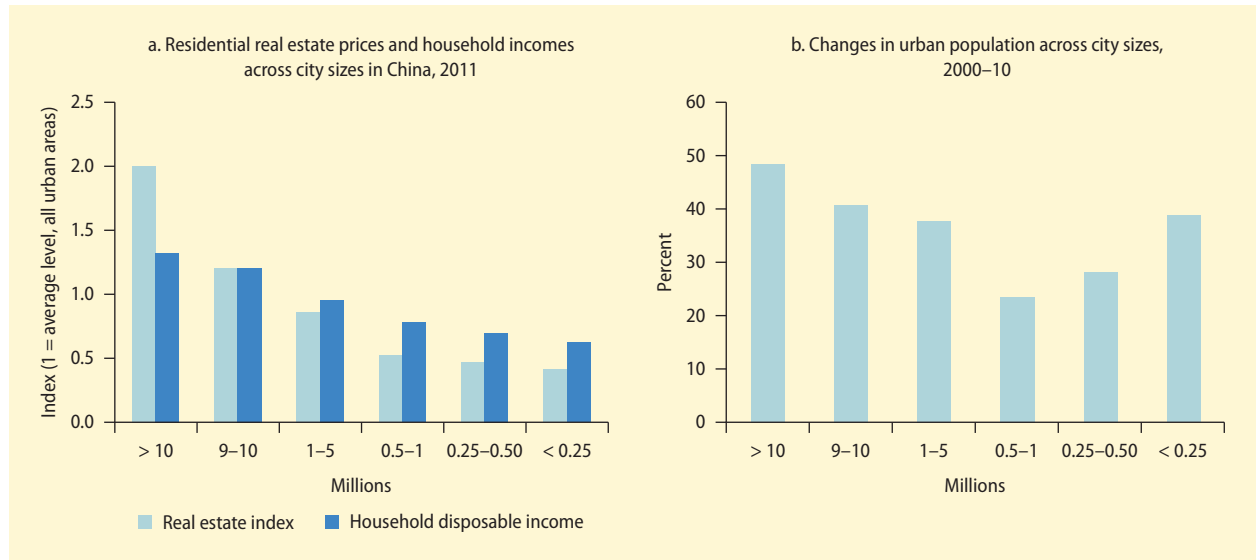
Cities offer consumption amenities associated with higher densities, which are associated with higher household incomes, as economies of scale allow firms to offer higher wages for labor (Glaeser, Kolko, and Saiz 2001) (figure 1.14). Those higher incomes,

**FIGURE 1.14 Higher densities are associated with higher incomes and consumption**

Source: World Bank staff estimates based on CEIC dataset.

Source: World Bank staff estimates based on CEIC dataset.

**FIGURE 1.15** Real household incomes (adjusted for cost of real estate) are lower in the largest cities, yet they have experienced the largest increase in population



Source: World Bank staff estimates based on CEIC dataset.

Source: World Bank staff estimates based on census data.

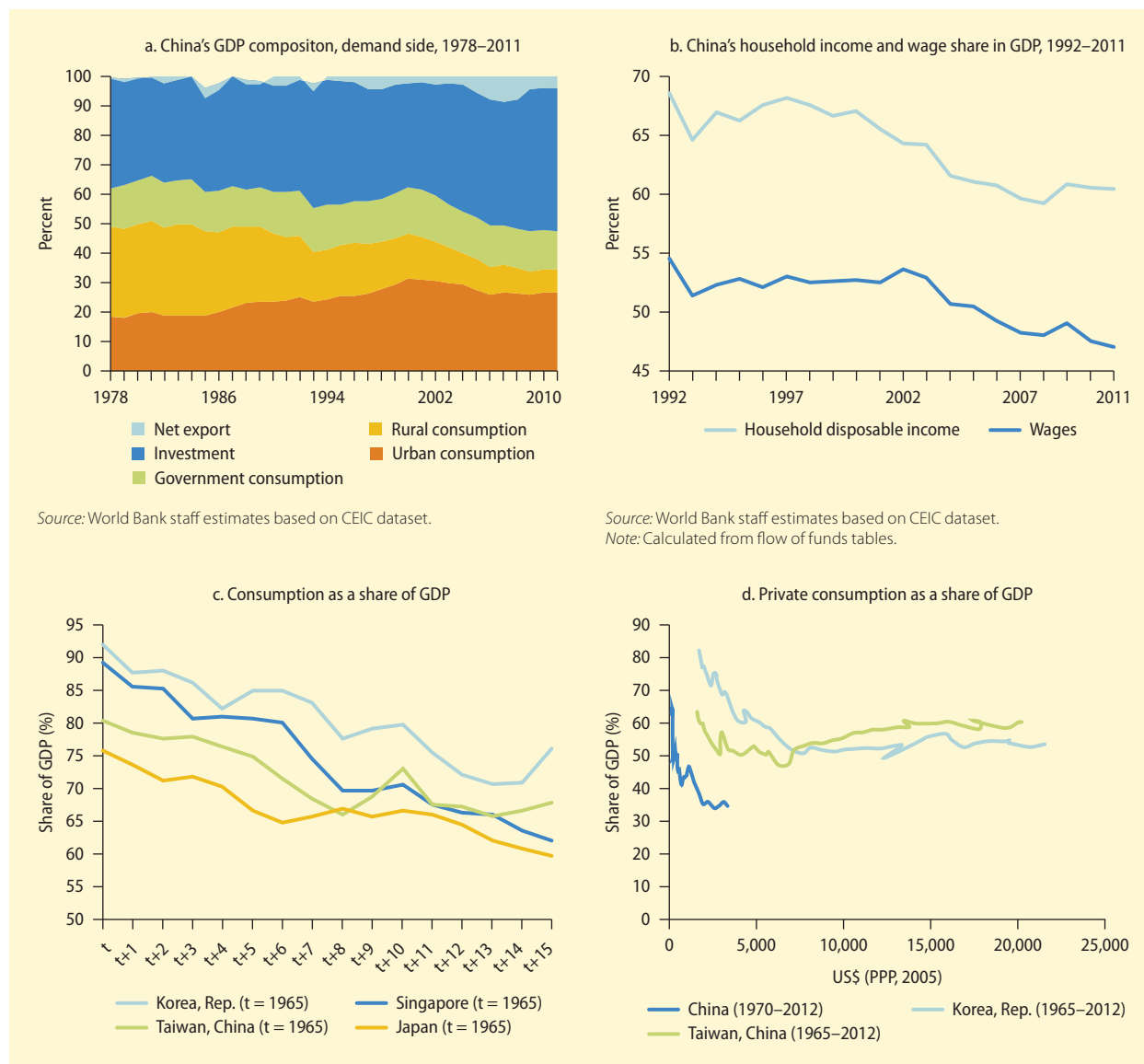
combined with social interactions associated with higher densities, boost the demand for consumption amenities. Cities can offer live concert, theater, and other commercial performances associated with large fixed costs. And it is argued that rising consumer amenities are associated with a revival of many of the metropolitan areas in the United States (Glaeser and Gottlieb 2006).

Estimating the value of available consumption amenities is difficult. One way to estimate how much households are willing to pay for these amenities is to compare incomes and costs of housing across cities. If there were a positive consumption externality associated with density, one would expect that incomes in larger cities, adjusted for costs of housing and transport, would be lower.<sup>14</sup> And indeed, average household incomes in China's largest cities are about 30 percent higher than on the average for all urban areas, while housing costs per square meter are double the average. Yet the largest increases in population over the past decade were still in large cities (figure 1.15).

The first stage of urbanization commonly lowers the shares of consumption. Growth is driven mainly by industry and investment

rather than services and consumption. The productivity gains unlocked during China's structural transformation from rural to urban activities were far greater than real increases in labor compensation. And the remaining surplus labor in rural sectors constrains any upward wage pressures. As a result, the majority of the gains are captured by enterprises, allowing them to maintain high corporate savings rates to finance capital-intensive growth (figure 1.16). At the same time, moderate real wage growth maintained China's competitiveness in external markets. A simple "dual economy" model shows how the transfer of surplus workers from the rural sector to the modern economy, complemented by rising investment, leads to rapid but inefficient growth (Lewis 1954).

But China's growth imbalances have lasted much longer than those in other countries experiencing rapid economic development and transformation. They also differ across regions—the share of investment in GDP is significantly higher in western and central provinces. And imbalances in these regions widened after 2008, driven mainly by investment stimulus measures by local governments in western and central provinces.

**FIGURE 1.16** The initial stages of urbanization and industrialization led to imbalances in economic growth

Source: World Bank staff estimates based on CEIC dataset.

Note: Primary industry—agriculture, Secondary—industry and construction, Tertiary—services.

Source: World Bank staff estimates based on World Bank Data Development Platform.

Mounting evidence suggests that returns on those investments have started to decline, requiring ever higher levels of investment to maintain economic activity (Lee, Syed, and Xueyan 2013). This finding contrasts with coastal provinces, where high investment rates in the past have started to translate to gradual increases in private consumption, as returns to those investments contribute to higher household incomes.

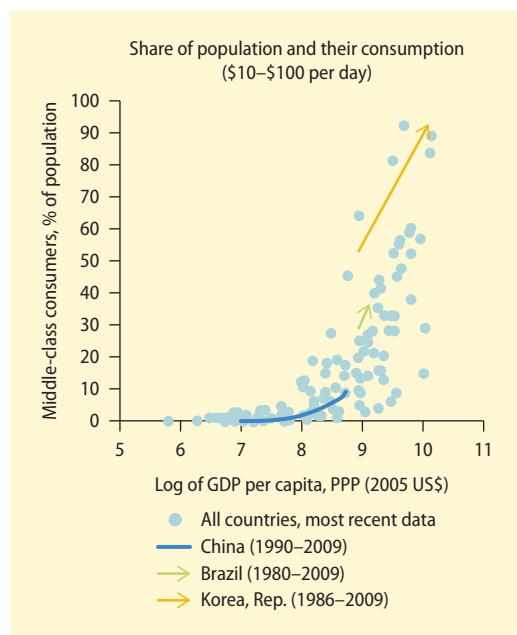
China's global middle class grew from less than 2 percent in 2000 to 11 percent in 2010, but its relative size remains low.<sup>15</sup> China has become the world's second largest middle class in absolute terms with 157 million consumers, behind only the United States. But at only 11 percent of its population based on consumption, the Chinese middle class is small in relative terms (table 1.6 and figure 1.17).<sup>16,17</sup> And at China's per capita income,

**TABLE 1.6** Percentage of population with consumption between \$10–\$100 a day, in 2005 PPP dollars

	Urban	Rural	National
2000	3.5	0.6	1.7
2005	7.9	1.3	4.1
2006	9.7	1.8	5.3
2007	11.8	2.0	6.5
2008	13.6	2.1	7.5
2009	16.8	2.7	9.5
2010	19.5	3.2	11.4

Source: World Bank staff estimates based on Povcal data.

**FIGURE 1.17** China's middle class continues to grow, but it remains small relative to China's development level



Source: World Bank staff estimates based on Povcal data.

more than 20 percent of the population should have entered the global middle class.

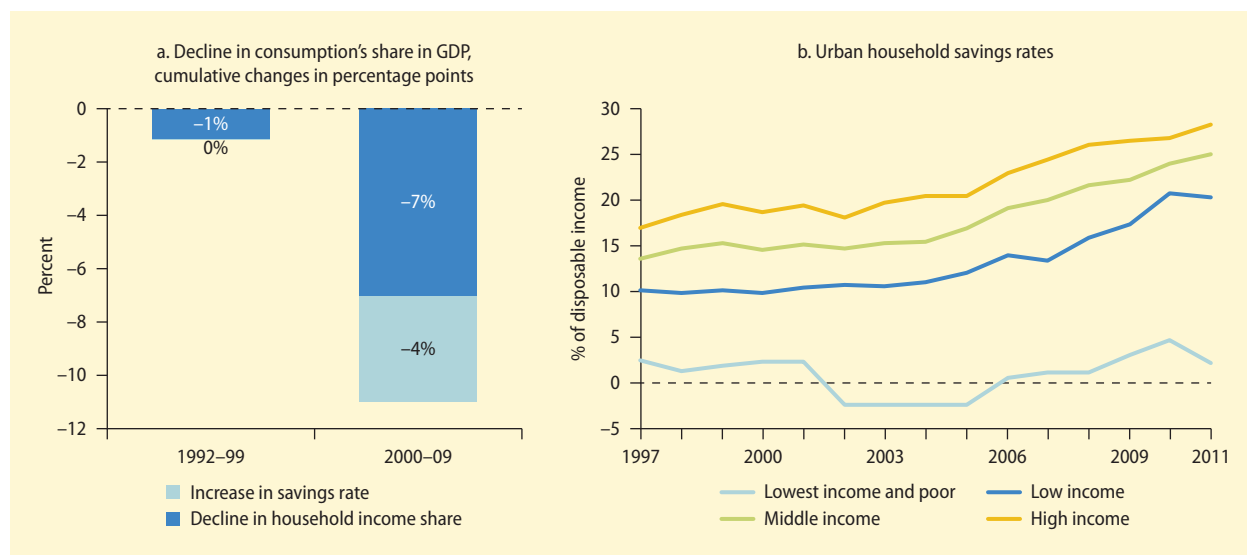
China's current per capita income is similar to Brazil's in 1980 and Korea's in 1986, but China's middle class is half that of Brazil's and a quarter that of Korea's (Kharas 2010). Korea's transition to high income came from developing an innovation-based knowledge economy on the shoulders of its large middle class. Brazil, meanwhile, continued to rely on commodity exports without sufficient

middle-class domestic demand. China's inequality is more similar to Brazil's in the 1970s than Korea's in the 1980s, and its high household savings rates further depress the emergence of a vibrant middle class.

Households with high-income inequality, a low-income share of GDP, and a high-savings rate have constrained middle-class development in China, all undermining faster growth in consumption (figure 1.18).

China's rising income inequality over the reform period is fairly normal, but the rate of increase is largely unprecedented. China is rapidly approaching the per capita income at which the United States inequality began to decline (before rising again at a much wealthier stage). And there are signs that China may be reaching the inflection point of the Kuznets curve. Whereas intrarural inequality at the start of reform was significantly higher (0.33) than intraurban inequality (0.24), intraurban inequality has grown much more over the past 30 years,<sup>18</sup> especially when migrants are included.<sup>19</sup> Even so, China's overall income inequality remains comparable to Malaysia, Singapore, and the United States. The contribution to overall inequality made by mean difference in urban and rural incomes rose from 37 percent in 1988 to 54 percent in 2007.<sup>20</sup> Adjusting for spatial cost-of-living differences reduces this figure to 41 percent, which is much higher than most other countries (Li, Chuliang, and Sicular 2013). But the urban-rural income gap began to shrink in 2009 and the consumption gap began to shrink as early as 2004. Despite wide interprovincial expenditure inequality—the richest province spends more than 8 times per capita than the poorest province, much larger even than Brazil where the richest state spends 2.3 times more than the poorest state (Dollar and Hofman 2008)—intraprovincial inequality of county-level units is even more extreme. In 2010, intraprovincial inequality accounted for 67.5 percent of national inequality in average county income, but interprovincial inequality accounted for only 32.5 percent.

High household savings are further inhibiting the emergence of a vibrant middle class. Rural households and migrants save as much as 30 percent more than permanent urban

**FIGURE 1.18 Why is urban consumption so low?**

Source: World Bank Staff estimates based on CEIC dataset.

residents at similar incomes. The migrants' precautionary savings are high because they lack social services and safety nets, such as government-supported social housing—and are less able to obtain private mortgages, so they generally cannot purchase homes except with cash. The lack of access to mortgages means that migrants do not enjoy a housing wealth effect: they cannot benefit from the massive increase in urban wealth resulting from the privatization of housing in the 1990s.<sup>21</sup> Migrants' low wages and high household savings also limit their demand for consumer goods. If migrants were to consume at urban rates given equal service provision and more accessible and affordable housing, back-of-the-envelope calculations imply a 1.8 percentage point increase in the household consumption share of GDP.

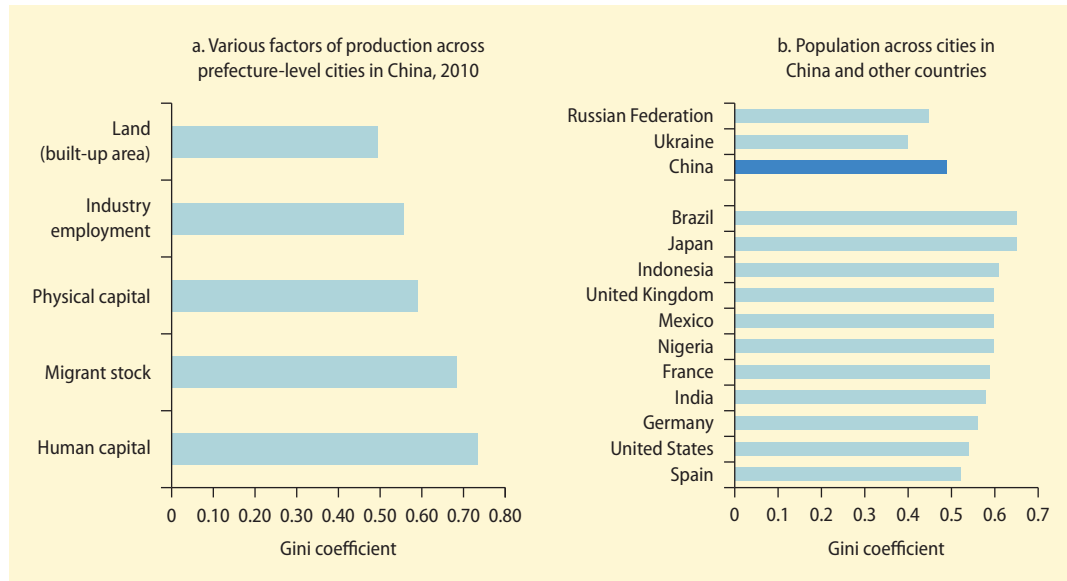
### More efficient, inclusive, and sustainable urbanization and growth

A new urbanization trajectory to strengthen agglomeration and specialization will require comprehensive reforms in land and financial sector policies, while changes in hukou and fiscal policy will be required to strengthen

mobility and connectivity. The government should let market forces do more in allocating factors of production, particularly land and capital, and get out of providing goods that the private market is better at delivering. Adjustments in the hukou system will be required to integrate migrants into urban life. Distorted incentives of local governments have made them direct participants in driving the economic growth by sustaining high public investment growth rather than efficient providers of public social services for all residents. Implementing these policies will not be easy, but it will be essential to complete China's transition to a market economy and further strengthen its foundations for growth.

### Adjusting land and financial sector policies to strengthen forces of agglomeration and specialization

China's future economic growth will depend on efficiently allocating factors of production, but distorted incentives and price signals in factor markets are leading China's urbanization astray. Distortions in the price of land have encouraged urban sprawl and undermined agglomeration economies. And distortions in access to and cost of capital have reduced the returns on capital and

**FIGURE 1.19** The concentration of different factors of production differs widely in China

Source: World Bank and DRC staff estimates based on CEIC dataset and census data.

undermined specialization and technological upgrading.

The concentration of different factors of production differs widely in China. The Gini coefficients of concentration of various factors of production show that while the vast majority of migrant and human capital stock tends to be very concentrated, industrial employment and physical capital concentration is lower (figure 1.19). Moreover, the concentration of land, a factor that is immobile and should have very low concentration, is almost as concentrated as employment. The concentration of population in China is very similar to other former economies of central planning, but it remains significantly lower than in Brazil, Japan, and the United States. For economic efficiency, land and capital must be used in a way that has the greatest value. If not, the economy is not achieving its potential. Markets accomplish this through land prices and interest rates, but administrators have a difficult time imputing value to land or capital.

Distorted land prices have slowed specialization and the transition toward a service-based economy. Industries were drawn by cheap land, and they have no incentive to leave. In March 2013, the average price of

land for industrial use in Chinese cities was RMB 544 per square meter, while the average price of land for commercial use was about 10 times higher—RMB 5,151 per square meter. Moreover, while the price of land for industrial use remained broadly constant in real terms, the price of land for commercial use increased by about 12 percent a year on average in the past four years.<sup>22</sup> In addition, whereas the prices of industrial land remain broadly uniform across cities, there is considerable variation in prices of land for commercial use across cities. In cities with more developed services, the price of land for commercial use has increased more. In Guangzhou, a ratio between prices of land for commercial and industry use is as high as 42. If industrial firms could capture the value of their land holdings, they would find it more attractive for some of them to relocate out of the city. Similarly, the low cost of land has resulted in sprawl, pollution, and congestion that would be lower if land were priced at its true social value.

The present land system—with incomplete property rights and government controls—creates stress, tension, and rising inequality. Land is essentially owned or controlled by the government, and its use is determined by

applying administrative rules. The rules are well intended, as are the people administering them, but they are not compatible with China's dynamic economy. Rigid land policies have effectively tied half the population to rural areas that produce only 10 percent of GDP. Rural peasants, among the poorest in any society, hold land collectively and cannot liquidate their holdings when they exit the collective. Household plots are also collectivized so that families do not even own the land under their houses, nor can they get a mortgage on that land.

Land reforms would give peasants the wealth from land sales, reducing social tensions and mitigating growing wealth inequality. Between 1990 and 2010, local governments expropriated rural land at RMB 2 trillion below market value (Page 2011). Assuming that this wealth would have generated returns similar to overall growth, farmers today would have more than RMB 5 trillion in household wealth, greatly lowering the urban-rural asset gap and increasing consumption through a wealth effect. In addition, rural land is held in small parcels, making it difficult to assemble economic-sized farms, reducing agricultural productivity and rural incomes. Despite massive off-farm migration, rural population growth has meant that cultivated land per agricultural laborer has remained fairly constant, increasing only from 0.35 hectares in 1978 to 0.41 in 2008. Average Chinese farm holdings are well under 1 hectare, far lower than the global average and 300 times smaller than the average farm in the United States.

Global evidence demonstrates that formal rural land markets with unconstrained transferability (selling and renting) lead to significant increases in agricultural investment and productivity through mechanization and larger rural plots. In the decade after Taiwan, China, privatized rural land in the 1950s, annual rice yields rose 60 percent and farm incomes 150 percent. New laws in Vietnam in 1993 established the right to inherit, transfer, sell, lease, or mortgage land and extended duration of land use rights from 20 years to 50 years. These reforms increased both efficiency and equity. Rental market participation quadrupled in the five years following

reform and land sale transactions increased sevenfold. Both had an unambiguously positive impact on productivity, and Vietnam went from being a net rice importer to becoming the world's second largest exporter (Deininger and Jin 2003).

Despite China's impressive progress in reforming the financial sector, the financial system remains repressed and suffers from key structural imbalances (World Bank and DRC 2013). Not only do these imbalances pose significant systemic risks, they prevent China's financial system from serving an increasingly dynamic and internationally integrated economy. China's municipal governments have increased investments in infrastructure, primarily through off-balance sheet borrowing to bypass their severely constrained access to capital markets. More efficient allocations of capital would require increasing interest-rate flexibility by moving to a point where interest rates clear the credit market. With interest rates doing so, the capital market would deepen to make more equity and securitized financing available. In addition, the capital market's legal framework would improve, the financial infrastructure would be upgraded, and more stringent rules on information disclosure would be imposed.

Constrained access to capital has slowed the specialization of high value-added services. China's financial sector, dominated by state-owned banks, facilitated a transfer of savings from households to large state-owned industrial enterprises. An interest-rate cap on domestic savings has effectively transferred household wealth of about 4 percent of GDP a year to the industrial sector (Lee, Syed, and Xueyan 2012). A transition from industry to services will be increasingly driven by small and medium enterprises, but China's financial intermediation remains inefficient in channeling financial resources. In addition, the interest-rate cap on domestic savings has also distorted the allocation of capital, encouraging households to channel their savings to nonproductive assets, notably real estate.

Market forces should play a greater role in allocating land and capital. To increase the efficiency of land use, it is necessary to ensure the security of agricultural land tenure, including introducing the transferability



of land rights and reforming land acquisition and compensation practices. This action includes rolling out the recent policy decision to grant indefinite land use rights to farmers, to expand land registration, and to strengthen rural land markets. These policies will increase more efficient allocation of land and support forces of agglomeration and specialization.

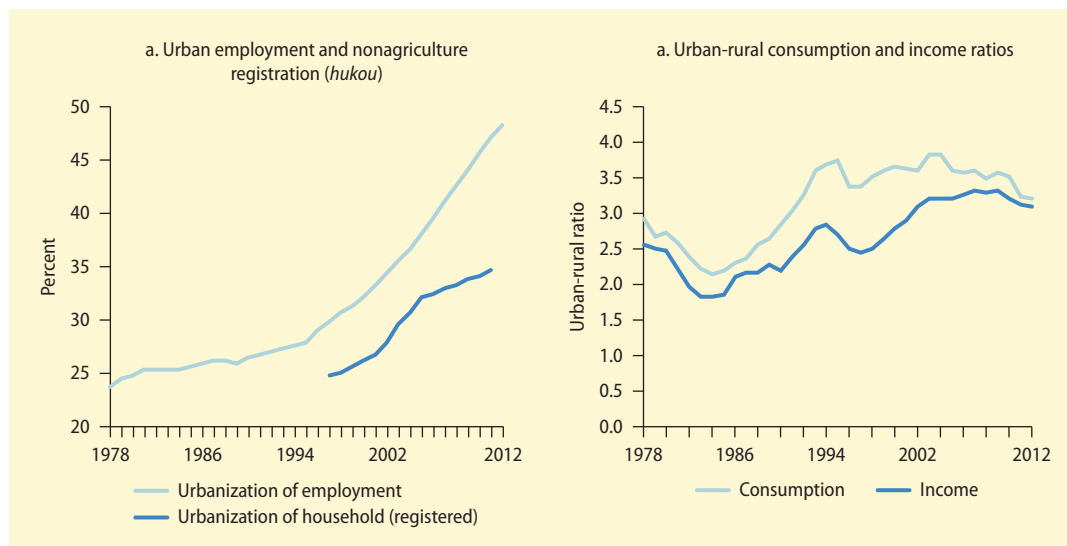
### Empowering the middle class by letting migrants become urban residents

Developing a flexible and dynamic labor market that supports agglomeration, specialization, and mobility will be central to China's future success as a high-income, open economy. Reforming the hukou system, the permanent residency of migrants, is an essential element in China's transformation to an economy based on domestic demand. Currently, barriers to free migration prevent workers from going where they are needed and lead to imbalances in the supply and demand for labor. Rural-urban labor mobility has been a driver of China's growth, and slowing it reduces China's future growth potential. Already, China's major cities see a growing gap between the supply and demand of labor.

China has been very successful at urbanizing employment, but it has failed to make sufficient progress in urbanizing people. Hukou-based institutional barriers to movements of people combined with a decentralized fiscal system that results in spatial differences in the ability to provide social services have slowed income convergence and undermined the growth of an urban middle class (figure 1.20).

Whereas urbanization has made migrants better off, their economic and social opportunities often lag behind those of urban residents. The hukou household registration system has institutionalized a "floating" population of those who migrate without their families and have unequal access to social insurance and public services. They work longer hours in worse jobs for lower wages. In 2011, average wages for urban migrants were 43 percent less than those for urban residents (Credit Suisse Research Institute 2011). Controlled for education, the wage gap almost disappears, but migrants have limited access to quality education and have worse educational outcomes. And rather than have urbanization gradually integrate the migrant population, it continues to widen the divide between permanent residents and migrants: whereas 31 percent of the urban population

**FIGURE 1.20** Slow urbanization of people has slowed income convergence



Source: World Bank Development Data Platform.

Source: World Bank Development Data Platform.

were temporary migrants in 2000, this share had grown to 42 percent by 2010.

The household registration system has also restricted many migrants from housing ownership in urban areas. Enabling people to live middle-class lifestyles requires a robust and affordable urban housing sector that gives all residents an achievable aspiration for better homes. Currently, only 10 percent of migrants own urban housing, compared with 90 percent of the permanent urban population. The migrants without housing do not gain from increases in home values and do not experience a positive housing wealth effect that would boost their consumption. Without permanent homes, they are also less likely to consume housing appliances and other goods and services related to home ownership. Because migrants are excluded from the mortgage finance market and from local urban social housing, they must save more of their income to purchase future housing. In other words, one-fifth of China's people are prevented from borrowing against future income and becoming current consumers.

Unequal sharing of capital gains is the source of serious and growing social discontent. In 2010, capital gains accounted for about 8 percent of average household incomes for permanent urban residents. But for urban migrants, the equivalent share was only about 3.4 percent. Rural-urban asset inequality is more extreme and has been institutionalized by semiprivatization of urban housing (with capital gains) and by continuing nontransferability of rural land. The wealth Gini coefficient in 2002 was 0.55, much higher than that of income inequality, and housing represented two-thirds of the inequality in net wealth (Zhao and Ding 2007). As urban housing prices rise, the differences become more stark: between 2002 and 2007, per capita urban housing wealth grew from 4.5 times rural housing wealth to 7.2 times, compared with an income gap of only 3.1 times in 2008.

China's constraints on free mobility of labor reinforced regional and urban-rural wage gaps, evincing a lack of efficiency, and China would have enjoyed large payoffs from quicker migration and faster convergence. Assume that over the 32 years from 1978 to 2010, migrants had naturally converged

wages, savings, consumption behavior, and nonwage income possibilities (property plus transfer income). Also assume that migrant labor productivity is equal to native urban labor productivity and that urban-rural migration does not diminish agricultural output (out-migrants are surplus labor). What would have been the gains to China's economy from faster migration? For every 0.1 percent faster annual migration over the 1978 to 2010 migration (1 million people in 1980, 1.34 million in 2010), real GDP in 2010 would have been higher by 4.6 percent. If China had enabled migration at close to Korean rates, its economy would be nearly 25 percent larger today. And structural change would have already begun: the household income share of GDP would be more than 5–8 percentage points higher than it is, and the consumption share of GDP would be 3–5 percentage points higher (depending on the growth rate from additional migration). China would be richer and already more dependent on domestic demand.

### **Providing public goods and services to support mobility and connectivity**

The expected urban population increase may well be more than most cities can absorb with their existing infrastructure and service delivery capacity. Over the next two decades, new amenities will be provided to satisfy a higher-income population and service industries will ask for a different package of infrastructure and social services than manufacturing industries did. Higher incomes and automobile ownership have slowed travel times in China's major cities. In 2011, the average travel speed in Beijing was estimated at 7.5 miles an hour, about half that in New York or Singapore.

Adequate public infrastructure and services have long been recognized as a key factor of development and a tool for governments to promote competitiveness and regional and productivity growth.<sup>23</sup> But insufficient infrastructure and inadequate services are associated with rapid economic transformation and urbanization in developing countries. In many aspects, China is an exception—its infrastructure stock is notably

higher than that in countries at a similar level of development. Municipal investments in public infrastructure have accounted for about 3 percent of GDP in the past decade. And China has made tremendous progress in providing access to basic education and health services. But in many parts of China, the access to and quality of service provision and infrastructure remain low.

Public services are essential to minimize negative externalities associated with high population densities. Noise, congestion, waste, infectious disease, and other externalities become more severe as people locate near one another in large agglomerations. So, public services are one of the key elements that define cities. Drinking water, sanitation, and sewage disposal directly influence human development. Services lower income inequality and reduce poverty by unlocking more productive opportunities for more people, enhancing human capital and incomes (Seethapalli, Bramati, and Veredas 2008). And thanks to economies of scale, cities can lower the unit costs of providing water, sanitation, health care, education, electricity, and other essential services.

A global middle class will demand more from its government, particularly better services that encourage accumulations of human capital. But China has outgrown parts of its fiscal system. The narrow tax base of municipal governments results in insufficient and unequal provision of public services for rapidly increasing urban residents.<sup>24</sup> Shanghai's public education system has responded by becoming the envy of other regions in China and other parts of the world.<sup>25</sup> But Shanghai is an outlier, and its achievements currently are beyond the reach of other Chinese municipalities. Lacking resources or real incentives, local governments often exclude migrants as beneficiaries of social services. So, with many citizens unable to enjoy basic social services, China is reducing its future human capital.

Increasing spending on social objectives will require broadening the revenue base of local governments and setting new priorities. Property taxes have substantial revenue potential, as do taxes on natural resources (energy, water, pollution). But the current governance structure has aligned local

government incentives to achieve economic growth objectives over social objectives. Local governments have used capital expenditures financed both by land transactions and debt to boost short-term growth by provision of capital investments in infrastructure and real estate development. Moreover, after 2009 many lagging regions in western and central China have relied on investment as the engine of growth. Although such policies have increased convergence, the returns on capital investments in these regions have declined considerably and local government debt has increased.<sup>26</sup>

A reallocation of spending toward social objectives, combined with increased migration, would also support regional wage convergence. Migration leads to regional wage convergence and tends to lower spatial and urban-rural inequality. But this convergence may not be fast enough. Cross-country evidence shows that access to basic public services converges slowly—urban-rural gaps in basic education, health, drinking water, and sanitation persist until countries reach upper-middle income. But most fast-growing countries have been able to quickly translate economic progress into spatial equity in basic health, nutrition, and education (World Bank 2009). Disparities in services within cities persist even in many upper-middle-income countries with high levels of urbanization.

### **China's growth dividends from the new urbanization trajectory**

China's new urbanization trajectory will require reforms that enhance efficiency, increase inclusiveness, and promote sustainability. It may not reverse a moderation of economic growth that is likely over the next decades. But the payoff from the new urbanization trajectory is more efficient, inclusive, and sustainable growth. And in absence of policy reforms, growth is likely to slow even more.

### **China's new urbanization trajectory is underpinned by reforms**

China's new urbanization trajectory is underpinned by reforms that will determine how

fast the excess employment from rural areas is integrated into urban areas. At the same time, the urbanization trajectory will be affected by demographic transformation.

Natural population growth in urban areas is estimated to moderate in the coming decades. According to the sixth population census, during the statistical period covering October 31, 2009, to November 1, 2010, the natural growth of urban population was just 0.42 percent. Using Chinese population estimates of the United Nations World Population Prospects 2010, it is estimated that the natural growth of China's urban population will be equivalent to 57 million over the next two decades. The United Nations also projects China's total population to reach 1.39 billion in 2030.

Excess employment in rural areas will be about 140 million in the next decade. Estimates of working hours indicate that those employed in agriculture spent on average only 158 working days on agriculture activities, suggesting that those in agriculture are underemployed.<sup>27</sup> In 2011, about 262.4 million people were employed in agriculture in rural areas.<sup>28</sup> An increase of working days spent on agriculture activities to 270 would reduce the number of workers currently employed in agriculture by a staggering 40 percent.<sup>29</sup> And an increase in mechanization in agriculture activities could reduce labor demand by another 16 million workers. So, the current stock of excess rural employment is estimated at around 105.7 million. Taking into account demographic changes (net working age population up by 6.04 million) and continuing mechanization (likely to release an additional 2.8 million workers each year), the excess rural employment is estimated to reach 149.5 million over the years 2012 to 2030.

In the coming decades, urbanization will continue, but its speed will moderate. Based on the logistic model, an S-shaped urban population trajectory is estimated for China (box 1.7). The model estimates predict that accelerated increase in urbanization rate for the period between 1994 and 2030. On the basis of those estimates, the inflection of urbanization rate (the highest annual rate of change in the urbanization rate) already

occurred in 2008. The urbanization rate will surpass 62 percent in 2020, 70 percent in 2030, and 76 percent in 2050. But in the medium term, the urbanization rate will be affected by the reforms undertaken.

Three broad sets of reforms underpin China's new urbanization trajectory:

- First are reforms to enhance the efficiency of urbanization by strengthening agglomeration, connectivity, and specialization. The largest cities in such urban agglomerations as Beijing, Shanghai, and Guangzhou have grown rapidly in recent years, serving as gateways to international markets. This trend is likely to be reinforced. Moreover, a gradual removal of constraints to labor mobility will accelerate urbanization. These reforms will increase TFP by 0.1–0.2 percentage points of GDP and increase the urbanization rate by 0.2 percentage points a year, relative to the baseline scenario.
- Second are reforms that enhance inclusive urbanization by strengthening the accumulation of human capital and increasing the access to public services. An increase in human capital will increase the skilled labor in the labor force and thus TFP.
- Third are reforms that make urbanization more sustainable by pricing some of the negative externalities associated with resource use, thus increasing energy efficiency.

To estimate the quantitative effect of the new urbanization trajectory, two quantitative growth scenarios are analyzed. The first scenario is analyzed on the basis of past trends, the second on the basis of three sets of reforms (table 1.7).

The scenarios result in diverging estimates of how much excess labor, including family members, will be absorbed in cities over the next decade. In 2011, it was estimated that the surplus labor transfer rate was about 65 percent—of the total rural employment surplus about two-thirds have already moved to urban areas. In the baseline business-as-usual scenario, the transfer rate is estimated to increase moderately to 80 percent. But in a reform scenario, the excess transfer rate is

### BOX 1.7 Logistic model estimates of China's urbanization trajectory

The long-term urbanization trends can be estimated using historical urbanization trends that typically follow an S-shaped trend (Northam 1975). The logistic model is the more commonly used model for predicting a country's middle- to long-term urbanization development. It can be characterized by the equation below where  $U(t)$  is urbanization rate at time  $t$ ,  $K$  is the peak urbanization rate, and  $A$  and  $B$  stand for an early and late start of urbanization and the fast and slow speed of urbanization.

$$U(t) = \frac{K}{1 + A \exp(-Bt)}$$

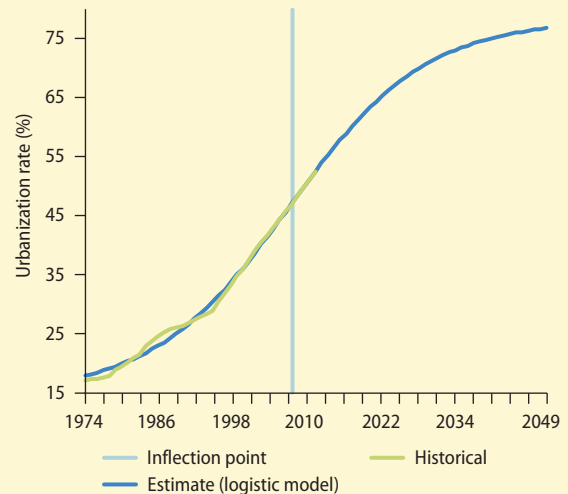
The key to the fitting of the logistic curve is to have appropriate estimates of parameters  $K$ ,  $A$ , and  $B$ . The approach used in the past was to take the log of the equation, turn it into a linear equation, and use the linear equation to fit the parameters. In this way, a nonlinear fitting problem becomes a linear equation. The approach is easy to use, but also it is a more subjective one because it requires having an estimate of  $K$ . In addition, this approach works under the implicit assumption that  $K$  is constant. This assumption is not, however, in line with the reality that the peak urbanization rate changes as the optimal scale of a city changes as a result of institutional and policy adjustments.

The United Nations has been using this model since the 1970s to forecast the global urbanization prospects. Many Chinese scholars adopt the logistic model to predict China's urbanization development.

In this study, the nonlinear parameters of the logistic curve are estimated directly using data starting from 1974.

$$U(t) = \frac{0.632}{1 + 20\exp(-0.089t)} + 0.15$$

**FIGURE B1.7.1** Estimates of China's urbanization rates, 1974–2050



Source: DRC estimates based on the logistic model.

Urban population growth estimates based on the logistic model depend on assumptions of China's peak urbanization rate—estimated at 76.8 percent for this study (figure B1.7.1). But the peak urbanization may change because of various factors. On one hand, infrastructure improvements in connectivity, as well as policy reforms, could increase the optimal scale of cities—leading to higher optimal urbanization rate in future. On the other hand, deteriorating energy and environmental conditions and policy interventions may lower the peak urbanization rate at the same time. Thus, these long-term estimates of urban population growth should be interpreted with caution, especially when predicting urbanization patterns in the medium term.

estimated to increase to 90 percent, attributable to policy reforms that remove administrative barriers to labor movements and provide more equal access to public goods and services. And the reform scenario implies that a higher share of migrant workers will migrate with family members over the medium term. According to the latest census, the average size of a rural household is 3.4 people, but migrant worker households in urban areas consist only of 2.5 people,

as some household members have remained in rural areas. In the baseline scenario, the urban migrant worker household size is estimated to increase to 2.8 and in the reform scenario to 3.25 because of increased access to public services. Finally, household members of current migrant workers left behind in rural areas are likely to migrate to cities.

On the basis of this analysis, the urban population will increase by about 290 million in a reform scenario by 2030 (table

**TABLE 1.7 Summary of the reforms scenario**

<b>First reform area: Enhance agglomeration economies and improve the efficiency of urbanization</b>	
Baseline	<p>The baseline scenario assumes that total factor productivity will be supported by gradual increases in human capital and technological advances (based on historical trends). Urbanization continues on past trends:</p> <ul style="list-style-type: none"> <li>• 0.9 percentage points a year 2013–20</li> <li>• 0.7 percentage points a year 2021–30</li> <li>• Technological and intermediate input changes (Total factor productivity [TFP] growth will be lower than the past 30 years, at about 2.0 percent.)</li> </ul>
Reforms	<p>Eliminate the barriers of labor movement and accelerate the migration of labor. Urbanization is faster than baseline by 0.2 percentage points a year in 2014–30.</p> <p>Increase flexibility of movement of production factors and improve regional connectivity and coordination to increase densities and diversify of cities. TFP growth is 0.1–0.2 percentage points faster than baseline scenario.</p>
<b>Second reform area: Increase the equality of outcome sharing and enhance the inclusiveness of urbanization</b>	
Reforms	<p>Accelerate the urbanization of migrant workers.</p> <p>Equalize the public service between urban and rural and within cities. Assume that public spending increases by 1–2 percentage points over the baseline.</p> <p>Reform the income distribution and increase the share of the middle-income group. Assume that the proportion of the middle-income group will increase by 0.3–0.5 percentage points and aggregate average propensity to consumption will increase by 5 percentage points cumulatively more than the baseline.</p> <p>Promote the accumulation of human capital by equalizing public service and increasing the middle-income group. Assume that the TFP growth increases 0.5 percentage points more than the baseline because of the progress on human capital. In addition, the number of high skilled workers will increase 0.4 percentage points faster than the baseline.</p>
<b>Third reform area: facilitate green growth and increase the sustainability of urbanization</b>	
Reforms	<p>Impose a carbon tax to improve energy efficiency and reduce emissions intensity. Assume that the carbon tax will be levied from 2015 at RMB 50 per ton of carbon dioxide (CO<sub>2</sub>) and be gradually increased to RMB 150 per ton of CO<sub>2</sub> in 2030.</p> <p>Energy efficiency will increase 0.5 percentage points faster than in the baseline.</p>

**TABLE 1.8 Urban population projections over the medium term**

	Baseline scenario	Reform scenario
Current stock of migrant workers	197.6 million	
Rural excess labor in 2011	105.6 million	
Cumulative rural excess labor (2012–30)	142.8 million	
Surplus labor transfer rate	80 percent	90 percent
Employment migration from rural to urban areas (2012–30)	119.6 million	134.5 million
Average size of migrant worker household (number of people)	3.0	3.25
Total new migrant worker and family member migration from rural to urban areas (2012–30)	149 million	181.6 million
Reunification of household units of existing migrants (2012–30)	32.18 million	48.2 million
<b>Total population movements from rural to urban areas (2012–30)</b>	<b>181.19 million</b>	<b>229.88 million</b>
Natural population growth in urban areas (2012–30)	57.25 million	
<b>Total additional urban population in 2030</b>	<b>238.4 million</b>	<b>287.13 million</b>
<b>Total urban population in 2030</b>	<b>929.2 million</b>	<b>977.9 million</b>
<b>Urbanization rate in 2030</b>	<b>66.8 percent</b>	<b>70.2 percent</b>

Source: Estimates by Development Research Center of the State Council.

1.8). In the absence of reforms that address labor mobility, urban population is likely to increase by only 238 million by 2030. As a result, the urbanization rate will reach 70.2 percent in 2030, almost 4 percentage points

higher than in the baseline scenario, bringing the country in line with expectations based on income. So, the reforms will accelerate the annual urbanization rate by 0.2 percentage points.



These estimates assume no additional changes in administrative divisions or statistical methods in classifying urban population.

### China's economic growth model will change

A moderation of urbanization will coincide with a structural transformation of China's growth model. Within the next decades, China's economy will shift from rapid to moderate growth, with average annual growth of around 5 percent by 2030. First, because of a weaker external demand, China's export growth will slow—to around 10 percent annually on average—in the next 10 years. Second, continuing capital accumulation will contribute less to growth as the capital-labor ratio rises. And changes in the demographic profile will lead to a decline in the labor market participation rate. China's working-age population is expected to decline, and labor's contribution to growth will turn negative. In addition, the spatial transformation in labor markets will contribute less to growth.

Analyzing the effect of such a reform package will require quantifying both the supply- and demand-side factors of economic growth and their links. To project the effect of the new urbanization trajectory on growth, the study adopts the computable general equilibrium model of China's Development Research Center (box 1.8). Different from the simple macro model of aggregate production function, it can better simulate the effect of structural changes.

These three policies will contribute to higher growth rates under a reform scenario:

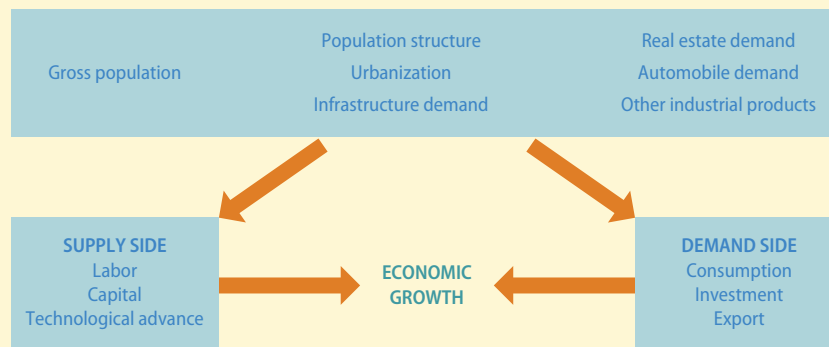
- The reallocation of excess labor from agriculture to other sectors will be accelerated, increasing growth by about 0.2 percentage points.
- Higher urbanization will result in a higher savings rate and investment (relative to the baseline) as the share of urban residents increases faster.
- An increase in the urbanization rate will promote human capital accumulation and agglomeration economies that will increase productivity relative to the baseline.

### BOX 1.8 China's Development Research Center computable general equilibrium model

The model allows incorporating both the supply- and demand-side factors of growth (figure B1.8.1). On the supply side, the model includes key factors of production and also changes in production technology. Changes in production technology allow the model

to project both the effect of technological innovations in the production. On the demand side, the model includes both domestic (consumption and investment) and external sources of demand.

**FIGURE B1.8.1 Analytical structure of the growth model**



Source: Development Research Center of the State Council.



**TABLE 1.9 Sources of growth, five-year averages: Baseline and reform scenarios, 2015–30**

	2015–20	2020–25	2025–30
<b>Annual GDP growth in baseline scenario</b>	<b>7.0</b>	<b>6.0</b>	<b>4.9</b>
<i>Sources of growth:</i>			
Labor	–0.2	–0.2	–0.4
Capital	8.3	6.6	5.1
TFP	2.1	2.1	2.1
<b>Annual GDP growth in reform scenario</b>	<b>7.2</b>	<b>6.1</b>	<b>5.2</b>
<i>Sources of growth:</i>			
Labor	–0.2	–0.2	–0.4
Capital	8.1	6.3	4.7
TFP	2.4	2.5	2.5

Source: Estimates of the Development Research Center's Computable General Equilibrium model.

Note: TFP = total factor productivity.

**TABLE 1.10 Composition of the demand side of GDP: Reform scenario, 2010–30**

	2010	2015	2020	2025	2030
<i>GDP:</i>					
Household consumption	35.4	37.0	39.8	45.1	47.9
Government consumption	12.7	14.6	16.1	17.7	18.6
Capital formation	48.1	45.8	41.5	34.7	30.9
Net exports	3.8	2.6	2.6	2.6	2.6

Source: Estimates of the Development Research Center's Computable General Equilibrium model.

A reform dividend of an additional annual growth of 0.2 percentage points (table 1.9) will result in a cumulative increase in GDP by \$730 billion (in real prices) from 2015 to 2030.

Although growth rates will decline, the structure of growth will improve toward more efficient sources of domestic demand.

Demographic changes (population aging) and a decline in excess employment in agriculture will put upward pressures on wages. Higher wages and household disposable income will strengthen the middle class and support a shift in domestic demand from investment to consumption. Consumption as a share of GDP will start to increase gradually (table 1.10). And the structure of consumption will also change. As incomes increase, the share of services in the consumer basket will increase, while the share of agriculture output declines. By 2030, the proportion of household expenditures on services will increase by 18 percent while expenditures on agriculture outputs decline by about 5 percentage points.

China's industrial structure will also continue to evolve. In the reform scenario, the share of agriculture in output will continue to decline from 10 percent today to less than 6 percent by 2030 (table 1.11). The share of employment in agriculture will decline more rapidly—from 37 percent in 2010 to about 12 percent by 2030. The share of secondary industry in output will decline from about 50 percent in 2010 to 34 percent in 2030. But the composition of industries in manufacturing will also change—labor-intensive, export-oriented manufacturing sectors, such as textiles, clothing, and wood processing, are expected to decline, while transport, information technology, and other capital-intensive sectors are expected to grow more rapidly. Extractive industries are also expected to decline. And China's economic growth will become increasingly dependent

**TABLE 1.11 Industrial structure of GDP and employment: Baseline and reform scenarios, 2010–30**

	GDP					Employment				
	2010	2015	2020	2025	2030	2010	2015	2020	2025	2030
<b>Baseline scenario</b>										
Primary sector	10.0	8.1	6.9	5.7	4.4	36.7	31.0	25.9	21.6	17.1
Secondary sector	48.2	45.5	42.8	39.3	37.2	28.7	29.0	29.1	28.3	28.2
Tertiary sector	41.8	46.4	50.4	55.0	58.5	41.1	47.2	52.6	57.3	61.9
<b>Reform scenario</b>										
Primary sector	10.0	8.5	7.7	6.9	5.7	36.7	29.9	23.5	17.8	11.6
Secondary sector	48.2	44.7	40.9	36.5	33.7	28.7	29.2	29.2	28.3	28.1
Tertiary sector	41.8	46.8	51.4	56.7	60.6	41.1	48.2	54.8	60.9	67.1

Source: Estimates of the Development Research Center's Computable General Equilibrium model.

on services as urban areas will create the scale of demand for an increasingly diverse supply of services. The share of services will increase from 43 percent in 2010 to slightly more than 60 percent by 2030. The service sector's share in the economy will rise because of higher demand for services and because productivity increases in services are likely to lag behind those in manufacturing, increasing the relative prices of services.

Finally, a 1-percentage-point increase in the urbanization rate under a reform scenario can accelerate economic growth by about 0.8 percentage points of GDP in the first year and a cumulative 3.6 percent over five years, relative to the baseline scenario. These estimates are similar to other quantitative estimates of urbanization and growth elasticities.

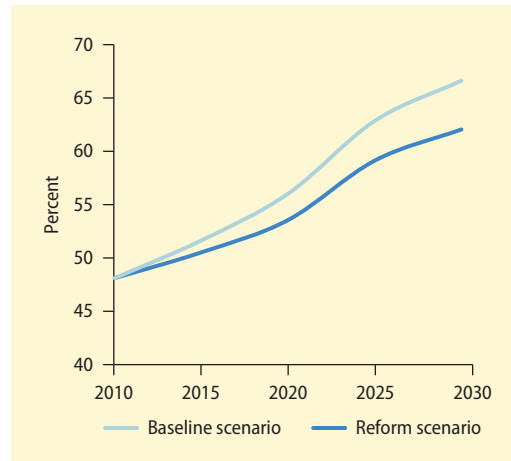
### The payoff from the new urbanization trajectory is more efficient, inclusive, and sustainable growth

China's new urbanization trajectory will not reverse a moderation of economic growth over the next decades. It is also clear that many second-generation reforms associated with the new urbanization trajectory are likely to have a significantly smaller impact on growth than the first-generation reforms that led to rapid technological absorption in the manufacturing sectors. But the new trajectory will improve the quality of growth by making it more efficient, inclusive, and sustainable. Without policy action, the slowdown in growth could be more severe.

First, China's economic growth will become more efficient. Economic growth will become less dependent on capital accumulation. The share of investment in GDP is estimated to decline from almost 50 percent of GDP today to about 31 percent of GDP by 2030. And share of consumption will gradually increase. In the reform scenario, consumption's share of GDP reaches 66.5 percent of GDP, about 4.5 percentage points higher than in the baseline scenario (figure 1.21).

Second, the income disparity between urban and rural households will decline. In a reform scenario, tighter labor supply in rural areas will catalyze land consolidation and

**FIGURE 1.21** Final consumption as a share of GDP, 2010–30

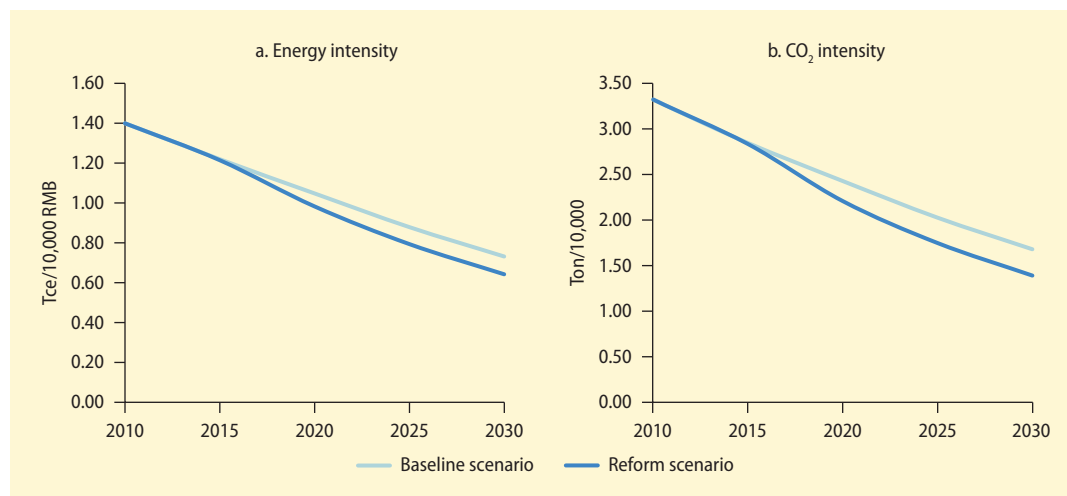


Source: Estimates of the Development Research Center's Computable General Equilibrium model.

rapid dissemination of new production technologies. This scenario will increase labor productivity, so wages in rural areas will rise faster than in urban areas, reducing urban-rural income disparities.

Third, the energy intensity of China's economy will decline (figure 1.22). The dominance of industry in its contribution to GDP, jobs, energy demand, and emissions makes China's cities unique. As the structure of economic growth moves from manufacturing toward services, the energy and carbon dioxide (CO<sub>2</sub>) intensities will decline. Policies that use market price mechanisms to internalize negative externalities of energy use and CO<sub>2</sub> emissions can accelerate this decline. In the reform scenario, energy use and CO<sub>2</sub> can decline by 12–17 percent.

The urbanization trajectory will provide lots of opportunities (table 1.12). But implementing the reform scenario will require collective efforts and coordination among enterprise, household, and government sectors. Making the new policies and putting them in place will not be easy. Indeed, a radical change of course might be required. Even if the reforms need to be less gradual than past reforms, they are essential to completing China's transition to a market economy—and to further strengthening its foundations for growth.

**FIGURE 1.22** The energy and CO<sub>2</sub> intensity of China's economy will decline

Source: Estimates of the Development Research Center's Computable General Equilibrium model.

Note: CO<sub>2</sub> = carbon dioxide.

**TABLE 1.12** Urbanization will bring potential gains and pose risks to enterprises, households, and governments

	Enterprises	Households	Central and local governments
Potential (gains)	<ul style="list-style-type: none"> <li>• Agglomeration effect: higher factor input intensity, companies gather related businesses and adjacent areas to form a cobweb structure</li> <li>• Specialization increases economies of scale and economies of scope, market size determines division of labor, productivity increases markedly</li> <li>• Strengthening comparative advantage of firms in transportation, inventory, transactions, raw materials, sales, information, labor searching, and reputation</li> <li>• Increased human capital and industrial clustering, conducive to innovation</li> <li>• Increased productivity in agriculture</li> </ul>	<ul style="list-style-type: none"> <li>• An increasing middle class</li> <li>• More employment opportunities</li> <li>• Better public services and convenience stimulate consumption</li> <li>• Knowledge dissemination and learning made easier, conducive to human capital accumulation and appreciation</li> <li>• Attractiveness of urban lifestyle</li> <li>• Increased propensity to purchase services</li> </ul>	<ul style="list-style-type: none"> <li>• Economies of scale for public services, more effective delivery</li> <li>• Expansion of public facilities stimulates domestic demand</li> <li>• Economic growth and efficiency gains on the basis of agglomeration, increased government revenue</li> <li>• Improved government capacity and efficiency</li> </ul>
Costs (risks)	<ul style="list-style-type: none"> <li>• Beyond a certain point of urbanization, external diseconomies will start to undermine city competitiveness</li> <li>• Sharp increases in labor costs</li> </ul>	<ul style="list-style-type: none"> <li>• Sharp increases in land and housing prices</li> <li>• Social instability</li> <li>• Pollution and environmental deterioration</li> <li>• Heavy congestion</li> </ul>	<ul style="list-style-type: none"> <li>• Increased complexities of city management</li> <li>• Implementation risk of proposed reform scenario</li> <li>• Increasing cost of managing traffic congestion and environmental problems</li> </ul>

## Notes

1. In 2006, the State Council promulgated Opinions on Addressing Migrant Worker-Related Issues, requiring equal treatment for migrant workers and entitling them to equal rights and obligations with urban workers.
2. Episodes of growth declines observed in other countries over the past decades are typically associated with a decline in productivity when gains from structural reallocation from agriculture to industry and technology absorption become exhausted (Eichengreen, Park, and Schin 2011).

3. Incremental capital-output ratio (ICOR) = (change in capital stock) / (change in gross domestic product) = (gross fixed capital formation as a share of total output) / (annual growth rate of gross domestic product).
4. The old-age dependency ratio is defined as the ratio of the number of people ages 65 years and older to those of ages 15–65.
5. The total number of migrant workers was 242 million in 2010, 13 million more than that in the previous year; 253 million in 2011, 11 million more than that in the previous year; and 263 million in 2012, 10 million more than that in the previous year.
6. See Zhuo (2013). Between 2000 and 2010, urban population increased by 232 million, 80 million from administrative changes. In the same time, the number of prefecture-level cities increased by 25, county-level districts by 779, and districts under municipal administration by 70.
7. Estimates suggest that China's imports of agricultural products are equal to using 35 percent of arable land and 47 percent of water for farming. Energy dependence, especially oil dependence, has risen to 57 percent. China's farm sector registers water-use efficiency of 30–40 percent, not even half the number in developed countries. Energy-use efficiency in China is around 30 percent, not even three-fourths that in developed countries.
8. In localization economies, arising mainly from within-industry interactions, spatial proximity of clustered producers allows sharing of a large pool of specialized labor, logistics, and other inputs. In urbanization economies, arising from between-industry interaction, spatial proximity of related producers allows them to exploit advantages of sharing capital inputs and services.
9. The Herschman-Herfindahl Index for sector  $i$  is the amount of activity in sector  $i$  in province or city  $j$  and is the total amount of activity in sector  $i$  in China as a whole.
10. Evidence from other countries shows that geographic clustering is more pronounced in high-skill and high-technology industries (such as electronic computing machinery, process control instruments, semiconductors, and pharmaceuticals) than in light industries (such as textiles or food). See also Henderson (1997) and Glaesar, Scheinkman, and Schleifer (1995).
11. The share of services in GDP in Korea and Japan was broadly the same as in China when the urbanization rate was about 50 percent.
12. In 2011, value added per employee in industry was still about 5.5 times higher than that in agriculture—and in services, it was about 4.2 times higher than that in agriculture.
13. In 2012, gross land lease proceeds accounted for 5.2 percent of GDP, although net proceeds adjusted for compensation were less. For 2011, it is estimated that net land lease proceeds accounted for only one-third of gross land lease proceeds.
14. See spatial equilibrium models by Alonso (1964), Mills (1967), and Muth (1969).
15. The global middle class is defined as households with daily expenditures between \$10 and \$100 per person (in 2005 PPP dollars). The lower bound is the average poverty line in Portugal and Italy. The upper bound is twice the median income of Luxemburg. Thus, the global middle class excludes those considered poor in the poorest advanced countries and considered rich in the richest advanced country.
16. Weighted by urban and rural population, about 11 percent of population in China had daily consumption expenditures between \$10 and \$100 (in 2005 PPP dollars) in 2010. Most Chinese (88%) consumed less than \$10 a day in 2010; about one-fifth spent less than \$2 a day. Less than 1 percent spent more than \$100 a day.
17. Measured by income, China's middle class made up almost 25 percent of China's population and more than 40 percent of its urban population in 2010.
18. China's 1988 income inequality urban Gini coefficient of 0.24 and rural Gini coefficient of 0.33 were very low by international standards. The national Gini coefficient of 0.38 reflected high urban-rural disparities. By 2007, these Gini coefficients were 0.34, 0.36, and 0.5, respectively (Knight 2013).
19. The 2002 Chinese Household Income Project (CHIP) survey enabled comparison of an urban Gini coefficient including and excluding migrants. Inclusion raised the Gini coefficient by 2 percentage points (Khan and Riskin 2007) but this is likely an understatement given that migrants living in households are likely wealthier than individual migrants.
20. Sicilar and others (2006) find that the gap has been overstated. Adjusting for spatial price differences and including migrants lowers the contribution to 26–27 percent of total inequality, although this is still high by international standards. Whereas many measures of the rural-urban income gap are overstated

- by nonadjustment for cost of living differences, they are understated by not including urban subsidies.
21. China's Gini coefficient for wealth in 2002 was 0.55, much higher than that of income—and housing represented two-thirds of the inequality in net wealth (Zhao and Ding 2007). As urban housing prices rise, the differences become starker. Between 2002 and 2007, per capita urban housing wealth grew from 4.5 times rural housing wealth to 7.2 times, compared with an urban-rural income ratio of 3.1 times. Nearly 90 percent of permanent urban residents owned housing in the mid-2000s, but less than 10 percent of migrants did.
  22. The nominal price of land for industrial use increased 3.5 percent a year between 2009 and 2013.
  23. The importance of public spending, including provisions of public services and products, has also been studied extensively in literature. The new growth literature, employing either neoclassical (Solow 1956; Swan 1956) or endogenous growth (Lucas 1988) models, has intensively focused on the role of physical and human capital as key factors for long-run growth. Barro (1990) was the first to introduce public sector components in the production function within the endogenous growth framework to include tax-financed government services that affect production or utility.
  24. China's decentralized public finance system and municipal governments are responsible for providing and financing all vital public services and infrastructure, but municipal revenues are heavily concentrated in regions with economic activity.
  25. According to the Organisation for Economic Co-operation and Development's Performance for International Student Assessment survey, Shanghai ranks ahead of Korea; Finland; Hong Kong SAR, China; and Singapore on 15-year-old student performance in reading, mathematics, and science (OECD 2013).
  26. The total debt of the local government-borrowing platform has increased significantly in the past decade. A recent National Audit Office's report estimates that local government debt and contingent liabilities have reached 33 percent of GDP as of June 30, 2013.
  27. Estimates were based on CHIP data.
  28. In 2011, 3.6 million agriculture workers were located in urban areas.
  29. This relies on a consensus estimate of annual working days required for farming (Wang and Ding 2005).

## References

- Acemoglu, Daron, and Fabrizio Zilibotti. 1997. "Was Prometheus Unbound By Chance? Risk, Diversification, and Growth." *Journal of Political Economy* 105 (4): 709–51.
- Alonso, William. 1964. *Location and Land Use*. Cambridge, MA: Harvard University Press.
- Bairoch, Paul, and Gary Goertz. 1986. "Factors of Urbanization in the Nineteenth Century Developed Countries: A Descriptive and Econometric Analysis." *Urban Studies* 23: 285–305.
- Barro, Robert J. 1990. "Government Spending in a Simple Model of Endogenous Growth." *Journal of Political Economy* 98 (5): 103–25.
- Brookings Institution. 2012. *Global MetroMonitor*. Washington, DC: Metropolitan Policy Program at Brookings Institution.
- Bulman, David, and Aart Kraay. 2013. "Thirty years of Growth in China: Accumulation, Reallocation, and TFP Growth." Unpublished working paper, World Bank, Washington, DC.
- Cai, Fang, and Dewen Wang. 1999. "The Sustainability of Economic Growth and the Labour Contribution." *Economic Research Journal* 10: 62–68.
- Caselli, Francesco, and Wilbur Coleman. 2001. "The U.S. Structural Transformation and Regional Convergence: A Reinterpretation." *Journal of Political Economy* 109 (3): 584–616.
- Ciccone, Antonio, and Robert Hall. 1996. "Productivity and the Density of Economic Activity." *American Economic Review* 86 (1): 54–70.
- CEIC Data: [www.ceicdata.com](http://www.ceicdata.com).
- Credit Suisse Research Institute. 2011. *China Consumer Finance Survey*. Hong Kong SAR, China: Credit Suisse Research Institute.
- Deininger, Klaus, and Songqing Jin. 2003. "The Impact of Property Rights on Households' Investment, Risk Coping, and Policy Preferences: Evidence from China." *Economic Development and Cultural Change* 51 (4): 851–82.
- Dollar, David, and Bert Hofman. 2008. "Intergovernmental Fiscal Relations, Expenditure Assignment, and Governance." In *Public Finance in China: Reform and Growth for a Harmonious Society*, edited by Jiwei Lou and



- Shuilin Wang, 39–51. Washington, DC: World Bank.
- Duranton, Gilles, and Diego Puga. 2004. “Micro-foundations of Urban Agglomeration Economics.” In *Handbook of Region and Urban Economics, Volume 4: Cities and Geography*, edited by Vernon Henderson and Jacques-François Thisse, 2063–2111. Amsterdam: Elsevier.
- Eichengreen, Barry, Donghyun Park, and Kwanho Shin. 2011. “When Fast Growing Economies Slow Down: International Evidence and Implications for China.” NBER Working Paper No. 16919, National Bureau of Economic Research, Cambridge, MA.
- Fan, Jianyong, and Ting Shao. 2011. “Housing Price, Location of Differentiated Product and Urban System.” *Economic Research Journal* 46 (2): 87–98.
- Fan, C. Cindy, and Allen J. Scott. 2003. “Industrial Agglomeration and Development: A Survey of Spatial Economic Issues in East Asia and a Statistical Analysis of Chinese Regions.” *Economic Geography* 79 (3): 295–319.
- Fujita, Masahisa, and Hideaki Ogawa. 1982. “Multiple Equilibria and Structural Transformation of Non-Monocentric Urban Configurations.” *Regional Science and Urban Economics* 12 (2): 161–96.
- Fujita, Masahisa, and Jacques-François Thisse. 1996. “Economics of Agglomeration.” *Journal of the Japanese and International Economies*, 10 (4): 339–78.
- Gill, Indermit, Homi Kharas, Deepak Bhattasali, Milan Brahmabhatt, Gaurav Datt, Mona Haddad, Edward Mountfield, Radu Tatucu, and Ekaterina Vostroknutova. 2007. *An East Asian Renaissance: Ideas for Economic Growth*. Washington, DC: World Bank.
- Glaeser, Edward, and Joshua Gottlieb. 2006. “Urban Resurgence and the Consumer City.” Discussion Paper 2109, Harvard Institute of Economic Research, Cambridge, MA.
- Glaeser, Edward, Jose Scheinkman, and Andrei Schleifer. 1995. “Economic Growth in a Cross-Section of Cities.” *Journal of Monetary Economics* 36 (1): 117–43.
- Glaeser, Edward, Jed Kolko, and Albert Saiz. 2001. “Consumer City.” *Journal of Economic Geography* 1 (1): 27–50.
- Han, Jun. 2009. *Surveying the Chinese Migrant Workers*. Beijing: China Development Press.
- Helsley, Robert W., and William C. Strange. 1990. “Matching and Agglomeration Economies in a System of Cities.” *Regional Science and Urban Economics* 20 (2): 189–212.
- Henderson, J. Vernon. 1997. “Medium Size Cities.” *Regional Science and Urban Economics* 27 (6): 583–612.
- . 2001. “Scale Externalities in Korea.” *Journal of Urban Economics*: 49 (3): 479–504.
- . 2002. “Urbanization in Developing Countries.” *The World Bank Research Observer* 17 (1): 89–112.
- . 2003. “The Urbanization Process and Economic Growth: The So-What Question.” *Journal of Economic Growth* 8 (1): 47–71.
- Ke, Shanzi, and Yufeng Yu. 2014. “The Pathways for Industrial Agglomeration to TFP Growth—The Experience of Chinese Cities for 2001–2010.” *Journal of Asia Pacific Economy* 19 (2): 310–32.
- Khan, Azizur, and Carl Riskin. 2007. “Growth and Distribution of Household Income in China between 1995 and 2002.” In *Inequality and Public Policy in China*, edited by Björn Gustafsson, L. Shi, and T. Sicular, 35–60. Cambridge, U.K., and New York: Cambridge University Press.
- Kharas, Homi. 2010. “The Emerging Middle Class in Developing Countries.” OECD Development Centre Working Paper No. 285, Organisation for Economic Co-operation and Development, Paris.
- Knight, John. 2013. “Inequality in China: An Overview.” *The World Bank Research Observer* 29 (1).
- Lee, Il Houg, Murtaza Syed, and Liu Xueyan. 2012. “Is China Over-Investing and Does It Matter?” IMF Working Paper No. 12/277, International Monetary Fund, Washington, DC.
- . 2013. “China’s Path to Consumer-Based Growth: Reorienting Investment and Enhancing Efficiency.” IMF Working Paper No. 13/83, International Monetary Fund, Washington, DC.
- Lewis, W. Arthur. 1954. “Economic Development with Unlimited Supplies of Labour.” *The Manchester School* 22 (2): 139–91.
- Li, Shi, Luo Chuliang, and Terry Sicular. 2013. “Overview: Income Inequality and Poverty in China, 2002–2007.” In *Rising Inequality in China: Challenge to the Harmonious Society*, edited by Shi Li, Hiroshi Sato, and Terry Sicular, 24–59. New York: Cambridge University Press.
- Lin, Hui-Lin, Hsiao-Yun Li, and Chih-Hai Yang. 2011. “Agglomeration and Productivity: Firm-Level Evidence from China’s Textile Industry.” *China Economic Review* 22 (3): 313–29.

- Liquan, Peng, and Sheng Laiyun. 2006. "The Number, Structure, and Feature of Present Migrant Workers." In *Report about China's Population and Labor No. 7—The Social Economic Result of Population Change*, edited by Cai Fang. Beijing: Social Science Documentation Publishing House.
- Lucas, Robert E. 1988. "On the Mechanics of Economic Development." *Journal of Monetary Economics* 22: 3–42.
- Marshall, Alfred. 1890. *Principles of Economics*. London: Macmillan.
- Mills, Edwin S. 1967. "An Aggregative Model of Resource Allocation in a Metropolitan Area." *American Economic Review* 57 (2): 197–210.
- Ming Lu. 2013. *The Power of Space: Geography, Politics, and Urban Development*. Shanghai: Shanghai People's Press.
- Moretti, Enrico. 2004. "Worker Education, Spillovers, and Productivity." *American Economic Review* 94 (3): 656–90.
- Muth, Richard. 1969. *Cities and Housing: The Spatial Pattern of Urban Residential Land Use*. Chicago: University of Chicago Press.
- National Bureau of Statistics of China. 1994. *China Statistical Yearbook*. Beijing: China Statistics Press.
- . 2012. *Survey Report of Chinese Migrant Workers*. Beijing: China Statistics Press.
- . 2013. *Fifth National Population Census*. Beijing: China Statistics Press.
- Nomura International. 2009. "China: A Secular Shift." In *Asian Bank Reflections*, vol. 3. Tokyo: Nomura International.
- Northam, Ray M. 1975. *Urban Geography*. New York: John Wiley & Sons.
- OECD (Organisation for Economic Co-operation and Development). 2013. Programme for International Student Assessment (PISA). OECD website. <http://www.oecd.org/pisa/>.
- Page, Jeremy. 2011. "Land Dispute in China Town Sparks Revolt." *The Wall Street Journal*, December 15.
- Salop, Steven C. 1979. "Monopolistic Competition with Outside Goods." *The Bell Journal of Economics* 10 (1): 141–56.
- Schor, Juliet B. 1999. "The New Politics of Consumption." *Boston Review* 24 (3–4): 4–9.
- Seethepalli, Kalpana, Maria Caterina Bramati, and David Veredas. 2008. "How Relevant Is Infrastructure to Growth in East Asia." Policy Research Working Paper, World Bank, Washington, DC.
- Sicular, Terry, Ximing Yue, Björn Gustafsson, and Shi Li. 2006. "The Urban-Rural Income Gap and Inequality in China." Working Paper RP 2006/135, World Institute for Development Economic Research (UNU-WIDER), Helsinki.
- Solow, Robert. 1956. "A Contribution to the Theory of Economic Growth." *The Quarterly Journal of Economics* 70 (1): 65–97.
- Swan, Trevor. 1956. "Economic Growth and Capital Accumulation." *Economic Record* 32 (2): 334–61.
- Wang, Jianguo, and Shouhai Ding. 2005. "How Much Surplus Agricultural Labor Is There in China?" *Social Sciences in China* 5: 27–35.
- World Bank. 2006. *China: Governance, Investment Climate, and Harmonious Society: Competitiveness Enhancements for 120 Cities in China*. Washington, DC: World Bank.
- . 2009. *World Development Report 2009: Reshaping Economic Geography*. Washington, DC: World Bank.
- . 2011. *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium*. Washington, DC: World Bank.
- World Bank and DRC (Development Research Center of the State Council, China). 2013. *China 2030: Building a Modern, Harmonious, and Creative Society*. Washington, DC: World Bank.
- Yan, Yulong, and Xiaoyu Li. 2007. "The Measurement of Contribution of Off-Farm Workers to Economic Growth and the Fruits of Economic Growth They Shared." *Statistical Research* 24 (1).
- Zhao, Renwei, and Sai Ding. 2007. "The Distribution of Wealth in China." In *Inequality and Public Policy in China*, edited by Björn Gustafsson, Li Shi, and Terry Sicular, 118–44. New York: Cambridge University Press.
- Zhuo, Xian. 2013. "How to Evaluate the Actual Progress of China's Urbanization." Working Paper, Development and Research Center of the State Council, Beijing.



# Planning and Connecting Cities for Greater Diversity and Livability

## Introduction

The pace of China's transformation from an agricultural to an industrial economy has been unprecedented, with agriculture's share in gross domestic product (GDP) declining from 35 percent in 1960 to 10 percent in 2010. In the process, the country's large coastal cities have become factories for the world. Much of the industrial transformation and accompanying urbanization over the past 30 years was enabled by national reforms that opened the economy to foreign investment and built the infrastructure to support an industrial economy. Shantou, Shenzhen, and Zhuhai in Guangdong Province and Xiamen in Fujian Province became pilots for opening China to the global economy, allowing entrepreneurs to start businesses and relaxing price controls, protectionist policies, and regulations. Large-scale investment followed, with gross capital formation increasing from 35 percent of GDP in 1980 to 48 percent in 2011. Infrastructure investment accounted for 10 percent of GDP. Such magnitudes of investment were also characteristic of the Republic of Korea, which urbanized rapidly and moved into high income.

China needs to enhance economic efficiency by gradually moving from a lower-end

export-oriented industrial economy to a higher-value-added manufacturing and service economy with an increasingly strong internal market for consumption. In fact, market forces will push China toward a greater concentration in innovation and services than in industry. Banks, insurance companies, hospitals, and schools can operate in high-rise buildings that economize on land and promote high density (World Bank 2009). Because of external economies, business services have even greater potential for agglomeration than does industry—financial firms, insurance companies, and banking syndicates benefit from being close to one another. In the United Kingdom, for example, financial and insurance services are 35 times, and information and communication firms 7 times, more concentrated than manufacturing (Campos 2012). Locating in close proximity stimulates the growth of other specialist services, such as legal, software, data processing, advertising, and management consulting firms. Enabling these interactions is the density that cities offer, making it easier for frequent face-to-face contact between employees, entrepreneurs, and financiers, which in turn increases innovation and productivity (Black and Henderson 1999; Lucas 1993; Rosenthal and Strange 2003).

The concentration of services will also be accompanied by spreading industry from a few metropolises to a larger number of small cities. In the United States between 1972 and 2000, service employment concentrated in metropolitan areas as industry moved out to suburban locations 20 to 70 kilometers away (Desmet and Fafchamps 2004). Investments in transport infrastructure, which made trade cheaper, made the decentralization of industry possible. In Korea, the decentralization of industry from the three largest cities to smaller cities and the hinterland followed massive transport and communications infrastructure investments in the early 1980s (World Bank 2013a).

The transformation from a concentration on industry to one on services is already taking place. Consider Beijing, whose economy is 14 times more concentrated than the national average in high-end service jobs and 12 times more concentrated in research and development jobs. But the pace of transformation is slow. This report focuses on the next phase of economic growth, which will be based on cities reaping the full benefits of agglomeration through greater efficiency, more rational use of resources, a transition toward higher-value-added manufacturing and services, and increased productivity and innovation. Cities will have to leverage market forces to support strategic objectives for socioeconomic development and to maximize the impact of past and future investments in connectivity. Policy makers will have to promote a continuous dialogue among all stakeholders on the best solutions for making cities competitive, as well as attractive locations for people and investments, while addressing critical bottlenecks such as congestion and pollution. The following are the challenges that city governments face as they move from the role of direct planners and implementers to becoming regulators and enablers of the urbanization process:

***Reduce sprawl and increase productivity by implementing a unified market-based land pricing system for both rural and urban areas.*** Such a system, together with the use of market-based disposition mechanisms such as auctions and requests for proposals to determine all land uses (without favoring

industries), will greatly help optimize land use. Because the value of land is determined by both its location and its land use, master plans should facilitate private sector investments by providing clarity on permissible uses. The system should be flexible to allow for changes in use and densification or intensification of development (by increasing the permissible floor-area ratio) as land values increase over time. Instruments for trading development rights should be developed to encourage development within superblocks and to create more intense urban environments more efficient use of existing infrastructure, leading to increased productivity and knowledge spillovers.

***Foster livable, highly productive, and efficient cities through flexible people-centered planning.*** Urban spaces should be built on a human scale that people can relate to and in which people can interact. The uniqueness of existing cities and their natural and cultural environment should be the starting point (as opposed to turning one's back on existing settlements in favor of new cities). Incentives can be established for mayors to invest in improved livability and to reward them based on the quality of service delivery. Regulation should be adjusted to allow for regeneration and intensification within existing superblocks, and for implementing new small-block development. A fine-grain street grid can be developed to foster mixed use and local accessibility to daily amenities such as shops, health clinics, schools, and public parks. Integration of transport systems from the local to the regional should be seamless. The result would be more livable cities that foster economic growth, productivity, and people-friendly environments; attract higher talent and more knowledge spillovers; encourage services and technology development and more efficient use of resources (infrastructure, energy, land, water); and produce less pollution.

***Facilitate the development of clusters by improving connectivity of people and businesses.*** China has done a remarkable job of developing infrastructure to connect cities and regions in the country. This strategy should be enhanced by improving

connectivity between cities and integrating different transport systems for a more seamless connection of businesses. Special attention should be given to local accessibility and door-to-door connectivity of people and communities to services and jobs. Metropolitan governance structures and financial transfer systems should be established to coordinate strategic plans and seek opportunities for joint public service delivery. The result will avoid duplication and move toward higher productivity, specialization, and more efficient delivery of services.

### Enhancing efficiency and agglomeration economies in China

#### Urban concentration and spatial development in China

The urbanization process around the world has led to a portfolio of viable and livable cities, differentiated by size, location, and density, but well connected at the national level and clustered at local and regional levels. China's urbanization process resembles that of developed economies such as the United States and Japan, with a substantial number of people moving to large urban agglomerations. The 10 largest metropolitan regions in China—Beijing, Changsha, Chengdu, Guangzhou, Hangzhou, Nanjing, Shanghai, Shenzhen, Tianjin, and Wuxi—have become the main engines of growth, creating 26 percent of China's GDP in 2010. Cities of 1 million to 10 million people, the so called second-tier cities, provide specialized and differentiated products and services. Getting urbanization “right” requires the creation of an even playing field to encourage scale and agglomeration economies across cities together with efforts to manage the downsides of congestion, pollution, and natural resource depletion. Improved land management should be at the heart of policy reforms across urban areas, coupled with connectivity enhancements between towns, cities, and metropolises.

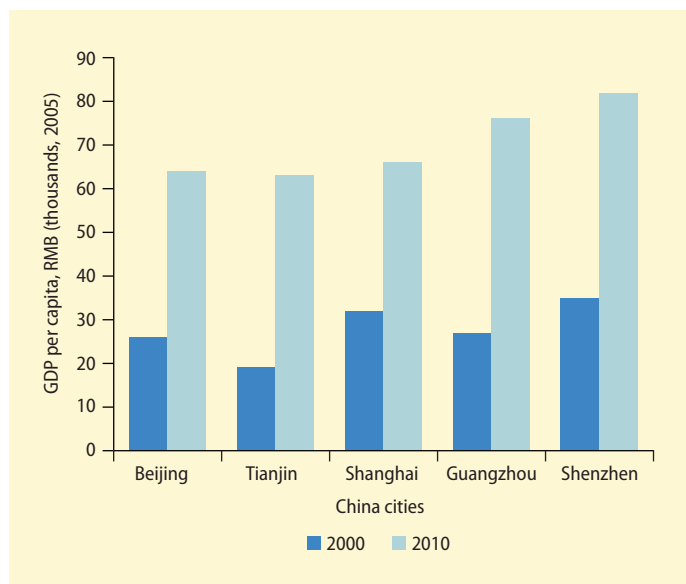
The most striking feature of China's urbanization in the past decade has been the rapid concentration of people and economic activities in large cities with good access to international markets. The largest and

fastest-growing internal migrant populations are in the Beijing, Dongguan, Guangzhou, and Shanghai metropolitan regions, with more than 52 million migrants in 2010, or 35 percent of all migrants in China. Urbanization—particularly urban concentration in the largest cities—has gone hand in hand with economic progress. Econometric analysis shows proximity to global cities such as Beijing, Shanghai, or Shenzhen, along with clustering of the urban population, to be an important contributor to a city's success, both for economic productivity (GDP per capita) and population growth (Lall and Wang 2011).

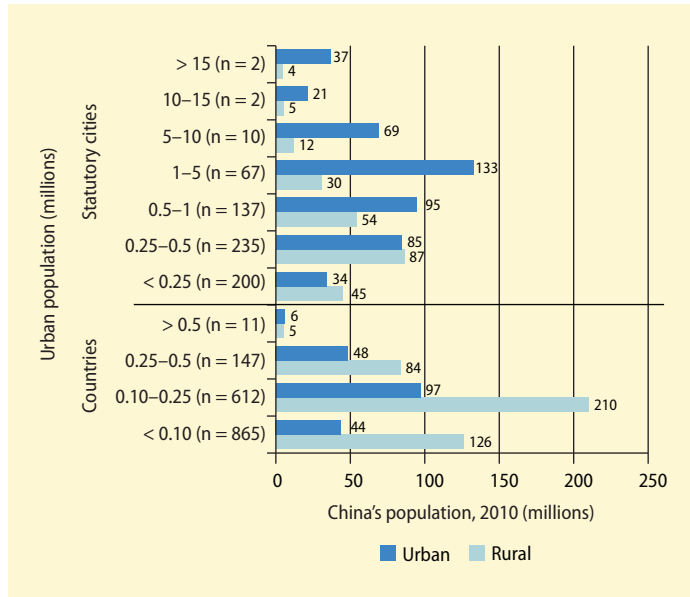
The combined economies of Beijing, Guangzhou, Shanghai, Shenzhen, and Tianjin amounted to \$1 trillion in 2010, twice the size of Norway's or Sweden's economy, and on the heels of Korea's. Incomes have increased rapidly as well. Per capita GDP rose from RMB 35,000 to RMB 82,000 in Shenzhen between 2000 and 2010, and from RMB 32,000 to RMB 66,000 in Shanghai (figure 2.1). Rising prosperity has attracted millions of people from the countryside. Between 2000 and 2005, migration to Beijing from other provinces grew 6.6 percent a year; and to Shanghai, 9.1 percent a year.

The very rapid pace of economic growth and migration to cities has enhanced the

**FIGURE 2.1** Per capita GDP in 2000 and 2010



Source: CEIC data.

**FIGURE 2.2** Population in 2010 by city size

Source: Staff estimates based on 2010 Census Data.

economic efficiency of China's urban system. In the early 1990s, Chinese cities were undersized with substantial efficiency losses from lack of scale. With migration restrictions limiting labor mobility and agglomeration into larger cities, a much larger share of China's urban population lived in small cities (between 100,000 and 1 million) than was the case in other emerging economies and such developed countries as the United States (Au and Henderson 2006).

China's urbanization rate rose from around 20 percent in 1980s to 50 percent in 2010 (figure 2.2). This fast-paced urbanization has led to a shift away from the countryside and toward increasing concentrations of people in cities and city regions, especially in the Yangtze and Pearl River Deltas, and in the Beijing-Tianjin region in the north. During the past decade, the decline in population has been significant in much of the Northeast, in the Sichuan Plain, across most of the Yangtze and Huai River Basins, in the inland coastal areas of Zhejiang and Fujian, northern Guangdong, and most of Guizhou and Guangxi Provinces (map 2.1).

The relaxation of migration restrictions and the huge migrations that followed have dramatically altered the distribution of

people across cities of different sizes. The distribution of towns, cities, and metropolises in China now resembles that of developed economies such as the United States and Japan. China's share of population in smaller cities is comparable to the rest of the developing world, although it is much higher than in developed countries that are fully urbanized like the United States (figure 2.3). Right-sizing the urban distribution enhances efficiency because larger cities can support more economic diversity based on lower fixed costs of setting up a firm, on scale economies in providing nontraded intermediate inputs (Au and Henderson 2006), and on the propensity of metropolitan areas to produce more high-tech and experimental items that require a diversity of skills and production types to thrive (Jacobs 1969; Duranton and Puga 2000). Secondary cities will specialize in more standardized manufacturing, while small cities strengthen their economy around existing industries and sectors related to natural resources and agriculture.

With massive inflows of workers, China's cities have become factories for the world. A report published by the *China Economic Weekly* in 2012 showed that the nation produced 80 percent of the world's color televisions, 70 percent of its air conditioners, 50 percent of its refrigerators, and 40 percent of its washing machines. Total output of the home appliance sector in China reached RMB 1.07 trillion (\$169 billion) in 2011, which was 4.7 times the amount in 2001, when the country became a member of the World Trade Organization.<sup>1</sup> Abundant low-skilled workers, along with access to land and global markets, allowed manufacturing firms to exploit huge economies of scale. Nearly two-thirds percent of all manufacturing jobs are in coastal provinces.<sup>2</sup> Indeed, China's development story of the past three decades has been centered around a well-defined and extremely effective "growth template," where successive waves of Chinese cities moved aggressively to boost investment and job creation, mostly based on establishing economic development zones centered around low-skilled manufacturing that benefited from economies of scale and access to markets.

Notable here is the Pearl River Delta, which accounts for 1.2 percent of China's land area, 4.5 percent of population, and 9 percent of GDP.<sup>3</sup> China's opening to the world began with experiments in Shenzhen and Zhuhai in 1980 that rapidly spilled over to neighboring cities and towns in the delta. Today, the delta is China's most prosperous region, with per capita incomes more than twice the national average. With the delta designated a special economic zone (SEZ), local governments, individual enterprises, and farmers enjoyed more autonomy in decision making for what to produce, where to produce it, and where to live. With government enabling the market, 70 percent of Hong Kong SAR, China's industry moved to China in 10 years (Klako Group 2004).

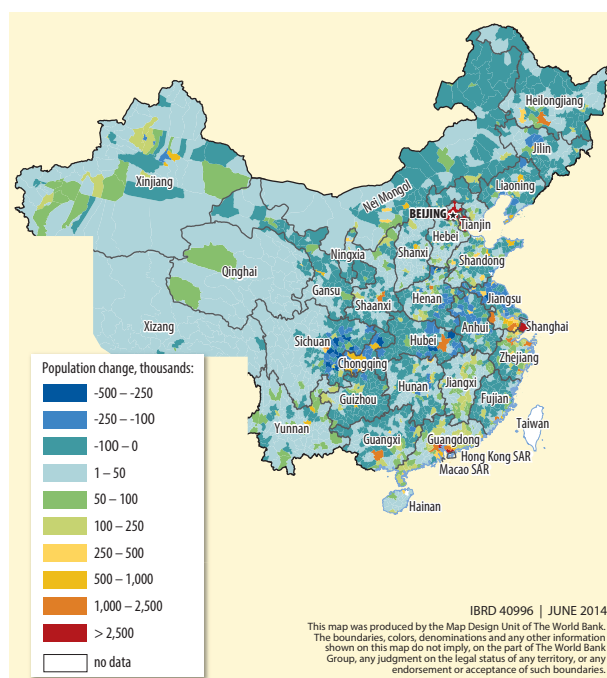
Since the mid-1990s, large amounts of foreign direct investment (FDI) have come from Japan, the United States, and the European Union, among other places. In 2010, the Pearl River Delta was the destination for more than 10 percent of the FDI in China. And the delta is moving up the industrial value chain, shifting away from its concentration in textiles technology-intensive manufacturing such as electronics, biotechnology, and optical and electromechanical products.

Up the eastern seaboard is the Yangtze River Delta, China's economic giant. A physically integrated cluster with the strongest economy in China, the delta accounts for 4.4 percent of China's land area, 10 percent of its population, 24 percent of industry, and 19 percent of GDP. The hub city of Shanghai serves as the economic and financial center, and spoke cities include Hangzhou, Nanjing, and Suzhou. Between 2000 and 2010, land use in the Yangtze River Delta rapidly changed to transform the cities of Shanghai, Suzhou, Wuxi, Wujin, Nanjing, and others into a continuous urban agglomeration.

### China's urbanization and industrial development

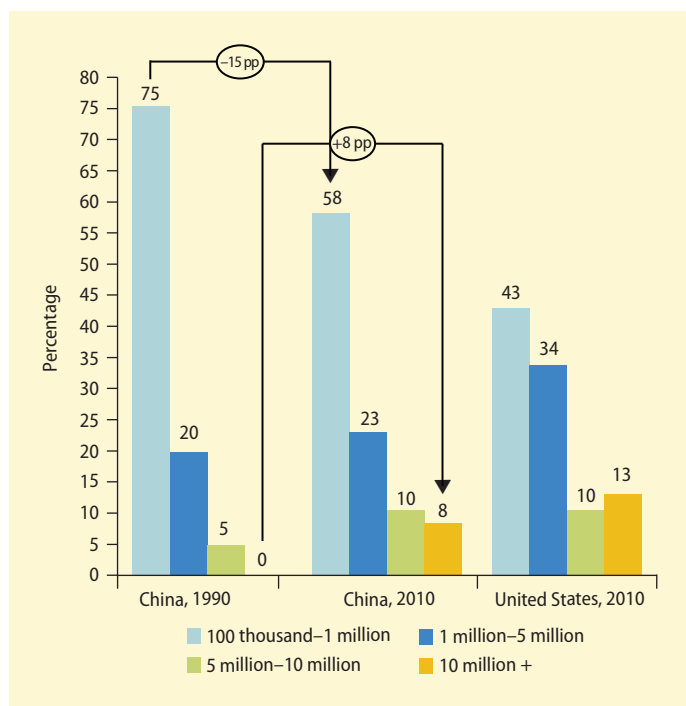
China's rapid urbanization and concentrated industrial development followed the norm for East Asian countries. From the 1950s through the 1980s, economic activity in Japan concentrated in the Tokkaido region

**MAP 2.1** Population changes from 2000 to 2010



Source: Staff estimates based on 2000 and 2010 Census Data.

**FIGURE 2.3** Distribution of cities by size in China and the United States



Source: Henderson 2013.  
Note: pp = Percentage points.



(Tokyo–Nagoya–Osaka corridor), aided by a conscious decision to concentrate infrastructure investment in this region. High savings and investment rates of around 40 percent of GDP by 1970 provided the resources for heavy transportation and urban infrastructure. Japanese cities began by specializing in labor-intensive, low-technology goods and then moved up the technology chain. Economic concentration was also instrumental in economizing on infrastructure investment, and the geographical proximity of different activities gave rise to agglomeration economies that aided rapid productivity growth and enabled innovation in traditional production processes.

Following Japan, the Asian Tigers—Hong Kong SAR, China; Korea; Singapore; and Taiwan, China—also followed a path of rapid urbanization and concentrated industrial development. Like Japan, they first specialized in labor-intensive, low-technology goods and then moved up the technology chain. The Seoul and Pusan metropolitan regions accounted for almost 70 percent of Korea's urban population by the mid-1970s. Taiwan, China, also focused on concentrated spatial development in Taipei and Kaohsiung. Each Tiger adopted an export-oriented strategy, which required massive investments in key transport and communication links with the rest of the world. The economic activities in these cities were as connected with the rest of the world as with their hinterlands, if not more so.

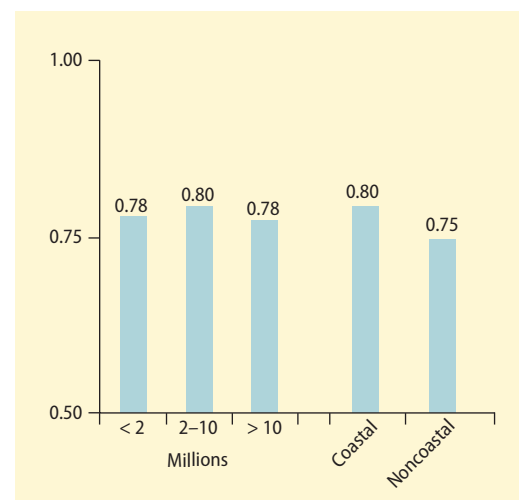
Concentrated economic growth and urbanization has also been the pattern India has followed since its economic liberalization in the early 1990s. Urban growth has been concentrated in the largest metropolises and their neighboring suburbs, which support 9 percent of the country's population and provide 18 percent of the employment on 1 percent of the land area. Within manufacturing, high-tech industries are specialized in the seven largest metropolises, and medium-tech industries are more densely specialized in the second-tier cities of 1 million to 4 million people (World Bank 2013a). As the Russian Federation moved to a market-based economy after 1989, many firms left remote areas and new firms grew up in places close to large

markets. Between 1989 and 2004, 70 percent of the national increase in firms took place in regions with broad market access (Brown and others 2008).

The concentration of people and economic activities in China's coastal cities has benefited economic efficiency. The concentration of activities and increased densities in cities make it easier to move goods, people, and ideas and to provide services more efficiently. Cities remove physical spaces between people and firms, and proximity is valuable precisely because it makes connections easier (Glaeser 2011). Because they are close to buyers, suppliers, workers, and others in related industries, firms can reduce transaction costs, enhance productivity, and innovate. Recent evidence for China shows that efficiency measured by total factor productivity (TFP), using the standard Cobb-Douglas production function with land, labor, and capital, tends to be slightly higher in coastal cities than elsewhere in China (figure 2.4).

Research conducted across 261 Chinese cities in 2004 showed that labor productivity would increase by 8.8 percent with a doubling of employment density (Fan 2007). In contrast, the elasticity of labor productivity

**FIGURE 2.4** Efficiency by city size and location in 2010



Source: Employment data are taken from the 2010 census; capital stock is derived from fixed asset investment reported in CEIC ([www.ceicdata.com](http://www.ceicdata.com)), and land is measured as the built-up area of each city. Note: The vertical axis of this chart shows the residual from a Cobb-Douglas production function with labor, land, and capital as inputs.

is 5 percent in the United States and 4.5 percent in Germany, Italy, France, and Spain (Ciccone and Hall 1996). Evidence from the Yangtze Delta shows that doubling the concentration of firms in the same industry boosts productivity by 3.3 percent and that the benefits accrue more to firms with higher-skilled workers, who are more likely to absorb technology spillovers (Hashiguchi and Tanaka 2013).

Using firm-level data from China's industrial census for 2004, recent research for this report shows that manufacturing firms strongly prefer to be in close proximity to other firms in the same industry, benefiting from localization economies. Firms in high-tech production are willing to pay RMB 1.03 million for an increase of one percentage point in the number of firms from the same sector at the same location. And firms in the machinery sector are willing to pay RMB 917,000 for such an increase (Afilal and Lall 2014). Interestingly, while industries employing skilled workers tend to cluster in large cities, standardized manufacturing prefers to disperse from large cities to specialized clusters. In addition, to reduce their transport costs, export-oriented firms prefer to locate close to ports, although not in a large city. Clearly, a process of industry upgrading and specialization across cities of different types is under way.

#### *Externalities of urbanization process*

The number of vehicles, congestion, and energy demand are all increasing rapidly and posing a major challenge for the livability and environmental quality in cities over the next two decades. Current urban expansion and lack of coordinated land use and transport policies are locking cities into car dependency and further congestion. Chinese cities in general tend to have high densities in central areas surrounded by greatly dispersed and low-density suburban areas; public transportation in suburbia is thus not efficient or even economically feasible. The number of motor vehicles almost quadrupled over 12 years, up from 56 million in 2000 to 240 million by the end of 2012, as reported by the Ministry of Public security. China has also become the

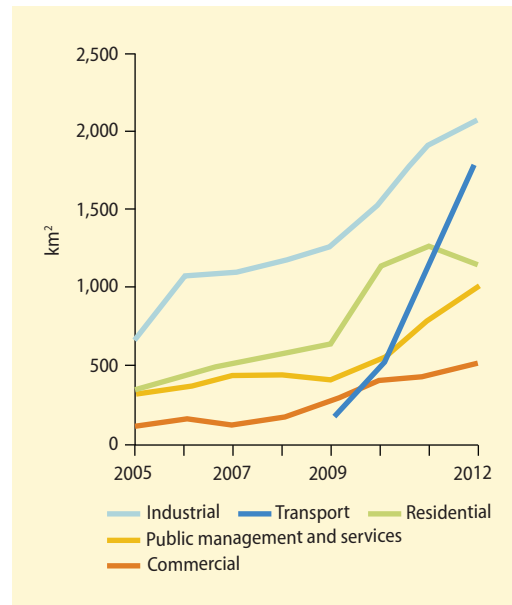
world's largest car producer and the largest new car market in the world.

#### *Impacts of administrative land allocation*

Land use in Chinese cities is determined by administrative decisions and detailed in master plans. Land for residential and commercial purposes is auctioned, whereas land for industries is heavily subsidized because industrial production is given priority over commercial and service-oriented activities. The proportion of land devoted to industries has been growing rapidly in the past few years (figure 2.5). Around 26 percent of the built area of cities is devoted to industrial development. For example, in Tianjin, industrial land amounts to 22 percent of the built area, while in Zhengzhou it amounts to 23 percent. Both cities are slightly below the Chinese average but still much above large cities in market economies. In contrast, Seoul uses 7 percent of its built land for industries; Hong Kong SAR, China, 5 percent; and New York City, 4 percent.

The large proportion of industrial land in Chinese cities reflects the location of enterprises in designated industrial zones close to

**FIGURE 2.5** Recent trends in land use allocation from farmland to other uses (square kilometers)



Source: Staff estimates.

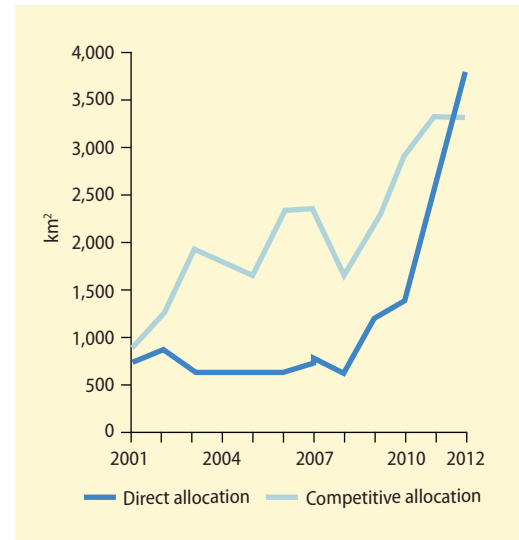


cities. Most industrial zones are managed by municipalities or designated municipal-owned corporations, which receive loans for infrastructure investments with land as collateral. Land use rights for industrial use are negotiated at low rates to attract mobile capital and with the expectation that these industries will provide jobs and tax revenues for the city. Recent trends show that in 2012 alone more than 2,000 square kilometers were allocated for industrial development. Of the 6,015 zones established by municipalities, only 1,251 are registered with provincial governments or the State Council (Peterson and Clarke-Annez 2007). By contrast, when market mechanisms are involved, industries compete with other sectors for the use of land. Land-intensive industries are pushed by economic forces to peripheral or smaller towns where real estate is cheaper. Such competition increases economic efficiency.

Not only has the municipal allocation of land for industrial use slowed the pace of urban redevelopment, it has potentially stifled the growth of smaller cities that could be more natural locations for mature industries moving out of the big metropolises. Even when industries do move from the urban core, they are often relocated to the immediate periphery of urban areas, often preventing smaller towns in different administrative jurisdictions from competing. Consider firms in heavy manufacturing, including chemicals, metal products, and plastics. In 1999, 49 percent of these firms in a megacity with more than 10 million people were located in the urban core; by 2009 that share had dropped to 38 percent. Heavy industry deconcentrated to rural counties in these megacities. At the same time, heavy industry declined from 40 percent to 30 percent in the urban cores of cities between 3 million and 10 million people. Similar patterns of suburbanization or limited deconcentration to urban peripheries are seen for other sectors such as machinery and textiles. For 108 metropolitan areas in China, 85 percent of industrial GDP in 1990 was produced in center cities; by 2005, that share had fallen to 60 percent (Cai and Henderson 2013).

So while the share of industrial land in the city core built area is falling, its

**FIGURE 2.6** Annual construction land supply—direct vs. competitive allocation (km<sup>2</sup>)



Source: World Bank.

overall proportion in the metropolitan region is increasing, because industries can occupy larger tracts of cheaper land on the urban periphery. In recent years, most urban construction land has been administratively allocated for industrial development (about 10,800 square kilometers), while the competitive auction of land use rights for residential and commercial purposes has been much lower, 6,100 and 2,100 square kilometers, respectively (figure 2.6). In general, industry moved only as far as the city suburbs—Shanghai still had among the highest percentage of construction land zoned for industrial and warehousing use in China (World Bank 2008).

China must start getting industrial land consumption to more “normal” proportions. Continuing the current patterns is hurting the economy and can lock cities into unsustainable land uses that have long-term consequences for environment sustainability. As industry leaves the urban cores, the land it once occupied should be redeveloped to accommodate firms in tradable services. While a wide range of initiatives can repurpose old industrial districts, these initiatives typically involve redevelopment of infrastructure and other projects to make the city’s spatial structure more efficient, sustainable, and

### **BOX 2.1 Barcelona 22@: Urban land redevelopment led by the private sector and enabled by the government**

The city of Barcelona has undergone an ambitious transformation since the late 1990s, using the post-Olympic push to redevelop 180 hectares of the city's land languishing as warehouses after industry left the area 20 years before. Led by the private sector and enabled by public policy, the redeveloped area is now home to more than 1,500 companies, 10 universities with 25,000 students, 12 technology centers, and 3,000 new housing units for low-income residents.

The project, started as a government-led initiative, initially focused on offering preferential real estate and met with limited success. In 2004 the private sector got involved, focusing on four traded services that already existed in Barcelona but that were spread across the city. Market-induced relocation of interrelated activities allowed for rapid growth and attracted international companies.

One successful example was the work done to convince a large media company, Mediapro (<http://www.mediapro.es>), to move its headquarters, studios, and technical center into the same block with the Universitat Pompeu Fabra Media Center (<http://www.upf.edu>), plus similar nearby centers of other universities, the national public radio offices, and office space for

other media companies. All of it was done without any subsidies, just with an intelligent requalification mechanism that allowed private developers to convert industrial zoning into 22@ zoning with higher building ratios, in exchange for returning 10 percent of the land to the city for green spaces, another 10 percent for social housing, and 10 percent for common technological infrastructures (technology centers). All in all, the city paid for only a portion of the street paving and fiber optics infrastructure.

The key to success was the complementary roles of the public and private sectors. At inception, leadership came from the city mayor and the public sector, focusing on restructuring misused urban space close to the city center for mixed uses, clean industries, knowledge infrastructure, living areas, and green zones. Development through specialized traded clusters and private sector investment created incentives and a reality check for public sector ambitions. The danger in the maturity phase is when the government sees the success of the project and tries to replicate it by funding projects directly. Without building partnerships with the private sector, the project ran the risk of turning into "white elephants."

*Source:* Contributed by Emiliano Duch.

livable. The key here is to encourage businesses and residents to take the lead in redeveloping former industrial areas. The city of Barcelona with its 22@ Program shows how (box 2.1).

### **Improving efficiency and livability of cities**

#### *Increase the market role*

Market forces have pushed China toward concentrating industry in its large coastal cities, helping firms there reap economies of scale. Now, the economic path of cities across China's urban system will need to evolve. In the United States and Korea, industry decentralized out of the biggest cities, which then became hubs of research and development and higher-technology development, where diversity and cross-sector fertilization aids

innovation and new product development (Cai and Henderson 2013). The density and economic diversity of the largest cities enable experimentation, where potential manufacturers try different technologies and products until they find what they are best suited to produce (Duranton and Puga 2000). Experience from today's developed economies tells us that the innovation and service economy will be even more concentrated than the industrial economy because services tend to use less land per employee, and service sectors benefit more from external economies, increasing the demand for physical proximity and density.

Along with the concentration of services in the largest cities, standardized industries typically decentralize to smaller cities. In the United States, the share of manufacturing has rapidly declined in large cities and resulted in the development of many more service cities.

These include health, entertainment, transport services, insurance, and finance cities, in addition to the traditional university towns and state capitals. Although the transition was not without challenges, as New York experienced in the 1970s and Detroit is currently undergoing, formerly large and diverse manufacturing cities have become more market and service oriented, and the most industrialized parts of the United States are now rural areas and smaller cities (Kolko 1999). Firm-level evidence from Japan also shows that branches of electronics firms doing research and development and trial production are in larger metropolitan areas, while the mass production of standard items is in nonmetropolitan areas (Fujita and others 2004).

Decentralizing industry is possible with investments in transport infrastructure; lower transport costs help industrial firms leave large cities, where land prices are high, by giving them access to markets for their products. Between 1990 and 2010, the rail network length in an average prefecture increased from 142 kilometers to 210 kilometers. More dramatically, in 1990 there were no limited access highways in China; by the end of 2012, there were more than 96,000 kilometers. Recent econometric analysis shows that investments in railroads have led to the decentralization of industry in China (Baum-Snow and Turner 2012). Each railroad line from the city center outward is estimated to displace 25 percent of core city industrial GDP to the rest of the prefecture.

The transformation from industry to services is already taking place across Chinese cities. While Foxconn Technologies corporate headquarters and the business cluster

developing Apple products remain in Shenzhen, for example, the company's manufacturing base producing computer connectors has been relocated to Zhengzhou in Henan Province, and the computer manufacturing business is now in Chongqing and Wuhan (CDRF 2010). Statistical analysis of employment growth, using propensity score matching, points to faster growth in the tertiary sector in cities that belong to metropolitan areas compared with similar cities not in metropolitan areas (table 2.1). Finance, insurance, and real estate (FIRE) grew almost 2 percentage points more in metropolitan cities than in nonmetropolitan cities.

Systematic assessment of the service sector in China shows that tradable services are not adequately concentrated in the largest cities. Typically, when one thinks of financial and insurance services, New York and London come to mind as dominating the global landscape for these services. Such a city does not yet exist in China.

The location quotient is an index showing the specialization or share of a specific sector in a city's economy compared with the national share. The concentration of finance and insurance services in cities with populations of more than 10 million is only one-tenth the national average, whereas such services in small cities with less than 500,000 people are 35 percent more concentrated than the national average. This imbalance reflects efficiency losses, because these services benefit from agglomeration economies that come from being in large dense cities. Similarly, real estate services are also evenly distributed across different size cities in China. Perhaps the only service that appears to be concentrated in large cities is research

**TABLE 2.1 Annual change in key economic and welfare indicators between 2000 and 2010**

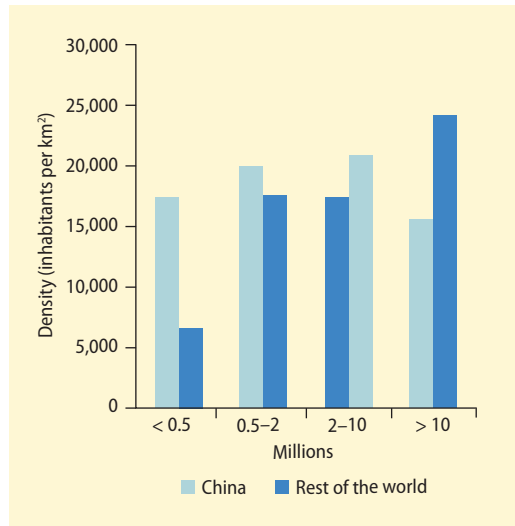
Percentage

Variable	Metro cities	Nonmetro cities	Difference	Standard error	T-stat
Total share of employees in manufacturing	76.6	82.9	-6.3	9.4	-0.6
Location quotient of manufacturing employees	2.3	3.1	-0.8	0.8	-1.1
Workers in secondary industry as a share of total employed	0.7	0.6	0.1	0.1	1.9
Workers in tertiary industry as a share of total employed	0.70	0.58	0.12%	0.04%	3.1
FIRE services	5.8	3.9	1.9	0.9	2.1
R&D services	33.2	22.7	10.5	13.8	0.8

Source: Census 2000 and 2010, based on propensity score matching.

Note: The location quotient measures a region's specialization relative to the nation's average. FIRE = finance, insurance, and real estate; R&D = research and development.

**FIGURE 2.7** China's largest cities have lower densities than their peers worldwide



Source: Demographia.com

and development, where the concentration of research and development (R&D) activities in cities of more than 10 million people is 35 percent higher than the national average. These patterns show that China has a long way to go to reach the concentration of traded business services in other large successful cities across the world.

China's cities need to get their densities "right" and make the city's markets for labor, goods, and services accessible to other cities. Cities with populations of more than 2 million are not as dense as similarly sized cities across the world (figure 2.7). Although China's megacities, with more than 10 million people, have comparable high densities in their central core areas to cities in Japan and the United States, densities drop significantly in suburban areas and the overall densities are rapidly declining.

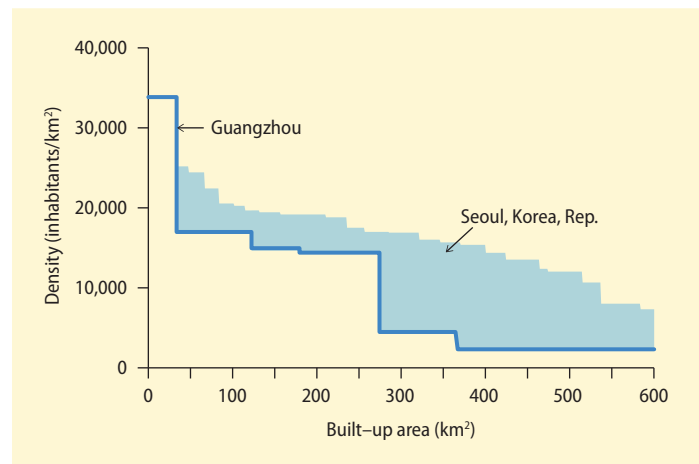
Making simultaneous progress on improving density and connectivity remains at the core of enhancing economic efficiency, and the government will have to focus its efforts in areas that it can manage—such as strategic infrastructure investments, urban planning, and public finance. But the government will also need to redistribute to national, provincial, and local governments the responsibilities, powers, and resources

necessary to coordinate investments and manage externalities—and relax its control and involvement in land, labor, and capital markets, activities that markets manage more efficiently.

#### *Price and regulatory instruments can enhance density and efficiency*

China is not yet taking full advantage of the benefits of density. For example, an additional 4.2 million people could be added to the Guangzhou population before it reached the same density profile as Seoul without adding more land (figure 2.8). The great benefit of doing so would be more efficient use of existing infrastructure and services, thus reducing the demand for new land and infrastructure. Similarly, Shenzhen could accommodate another 5.3 million people if it were redeveloped to the same density profile as Seoul. Not only does densification enhance efficiency, it also reduces carbon emissions and infrastructure costs. Chinese cities are already moving in the right direction with densities showing an upward trend. Beijing increased density by 50 percent on average in medium-low density areas (5,000 to 7,500 people per square kilometer), and by 48 percent in very low density areas (fewer than 1,000 people per square kilometer) between 2000 and 2010.

**FIGURE 2.8** Urban density profile comparison between Guangzhou and Seoul



Source: World Bank.

To enhance density and nurture innovation and the service sector while slowing the speed of a physical expansion, local governments need to refine urban planning capabilities by strengthening price and regulatory instruments in their planning repertoires. By allowing developers of industrial, commercial, and residential areas to bid competitively for land on a more equal basis, land use will become more efficiently allocated both in the urban cores and on the periphery.

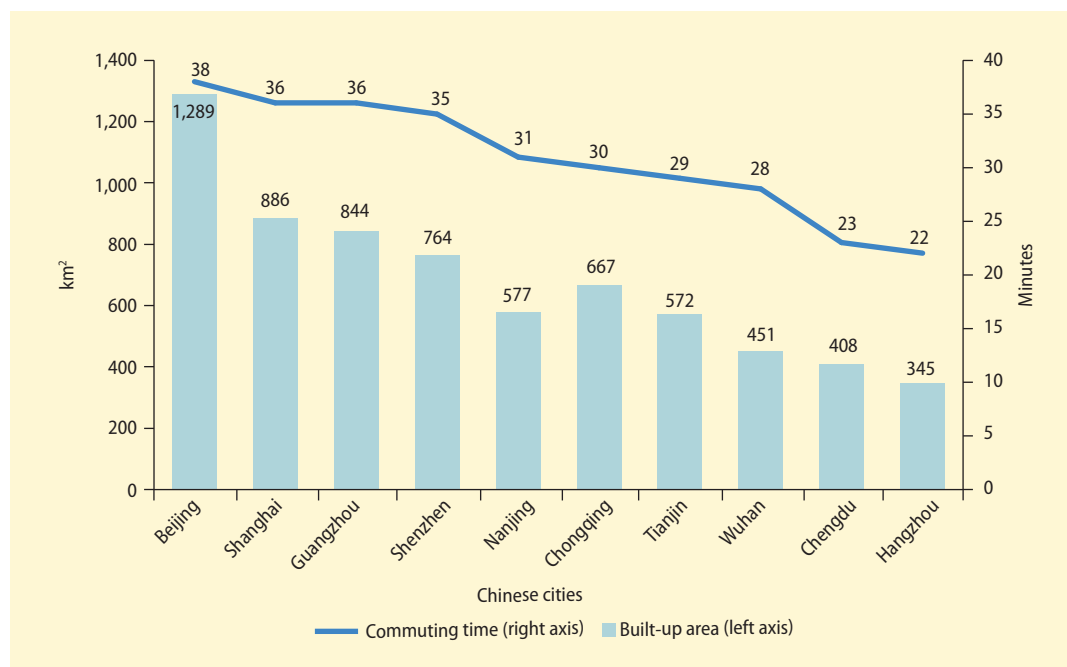
In most cities across the world, land prices shape density and land use, subject to restrictions put in place by land use regulations. If land prices are high, developers will build high-density, high-rise office buildings, shopping centers, and apartments. Higher densities generate greater need for infrastructure services (electricity, water, wastewater). But they also support environmental sustainability by being better suited to public transport. To be sure, density must not overwhelm infrastructure. Yet it is equally important not to underuse infrastructure by imposing low-density caps where infrastructure can support higher ones. Hence there is a need to coordinate land use and density with infrastructure.

### *Build urban planning and management capabilities at the metropolitan scale*

In addition to better managing urban densities, simultaneous improvements in connectivity within and between cities have considerable bearing on enhancing economic efficiency. Connections between cities enable firms to access local, regional, and global markets—both for buying inputs and selling outputs. They also give consumers options and, in many cases, better prices (World Bank 2013a). Within cities, connections enable people to access employment, and they enable firms to attract workers, access other inputs, and sell their products in local markets. In China the evidence points to increases in congestion and commuting times associated with rapid spatial expansion of cities, potentially eroding gains from urbanization (figure 2.9).

Rapid urbanization and economic growth have increased the movement of goods and products. Between 2008 and 2012, freight movement measured in ton-kilometers grew annually by 9.4 percent, on par with GDP growth, reaching 17 trillion ton-kilometers in 2012 (Clean Air Asia 2013). Road transport

**FIGURE 2.9** Spatial expansion of cities is associated with higher commute times



Source: Staff estimates.

accounts for 78 percent of the 41.2 billion tons of freight moved in 2012, and 35 percent of freight ton-kilometers. But moving freight by road is becoming inefficient as well as environmentally unsustainable. Some estimates suggest that 40 percent of trucks run empty for intercity trips and that it takes on average 72 hours to unload and load a truck (Clean Air Asia 2013). Short-haul truckers frequently return home empty, and long-haul truckers have to wait an excessive amount of time to get loads, seriously reducing operating efficiency (ADB 2012b).

With the largest Chinese urban regions rapidly spilling beyond their traditional boundaries, coordinating transport investments and policies at the metropolitan level is important. Accountability for providing better public transport blurs where the natural boundaries of a transport region include more than one autonomous agency. Many agencies at the city level are responsible for different aspects of urban transportation (metros, buses, road construction, traffic management, land use) that connects metropolitan areas.

To improve connectivity, metropolitan and regional agencies may need to be established where there is a mismatch between municipal boundaries and the urban economic footprint. In many countries, single subject or limited subject metropolitan-level agencies may be created by national law (as in *Syndicat des transports d'Île-de-France* [STIF] in the French Ile de France or the *Consortio Regional de Transportes de Madrid* [CRTM] in Madrid), or by state law (as in Vancouver, Canada). Or they may be formed by voluntary association between municipalities (as in most French metropolitan areas and in Recife, Brazil). The French case is particularly interesting: the formation of an urban transport organization authority (Autorité Organisatrice de Transport Urban [AOTU]), though voluntary action, is strongly encouraged by national law that gives areas setting up an AOTU the right to levy an employment tax specifically earmarked for public transport. There are even cases, as in the Washington, DC, metropolitan area, where the parties to the agreement (the District of Columbia and some districts within the states of Maryland and Virginia) have different legal status.

In all these cases the management of the transport organization includes representatives of the participant authorities and can operate only through the agreement of those representatives. In that sense there is indirect accountability. In most cases, to prevent a continuing haggle about the distribution of costs and benefits between the parties, there is a predetermined formula for allocating the costs, separate from the annual internal budgetary process. To reduce inefficiencies in the movement of goods and services, a good starting point will be to better coordinate policies, sequence investments, and integrate operations of the transport systems among the vast number of transport providers.

### **Planning for compact, dense, and vibrant cities**

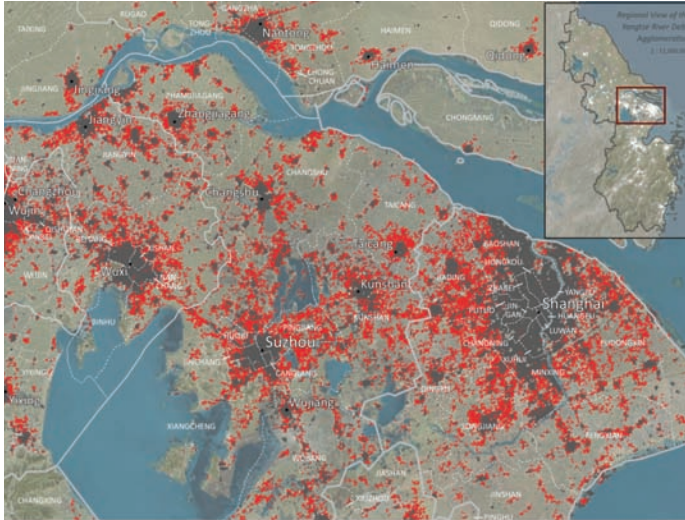
#### *Trends and processes in urban spatial layout and planning*

The stock of urban construction land increased more than 100 percent between 2000 and 2010 in Baoding, Fuzhou, Hangzhou, Hefei, Nantong, Quanzhou, and Shanghai, Metropolitan Regions. The largest absolute increases were in the Beijing, Guangzhou, Hangzhou, Shanghai, and Shenyang Metropolitan Regions. The area of urban land per capita varies significantly. The highest area per capita is in smaller metropolitan areas, with 1 million to 5 million residents. Tangshan and Baoding metropolitan areas have the highest ratio followed by Wenzhou, Zhongshan, and Changchun. None of these cities is a major destination for migrants, and expansion between 2000 and 2010 was likely supply driven by municipal governments and not by real demand for housing or industrial facilities.

New developments contribute to sprawl and to the decrease in densities (map 2.2 shows the sprawl for the Shanghai area). About 95 percent of urban growth in China happens as low-density edge or leapfrog growth, while a very little percentage of growth happens by infill and urban redevelopment. The building of new towns and economic development zones on the edges of existing cities serves local governments in



**MAP 2.2 Sprawl in Shanghai Metropolitan Region between 2000 and 2010 (in red)**



Source: Map prepared by the University of Wisconsin-Madison, May 2013.

their competition to attract capital and foster economic growth. The new expansion zones are often planned and built at rather low gross densities because of the size of road infrastructure, setbacks, and open spaces. For example, Binhai New District in Tianjin Municipality is being built at roughly half the density inside Tianjin's third ring road. Chenggong is another example. It is a new town 15 kilometers from downtown Kunming, with an area of 160 square kilometers, or 2.6 times the size of Manhattan. The planned gross floor area ratio (FAR)—the ratio of a building's total floor area (gross floor area) to the size of the piece of land upon which it is built—in Chenggong is 0.87, much less than the FAR of 3 to 4 in dense European cities.<sup>4</sup>

If sprawl continues at its current rate, urban areas will triple in land size by 2030. Based on empirical data from more than 50 cities worldwide, and with the expectation that the urban GDP will grow 2.5 times and the urban population will grow 1.5 times, urban energy consumption will triple. Sprawl will be responsible for 59 percent of this growth in energy consumption, while demographic changes and GDP will be responsible for just 12 percent and 29 percent, respectively (Bourdic 2011). Containing sprawl,

therefore, is extremely important for managing energy consumption and building more sustainable cities.

*Quotas and growth restrictions have had limited effect on urban expansion*

The spatial expansion of Chinese cities is marked by fragmented and noncontiguous development of new towns and economic development zones. This fragmentation is an unintended outcome of quotas to protect basic agricultural land because the policy does not discriminate sufficiently between agricultural lands within the city boundaries and those beyond. Because some of the agricultural land close to built-up areas cannot be developed, more distant nonagricultural villages are incorporated into the urban space. At the periphery, high-rise residential buildings are progressively replacing village housing and town and village enterprises (TVEs), while large pockets of agricultural land are left undeveloped within the city core. This leapfrog development is inefficient and expensive because utility networks and transport lines have to bypass the empty land, which loses productivity for lack of access to irrigation. Although the motivation of the Basic Agricultural Protection Law was well intended, its implementation lowers both agricultural and urban productivity.

A detailed study on the urban development process in Beijing showed that growth management policies had limited impact on the expansion of the city in suburban districts and greenbelt areas. The limited impact was mainly the result of conflicting national and local objectives that grew out of the fiscal and political decentralization process. With the dual land market system (box 2.2), local governments have relied on land conversion to finance public services. With increased decentralization and autonomy, they have pursued their own growth objectives and relaxed development controls to better obtain and compete (with other governments) for more investment opportunities. Few incentives exist for cooperation among governments, and village, town, and county interests prevail above municipal and national interests (Zhao, Lu, and Woltjer 2009).



## BOX 2.2 Dual land market system

China's current land system is a result of a series of land reforms that started in the early 1980s. There are two tiers of land use right markets in China. The first is administrative allocation of land use rights through the "plan track" to the state or a nonprofit entity. An "allocation price" is paid, consisting of three components: the expropriation cost of the land, various stipulated land fees, and a government-set allocation fee. The second tier is conveyance of land use rights from the state to private users for a fixed period of time (40 years for commercial land, 50 years for industrial land, and 70 years for residential land). The "conveyance price" also consists of three major components—the expropriation cost of the land and various stipulated land fees, as in the first tier, together with a conveyance fee, which is "market determined" in that it is negotiated or determined by public tender or auction. The market-determined conveyance fee is

usually substantially higher than the allocation fee. In other words, state units are able to obtain land use rights at costs that are much lower than those paid by commercial users and with no time limit.

Only private users that have gained land use rights through higher conveyance prices are able to participate in the "secondary market" for land use rights in urban areas. Specifically, holders of land use rights obtained through conveyance may transfer these rights to others, rent to others the land on which they have use rights, or use their land use rights as collateral. Furthermore, the price for land use rights in the secondary market can be substantially higher than the conveyance price in the primary market. So the ability to mortgage one's land use rights is tremendously important in an economy where the capital market is underdeveloped and where banks are unwilling to lend without collateral.

Industries located in central urban areas during the period of the planned economy are being relocated to smaller cities and new economic development zones in peri-urban areas where municipal authorities have incentives to release land below market value because they see industries as major drivers of local economic development and jobs. Most major cities are planning major expansions of new towns and development zones at the urban periphery as part of their urban master plans. These are quite often "showcase" or "image" projects and sacrifice people's preferences and intensity of land use. Land allocation to industry in Chinese cities is between two to three times that in comparable cities in other countries with well-functioning land markets. Although reforms are under way to correct the allocation and pricing of industrial land, the problem will take time to redress because most relocation of industry is fairly recent.

In addition, governments have increasingly been relying on mortgage loans through local government financing vehicles (land banks) that help circumvent restrictions on local government borrowing; these loans are backed by future land sales as collateral. Both practices have contributed to aggressive

requisitioning farmland in a manner that is contributing to unsound forms of urban growth, unsustainable local finance, and the waste of land resources. The oversupply of industrial land and limited release of urban land for residential and commercial purposes have a direct impact on housing prices, which have been soaring (Rabinovitch 2013), making the provision of affordable housing more difficult.

### *The planning process in China*

China's planning institutions follow a hierarchical structure. The main administrative system includes the central administrative bodies, the State Council, and local administrative bodies at the province, county, city, and township and district levels. At the local levels, the peoples' congresses have the capacity to elect members of the government and the power to adopt local regulations and monitor government functions, including urban planning (Song 2012). Local governments usually follow the lead of the central government in developing various plans, such as the five-year plans for economic and social development at each level. Further examples of national-level plans are provided in table

**TABLE 2.2** Examples of key national plans

Plan	Institution
<b>Major Function-Oriented Zone</b>	National Development and Reform Commission
<b>Land use master plans</b>	Ministry of Land and Resources
<b>Comprehensive plans for river basins and flood control planning</b>	Ministry of Water Resources
<b>Comprehensive transportation plans</b>	Ministry of Transport
	Ministry of Railway
	General Administration of Civil Aviation
<b>National economic and social development plans</b>	National Development and Reform Commission
<b>Regional economic development plans</b>	National Development and Reform Commission

Source: Adapted from Song and Pan 2009.

2.2. The planning system consists of socio-economic and sectoral planning at all levels of government, and urban planning at the municipal level. At each level, institutions are expected to coordinate with each other in the development, implementation, and monitoring of plans. The time frame for socioeconomic and sectoral plans includes long-term, medium-term (that is, five-year), and annual. Urban master plans usually cover a time span of 20 years.

A new tool, Major Function-Oriented Zone, is being implemented by the Chinese government. This tool promotes coordinated regional development and spatial structures, and takes into account the different roles that different regions in China play, for example, regarding urbanization and industrialization, the protection of ecosystems, agricultural production, and safeguarding the natural and cultural heritage. This new tool expands the focus from just economic development to embrace other development priorities throughout the regions.

Regional planning is not mandatory but is generally conducted at the central level by the National Development and Reform Commission, whose duties include preparing national economic and social development plans, planning development priority zones, coordinating regional development and strategies for urbanization and sustainable development. The planning process adopted by the Chinese system is similar to that seen in other countries. To put it simply, the system is a top-down and bottom-up process with a central planning agency. The main difference is that greater effort is needed for the Chinese system to cope with the inherent

complexity of economic planning for a large territory, population, and economy with significant regional diversity and disparity. With increasing emergence of interprovincial economic cooperation, the government is facing a new challenge in regional planning.

Urban planning is implemented at the state level by the Ministry of Housing and Urban-Rural Development (MOHURD), which is overseen by the State Council; at the provincial level by the Department of Housing and Urban-Rural Development, overseen by the Provincial Government; and at the city or town level by the construction commission, urban planning commission, or urban planning bureau, overseen by the local government (Song and Pan 2009). Institutions at various levels first prepare an urban master plan and then a detailed control plan for their level and submit it for approval to the appropriate upper-level body, depending on the size or status of the city or town. The State Council has to approve urban plans for several cities, including municipalities directly reporting to the council (Beijing, Chongqing, Shanghai, and Tianjin), provincial capital cities, cities with over 1 million residents, and other designated cities. A city planning supervising system covers all provincial capital cities, all subprovincial cities, and all national historic cities except municipalities.

At the local level, the preparation and implementation of urban development plans requires involvement of many government agencies; the key agencies are listed in table 2.3.

Master plans are usually prepared on a 20–30 year horizon and are for the whole metropolitan area, not just the urban area.

**TABLE 2.3** Key local planning institutions

Institution	Responsibility
<b>Development and Reform Commission</b>	Establish five-year plan for economic and social development and regional development plans and guide urban planning process
<b>Urban Planning Bureau</b>	Manage urban planning process as well as planning related projects
<b>Land Resources Bureau</b>	Manage land use master plan and other land-use related activities
<b>Water Resources Bureau</b>	River basin and flood control plans
<b>Transport Bureau</b>	Participate in urban planning process and transport planning
<b>Public Works/Infrastructure Bureau</b>	Maintain public infrastructure
<b>Environmental Protection Bureau</b>	Develop local environmental regulation and monitor environmental protection
<b>Statistics Bureau</b>	Provide demographic data for planning process

Source: Adapted from Song and Pan 2009.

Master plans have a five-year implementation plan and a number of associated sectoral master and implementation plans under them, and are expected to be updated and reappraised every few years. District plans may be prepared for medium-large cities. Detailed control plans and detailed construction plans are prepared under these higher-level plans. Urban transport plans are generally a process under the urban planning system. Land use plans are overseen by land management bureaus under a separate process from urban plans (and often are not in sync with the urban planning process). Because of the pace of urbanization and development, however, land use and infrastructure development in China's cities often exceeds the limit and expectation set by the master plan (Zhi 2013). The oversight function of higher-level authorities for urban spatial expansion also largely fails amid rapid urbanization.

As in other countries, various organizations, institutions, and levels involved in the planning process and coordination between planners and sector departments is essential for preparing comprehensive plans (but can face difficulties). An integrated urban plan is one that takes into account all the factors set out in table 2.4. At the core of the process is the need to synthesize and prioritize investments plans proposed under the plans and by line ministries and link these with the budgeting process managed by the Ministry of Finance (Zhi 2013).

#### *Planning practices and land use allocation in secondary land markets*

Chinese planning practice contributes to land use inefficiencies by limiting building intensity. China is developing a lot of land, but not necessarily in a way that responds

**TABLE 2.4** Factors making up an integrated urban plan

Factor	Role	Result
<b>Social and economic forecasts</b>	Evaluations of population and economic conditions	Shared with all other agencies to guide their plans (land use, infrastructure, environment)
<b>Land resource protection and land use allocation</b>	Land resource and land use planning combined into one function	Helps ensure timely decisions on new development locations and limitations and conservation of farmlands or open spaces
<b>Transport planning</b>	Coordinate with land use and urban planning	Ensures layout and capacity of transport infrastructure and systems correspond to land use and urban plans
<b>Environmental protection</b>	Coordinate with urban and transport plans	Monitors both industrial and agricultural pollution as well as mitigates pollution from urban and transport.

Source: Adapted from Song 2012.

### BOX 2.3 Regulatory restrictions on urban redevelopment and densification

Restrictions on urban redevelopment run a range of complexity. On the simpler side, consider the redevelopment of a traditional seven-story walkup area in a Chinese city. If the redevelopment is being done for a public purpose (such as for a park or railway), the current land users will be compensated at locally specified compensation rates. This type of redevelopment is relatively low cost and straightforward but can only be carried out by the government.

For commercial redevelopment, a prospective developer must negotiate with each individual property “owner” over the entire lot. Given how large these lots are, a typical superblock developed as a seven-story walkup would require negotiating compensation rates with many individuals, a challenging proposition for any private land developer. In practice, an urban development investment corporation (UDIC) negotiates with all the landowners and redevelops the entire lot—compensating land owners and clearing the land. Only then can the land be reapportioned and redeveloped using the same process as for newly converted urban land.

In other words, for almost any form of redevelopment within an urban area, it is likely that a government-backed UDIC will need to be involved and that the process will require complex negotiations with a huge number of land owners of a large-scale lot. This requirement for large-scale government intervention indicates that redevelopment in Chinese cities is a challenge. It cannot be done at a small scale, because all major changes can only be made at the “lot” level, which is typically large, fixed, and decided in the past. These restrictions suggest how land use and density decisions in China are “locked in”—decided at one point and difficult to change incrementally.

Contrast this situation with a case of the same set of buildings each on their own individual lot. Here, a property owner would only have to control one lot to propose a land use change. If, perhaps, a developer perceived a need for a hotel, or a set of shops, he could purchase one single property from its “owners” (a simpler proposition than negotiating with the entire large lot). In addition, if necessary, the developer could petition for rezoning only of his small lot, rather than the larger superblock containing dozens of buildings.

*Source:* Based on description prepared by Andrew Salzberg.

to consumer demand or promotes efficiency. Local governments have not used density regulations effectively to provide incentives to increase densities along major public transport corridors and stations, while reducing densities in less accessible and peri-urban areas. Zoning and FARs are often applied at the large block or parcel level and lack a clear strategic policy direction that would allow for gradual densification based on infrastructure improvements and land value increases over time. In general, density restrictions are too rigid in city centers, forcing development to the urban periphery.

Changes in land use require permission from the government, and land developers who abandon the use forfeit their right back to the government. Land developers have some flexibility in defining the layout and subdividing the lot under specific guidelines; however, the land’s delineation and FAR are often fixed with little flexibility. Because land and the buildings on that land are separate

items of ownership, they often require separate registration in different offices. Businesses and individuals who buy property, receive a certificate that links their property cadastral information to the entire lot that was leased to the developer, which contains other land and, likely, buildings. In other words, the original secondary land developer still controls the original lot (box 2.3), and the building developer only has an ownership certificate for his building. In other words, true “subdivision” of a lot, in the sense of the word used in western contexts, is not possible in the Chinese context. Even if smaller developers are allowed to participate in the development process by building and owning buildings, the underlying land remains tied to the original leased plot.

*Urban blocks are often oversized and do not optimize land use*

Chinese cities were developed with superblocks of 400 meters (or more) to accommo-

date the *danweis*, or the places of employment of state-owned enterprises, and the land use rights of many superblocks in older parts of cities are still owned by the *danweis*. Most new developments continue to be built at very large block sizes. The blocks in newly planned expansion zones typically range from 400 meters to over 800 meters a side, compared with blocks in Tokyo that average 50 meters a side, or blocks in Paris, London, and Manhattan that average 120 meters a side. One 400 meter Chinese superblock equals 64 Japanese blocks and 11 blocks in Manhattan, Paris, London or Hong Kong SAR, China. Like the former city center superblocks, the new superblocks are usually not subdivided into smaller plots when leased, which prevents a more competitive and gradual redevelopment of the block over time. The superblocks have also benefited large developers with the means and access to capital market to purchase the lease rights and develop these blocks.







The building coverage ratio—the ratio of the building's footprint to the size of the lot—of superblocks in Chinese developments varies between 15 and 25 percent.<sup>5</sup> This building coverage ratio is low compared with historical small blocks (where the ratio is 50–65 percent), forcing Chinese urban designers to compensate for the loss of density by going vertical. The density, as measured by the floor area ratio, of vertical

superblocks is by far inferior to that of small continuous perimeter blocks. Setbacks at the edge of the superblock create a strong discontinuity and isolation from the street, often reinforced with fences around new developments. Inside superblocks, repetitive buildings (office towers, housing parallel slabs, villas) stand in isolation without forming a continuous whole with the rest of the urban fabric. Superblocks thus lack complexity and differentiation. In an area of less than four Chinese superblocks, the city of Turin houses hundreds of buildings, many plazas and monuments, 40 kilometers of facades along streets, and 15 kilometers of facades along internal courtyards (box 2.4).

Although the Code for Transport Planning of Urban Roads (GB 50220-95) differentiates between different types of roads, the actual plans and designs of urban streets, especially in new development areas, make little distinction by use and function of streets. They do not take into account the needs of different users, nor are they based on realistic forecasts of traffic demand. Many roads are oversized, in part because planning guidelines require an arterial road (eight lanes or more) every kilometer and a main urban road every 500 meters. That might be appropriate for large metropolitan regions, but it is neither feasible nor desirable in smaller towns. The standards and guidelines are responsible for three

### BOX 2.4 Comparison of connectivity in Chinese and other cities

The table shows the differences in connectivity for three cities in China and three in Europe.

	Turin, Italy	Barcelona, Spain	Paris, France	Pudong Shanghai, China	Hutong Beijing, China	New areas Beijing, China
Urban grid						
Intersections per km <sup>2</sup>	152	103	133	17	119	14
Distance between intersections	80	130	150	280	75	400

inefficiencies: overly large superblocks that are not subdivided into smaller plots; roads that are too wide, often between six and ten lanes, and designed for high-speed traffic, typical of highways; and the absence of secondary and tertiary roads based on function; the lack of such a public street network results in a public street density that is three times lower than in Europe and in Manhattan and eight times lower than in Japan.

Public space design, including street design, has been replaced in Chinese urban planning practice by road engineering with increased traffic flows as the main objective. The National Standard of Urban Residential District Planning and Design sets out the standard for road width within the residential district. Regulations on street widths, street traffic speed, and block length shows that at the residential district level, the built environment is intended to promote walking. Given the arterial roads, however, which are normally one kilometer apart, the environment is not pedestrian friendly.<sup>6</sup> The multi-lane, high-speed arterial roads act as impassable barriers within the city and reduce the connectivity between neighborhoods as people are forced to walk 700 meters to cross an 80-meter-wide road.

#### *Huge potential for densification and intensification of urban development*

Compactness enhances economic efficiency and social inclusiveness of cities. Compactness, densification, mixed-use, and fine-grain street networks should be encouraged at the block, neighborhood, and metropolitan scales. At the block level, superblocks should evolve progressively into small blocks with higher FAR, better inside connections and more accessible amenities. At the neighborhood level, a dense distribution of public facilities and amenities should be encouraged. At the metropolitan level, infill development and integrated transport land use development need to be encouraged. Density (demographic or FAR) is not the only characteristic of compact sustainable cities. Proximity and accessibility, mixed use, and connectedness are also preconditions for the formation of agglomeration economies and for addressing

social inclusiveness and environmental well-being. They should be enhanced in an adaptive strategic planning process by increasing progressively the number of intersections per square kilometer and the linear density of streets to develop the connectivity and create a more fine-grain urban fabric.

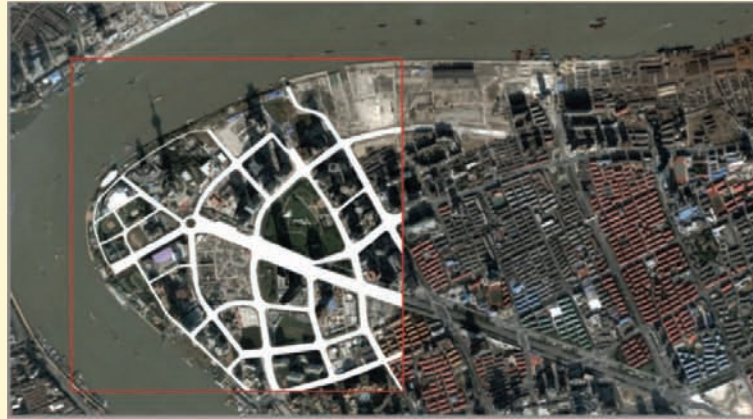
The density of public amenities such as public parks and health care, child care, and education facilities should be increased, to create a city where most daily amenities are accessible within a five minute walk. Finally, cities should mix commercial space, offices, and residential areas to reduce the distance residents have to travel to their jobs or to recreational space. Articulated densities will allow more efficient and cleaner transport modes to become viable and affordable, such as biking, walking, and public transit systems. Densification is not an end in itself, but a means of improving the sustainability, connectivity, accessibility, and diversity of the city, as well as its vitality. It is a relative indicator of the intensity of development, as one can see in the comparison between Pudong and Puxi, both districts in Shanghai (box 2.5).

Forms of densification must be encouraged at three different scales. At the building and block scale, traditional perimeter blocks of about 100 meters a side and buildings of medium height (five to seven floors) offer the highest potential for densification, with gross FARs (including infrastructures) usually three times higher than towers-in-a-park superblocks of 400 meters side. At the neighborhood scale, the density of urban fabric should be balanced by a fine mesh of streets and a dense distribution of public parks and amenities. At the metropolitan scale, planners should locate the areas where infill would increase the compactness and decrease the fragmentation of the urban area. They should give an efficient shape to the metropolitan growth by concentrating densification actions along transportation corridors and discouraging leapfrog and edge sprawl.

#### **Moving from superblocks to small, well-connected plots**



Small blocks allow more density and agglomeration economies. Chinese cities could be



**BOX 2.5 Density compared in Pudong and Puxi, Shanghai**

A one-square-mile selection in Pudong

Pudong is often considered as a model of high-density urban development. The following table compares two districts located on the opposite side of the Huangpu River: Pudong and Puxi. Because of the large-scale infrastructures associated with the large-scale buildings in Pudong, such as highways, large setbacks, parking space, there are huge areas that are not built. The building coverage ratio is much higher in Puxi, and, as a result, its gross urban density is higher than in Pudong.

800mx800m squares		
	HongKou– Puxi, Shanghai	Lujiazui– Pudong, Shanghai
Building type	Low-rise housing	Towers
Coverage ratio	53%	14%
Gross urban density	1.9	1.2

Source: Salat, Labbe, and Nowacki 2011.

redeveloped within the existing built urban footprint by dividing superblocks into smaller blocks and increasing intensity inward rather than directing the growth outward toward spatial expansion. Redevelopment within the existing footprint would create more compact cities, would foster short-range accessibility and interactions, would diversify the economic fabric at the local scale, and would decrease the environmental loads of cities. Small blocks in the Chinese context can achieve an average gross FAR around 2.5—doubling at a minimum the FAR of the current

superblocks (Salat, Labbe, and Nowacki 2011). A finer-grain urban fabric could be obtained by subdividing the superblocks into small blocks of 100–150 meters a side and reorganizing the spatial layout by constructing additional medium-rise buildings that redefine the boundaries and internal structure of the block. China's unprecedented effort of the past three decades to build large structures has left space to build the intermediate and small elements in the space in superblocks left empty by the low building coverage ratio. Filling in this empty land with new low-rise



dense and continuous construction, recreating vibrant streets inside the existing blocks, and connecting the whole city by narrower streets running from block to block with walking and cycling paths is a challenge—but it is also a source of new profits generated by the use of high-value existing urban land.

Several innovative strategies for infill development within existing superblocks in Chinese cities have been proposed in a joint Massachusetts Institute of Technology (MIT) and Tsinghua University project for designing more energy efficient and cleaner neighborhoods that would spur economic growth and quality of life of neighborhoods and cities (Frenchman, Wampler, and Zegras 2011).

Key concepts of the high-low-rise block are the following:

- The integration of high-rise with low-rise forms creates a high-density neighborhood that is human scaled, combining valuable properties of both low- and high-rise development.
- The new urban form is energy efficient. According to MIT calculations, it reduces the overall energy consumption per household by more than 40 percent compared with conventional superblocks and brings the energy consumption close to the same level as traditional forms and at the same level as small-block grid-based neighborhoods (Frenchman, Wampler, and Zegras 2011).
- The new urban form provides services and amenities that residents need daily within close walking proximity, creating a highly functional and livable environment.
- The basic unit of development consists of a mixed-use small perimeter block of four to six stories enclosing an interior courtyard and includes one or more high-rise towers. The courtyard provides semiprivate space for residents in the cluster.
- Towers are carefully placed in each cluster to ensure adequate sunlight in all residential units and beneficial shade in the summer months.

As the above example shows, there are design options to adapt the current superblock and intensify its use to serve various

functions, but a lot will depend on regulatory and institutional issues discussed earlier. Relaxing the block control rules is one of the key policies necessary for the Chinese urban landscape to evolve toward a more efficient mixed-use form. Chenggong's Master Plan, revised by Calthorpe Associates,<sup>7</sup> is based on smaller blocks and articulated density along transit systems. The Kunming Urban Planning and Design Institute designed it to conform to block control regulations, which resulted, even with "special case" status, in a plan with a core area made of 11 control units, 65 superblocks, and 384 parcels, with a net decrease in the street density. The revised plan is a significant progress compared with current practice, although it is still behind the level of fine-grained and mixed-use cities like Manhattan or Paris.

Removing barriers and introducing flexibility in the local planning and building regulations is key for implementing mixed-use small perimeter blocks. Success can be tested during a transitional phase through an assessment of the environmental performance of a building and neighborhood that considers such things as smart growth, energy efficiency, resource recycling, environmental quality, and sustainability. Examples, such as the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) in Japan or the Leadership for Energy and Environment Design for Neighborhood Development (LEED-ND), could be introduced and used to assess the effectiveness of local regulation and pave the way for changes. Current local codes do not allow small perimeter blocks, and negotiating with planning bureaus to get an exemption can be an extremely long and bureaucratic process. Even in special zones such as the Chenggong New Town, environmental and energy efficiency improvements were compromised considerably by the 50-meter setbacks rules on the main roads.

Revision of planning and building codes is urgently needed to bring them into line with international practice and allow for more efficient and sustainable urban development. The following changes would introducing more flexibility into the block control system and increase the kilometers of streets per square kilometer of area:

- Introduce conforming line ratios requiring that a minimal proportion of the buildings to be aligned along the street and sidewalk (without a setback). The conforming line ratio can be modulated according to the type of building (more than 60 percent for residential buildings, more than 70 percent for commercial and office buildings).
- Insert zoning at the parcel or lot level to encourage mixed use at the block level.
- Reset standards on building coverage and green coverage to allow a continuous façade of buildings.
- Reduce minimum building setbacks. Many American cities are suppressing their setback rules to promote pedestrian-friendly environments with active street edges. As an example, in Chenggong the minimum setbacks are being reduced to 10 meters along roads wider than 40 meters, to 5 meters for roads 40 meters wide, and between 1 and 5 meters for roads less than 40 meters wide.
- Introduce more flexibility in solar protection lines.
- Reduce turning radius at street intersections.

#### *Market diversification and other benefits of smaller blocks*

Subdivision of land leases and market opening to smaller-scale investors are key for incremental densification. Land leases should be subdivided into smaller plots, and financial mechanisms should be created, to foster the coexistence of a few large projects with large-scale finance, a medium number of medium-scale projects, and a myriad of microprojects financed by small and private local initiatives.

Except for rare and justified situations (large infrastructures, key urban amenities), cities should avoid the super block approach to land division. Rather, cities should divide superblocks into a few dozen urban plots (about one hectare in size) with diversified uses. To do so, national and local authorities will have to implement the following key actions.

The higher cost of fine-grain urban development can be covered through the increase of FAR and the implementation of FAR rights.

The development of a fine-grain street network is more expensive in absolute value, as shown in box 2.6: RMB 58 million per square kilometer compared with RMB 35 million in the more traditional developments. However, the increase in density made possible by the finer grain of urban fabric leads to lower pavement costs per capita—RMB 3,700 per capita, compared with RMB 5,514 per capita for the superblock. This inversion of absolute investment costs and per capita investment costs shows the importance of implementing financial mechanisms to finance the absolute additional costs with the increase in FAR. This approach makes economic sense only if densification takes place. In Europe, the public authority finances the fine-grain street network and captures the value in the long run through land sales and property taxes.

#### **More dense, mixed-use, and well-connected neighborhoods**


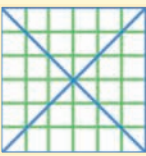
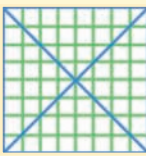
A high density of streets with a good balance of different street sizes promotes walking and cycling. A high density of narrow streets with close intersections creates a vibrant, safe, and walkable urban landscape. Destinations tend to be within walking distance, and the system of close intersections enables the pedestrian to change direction easily. The connectivity of streets of different sizes ensures the continuity of public space that is an essential feature for walkability (box 2.7). The differentiation of street widths goes along with a differentiation of travel speeds. Narrow streets are designed for low-speed traffic with bicycle lanes, while larger streets can accommodate faster traffic.

A sublayer of connective public streets and well-defined and designed public spaces inside the existing superblocks would increase connectivity in Chinese cities. Progressive development of a small-mesh street network would end up by reconnecting the full city. International best practice shows that this finer grain also better optimizes traffic flows while creating more direct routes and maximizing pedestrian mobility.

Local street patterns should be integrated with surrounding networks to provide flexibility and accommodate changes in built and

## BOX 2.6 Cost analysis of street network for various size blocks

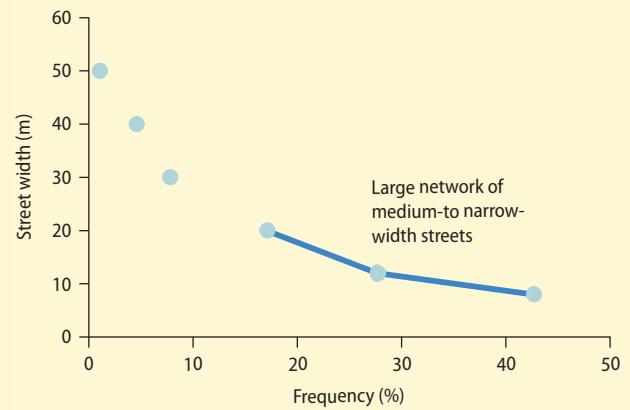
This box compares infrastructure costs associated with three models of street network. The first model corresponds to the traditional Chinese superblock, which typically has 500 meters between intersections and multilane roads every 500 meters. The third model corresponds to the European model, based on empirical figures for Paris (Bourdic and Salat 2013).

	<b>Model 1</b> <b>“Traditional”</b> <b>Chinese block</b> <b>500 m between</b> <b>intersections</b> 	<b>Model 2</b> <b>Medium-grain</b> <b>small block</b> <b>170 m between</b> <b>intersections</b> 	<b>Model 3</b> <b>Fine-grain</b> <b>small block</b> <b>130 m between</b> <b>intersections</b> 
	<i>Black lines: 10 lanes motorized streets (10L M)</i> <i>Dark blue lines: 6 lanes motorized streets (6L M)</i>	<i>Light blue lines: 4 lanes motorized streets (4L M)</i> <i>Green lines: 2 lanes motorized streets (2L M)</i>	<i>Light blue lines: 4 lanes motorized streets (4L M)</i> <i>Green lines: 2 lanes motorized streets (2L M)</i>
<b>Street length for 1 km<sup>2</sup></b>	10L M: 2,000 m 6L M: 2,000 m	4L M: 2,000 m Diagonal 4L M: 2,800 m 2L M: 10,000 m	4L M: 2,000 m Diagonal 4L M: 2,800 m 2L M: 14,000 m
<b>Street length by type</b>	Motorized way: 32,000 m Bicycle lanes: 8,000 m Pedestrian lane: 8,000 m	Motorized way: 39,200 m Bicycle lanes: 29,600 m Pedestrian lane: 29,600 m	Motorized way: 47,200 m Bicycle lanes: 37,600 m Pedestrian lane: 37,600 m
<b>Street area by type (m<sup>2</sup> for 1 km<sup>2</sup>)</b>	Motorized way: 115,200 m <sup>2</sup> Bicycle lanes: 16,000 m <sup>2</sup> Pedestrian lane: 16,000 m <sup>2</sup>	Motorized way: 141,120 m <sup>2</sup> Bicycle lanes: 59,200 m <sup>2</sup> Pedestrian lane: 59,200 m <sup>2</sup>	Motorized way: 169,920 m <sup>2</sup> Bicycle lanes: 75,200 m <sup>2</sup> Pedestrian lane: 75,200 m <sup>2</sup>
<b>Pavement costs for 1 km<sup>2</sup></b>	35.1 million RMB	47.8 million RMB	57.8 million RMB
<b>Block length facing street (km/km<sup>2</sup>)</b>	7.4 km	19.4 km	26.0 km
<b>Human density (job+housing)</b>	7,500 cap/km <sup>2</sup>	15,000 cap/km <sup>2</sup>	20,000 cap/km <sup>2</sup>
<b>Nb of intersections per km<sup>2</sup></b>	4	36	78
<b>Pavement cost per capita (RMB/cap)</b>	5,514 RMB/cap	4,033 RMB/cap	3,700 RMB/cap

### BOX 2.7 Street patterns in Paris, France

The street network in the central areas of Paris is distributed according to a long-tail distribution: 60 percent of the streets (the historical street network) are less than 12 meters wide and accommodate only low-speed traffic. Avenues and boulevards are 20 and 30 meters wide and can accommodate faster transit and public transportation (bus and tramway). There are

700 kilometers of medium-scale streets that ensure high walkability and accessibility and that foster smooth traffic diffusion in the city. There are in comparison, few large boulevards providing room for a variety of modal choices (public transportation, car, bicycle, pedestrians).



Paris street network (left). High proportion of medium-to-narrow-width streets (right).

Source: Bourdic and Salat 2012.

social environments. Street networks should, in general, be connected at all scales and in between scales. Connected or “permeable” networks not only encourage walking and cycling but also lead to a more even spread of motor traffic throughout an area and so avoid the need for distributor roads. A development with poor links to the surrounding area creates an enclave, which encourages movement to and from it by car rather than by other modes. New developments and alterations to existing street networks should be designed with multiple access points that connect with, and complement, existing street patterns. The traditional planning approach favoring mobility should be limited, and accessibility should be encouraged.

Housing choice and diversity should be provided. Neighborhoods must be planned

to provide for choices in quality housing that meets a greater variety of needs and preferences. Affordable housing development needs to be better integrated within the city fabric. Density levels in suburban areas of many cities in China are much lower than in the city core, which occupies only 4 percent of the land, but accommodates 29 percent of the total municipal population. Because local governments have limited revenue sources, low-income housing is built in suburban locations where land is cheap, and where supporting social and economic infrastructure (such as schools, health centers, transportation, and jobs) lag behind. This practice creates the risk of ghettoizing low-income households and contributes to urban sprawl.

Record land prices and strong property markets in many Chinese cities have raised

## BOX 2.8 China's urban villages

Urban villages (*chengzhongcun*, or literally “village in the city”) are a phenomenon of China's urbanization process, particularly in major cities, directly linked to the dual urban-rural land market. As cities expanded, local governments acquired agricultural land from rural collectives, converted it into state-owned urban construction land to build modern infrastructure and buildings. However, acquiring the associated rural residential properties and relocating households, particularly from well-established, concentrated villages, proved difficult, not to mention expensive. So, in many cases, these collective villages were left to be absorbed by the cities even though they were not part of the approved master plan. They are now surrounded by skyscrapers in the center of cities or by high-end gated villa communities in the suburbs.

Rental housing in urban villages has proved a valuable source of replacement income for residents. Residents of urban villages commonly retain their property rights and their housing plots within the collective land tenure system (Liu and others 2010). To make up for the loss of agricultural income, residents expanded and subdivided residential buildings on their properties to rent to migrants looking for affordable housing in major cities close to job opportunities. In Guangzhou, for example, there are an estimated 138 urban villages covering about 20 percent of the municipality and housing around 70

percent of migrants and 40 percent of the total urban population. The average monthly rent for an urban village space in Guangzhou is around RMB 16 (\$2.60 per square meter—half the city average (Lin and de Meulder 2012; Zheng and others 2009).

Urban villages are often overcrowded with poor sanitary conditions. To maximize rental income, residents have expanded houses, in some cases up to eight stories high. As these urban villages are outside the responsibility of the municipal authorities, the design and construction of buildings are not constrained by urban building and safety standards (Song and Zenou 2012). Standards for rural housing usually limit buildings to two and a half stories and certain perimeters (Wu, Zhang, and Webster 2013), but enforcement by village committees is weak. In the result has been high-density neighborhoods, inadequately served by basic public utilities, with poor ventilation and drainage and often lacking basic facilities. A survey of facilities in 50 urban villages in Beijing in 2008 showed that the majority did not have bathrooms, kitchens, or heating. (Zheng and others 2009).

Many municipal authorities and city residents consider these urban villages to be eyesores (Du and Li 2010). A recent study in Shenzhen, where urban villages are scattered throughout the city, found that proximity to urban villages has a negative effect on the prices of nearby residential developments (Song

concerns about the affordability of housing in many cities, where the costs of buying or renting a home are increasing much faster than incomes. Instead of intervening in the land markets and limiting the maximum bid prices as Beijing recently did, implementation of a property tax system could be an important instrument for local governments to capitalize on the heated market and cross-subsidize and expand the supply of affordable homes. Policies include the use of increased tax revenue associated with higher property values and an active real estate market, as well as requiring the inclusion of a modest number of affordable homes within new residential developments.

Experience in South Africa and Mexico illustrates that affordable homeownership programs on the outskirts of the city can be significantly less expensive in the short run,

but much more expensive in the long run. Regeneration of urban cores in established cities has higher up-front costs because of more complex construction, upgrading of public spaces, and improvement of existing services, but once revitalized, urban cores become self-sustaining by attracting further investments and for a considerably longer period of time (Licciardi and Amirtahmasebi 2012). Mixed land uses also prevent central areas from closing down at night, improve diversity in housing supply, stimulate a range of diverse economic activities, and reduce transportation costs.

Other important instruments that several countries have used to provide affordable housing include “inclusionary zoning” or “incentive zoning” policies. Zoning policies could require (inclusionary zoning) or create incentives (incentive zoning) for developers to

**BOX 2.8** (continued)

and Zenou 2012). However, urban villages have played a role by providing affordable housing for migrant workers to support the urban economy. Migrants living in urban villages are not limited to unskilled labor. University graduates live in urban villages and work in high-tech sectors such as information technology. One study in Guangzhou, found that 10.3 percent of migrants renting housing in the surveyed urban villages were university graduates (Du and Li 2010).

Because the land in urban villages belongs to the rural land system, residents cannot sell their land directly to developers. The state may acquire the land, compensating the current residents, and lease it to developers in the urban land market. However, these urban village collectives have strong vested interests in retaining their properties and rental and commercial incomes. Nonetheless, most major cities have already begun or are planning redevelopment projects to bring these, often prime pieces of land, into the urban land system and essentially to make them more governable (Wu, Zhang, and Webster 2013). Cities have taken different approaches to redevelopment of urban villages, with some cities compensating residents generously to encourage resettlement; others are working in partnership with developers and urban villages in the redevelopment process. This process is likely to lead to the introduction of more land within existing cities for infill development.

Redevelopment of urban villages needs an approach that considers all levels of government, all stakeholders, and multiple strategies based on thorough understanding of village attributes as well as the city's strategic priorities for housing migrant workers. The top-down approach, mainly based on a "demolish and redevelop model," is unlikely to work in many cases. Many large-scale redevelopment projects have been proposed in recent years, but the majority of them have not gone beyond the initial study stage because of conflicts of interest among stakeholder groups (Lin, de Meulder, and Wang 2011). Bottom-up approaches, to gradually reshape urban villages, are also unlikely to fully solve the problems of informality and lack of regulation on their own (Lin and de Meulder 2012). Different approaches are required for different types of urban village. Those in the inner city areas, for example, tend to have higher populations and building densities and higher socioeconomic status but poorer housing status. Understanding the physical form is not sufficient, however, to find strategies to integrate these communities into urban society. That will require a better understanding of social relations and the organization and management of the urban villages as well as recognizing the role of market forces and need for adoption of market rules (Liu and others 2010).

Contribution from Joanna Masic.

include a certain percentage of low-income housing (usually 10–20 percent either in rental or ownership) in new large-scale housing or mixed-use developments (those with at least 100 units, for example, or a minimum surface area, say, at least 50,000 square meters). A well-designed program could benefit the community, low-income people, and developers alike. Fairfax County in Virginia approved a plan to rezone an area around a metro station that will increase density substantially and required the developer to make at least 5 percent of the new housing "affordable." In addition, the government could provide special subsidies for the construction of affordable housing units (box 2.8).

Governments can also make abandoned or vacant land and properties available for affordable homes. Government-owned land,

such as large parking lots around government buildings and low-density structures in areas zoned for high-density development, can be used for affordable housing. The rehabilitation of older buildings to minimum safety standards could also provide reasonable and affordable housing for low-income people.

### Connecting people, linking businesses

#### Expanding the economic reach of cities through improved connectivity

Improvements in connectivity within and between cities have considerable bearing on enhancing economic efficiency.<sup>8</sup> They enable firms to access local, regional, and global markets—both to buy inputs and



sell outputs—as well as to exchange ideas, thereby stimulating innovation. Connections also give consumers options and in many cases better prices. Within cities, connections enable people to access employment and services, and they enable firms to attract workers, access other inputs, and sell their products in local markets.

Intercity connectivity has dramatically improved over the past 20 years in China, for both freight and passengers. The scale and pace of network expansion is unprecedented. China undertook major upgrades in each of the transport modes, particularly road and rail. Between 2006 and 2012, China added 780,500 kilometers of roads, 50,860 kilometers of expressway, 65,230 kilometers of rural highways, 20,900 kilometers of railway, 41 airports, and 2,361 kilometers of high-grade inland waterways. The new expressways and

high-speed railways (HSRs) helped cut intercity travel time by 50–70 percent.

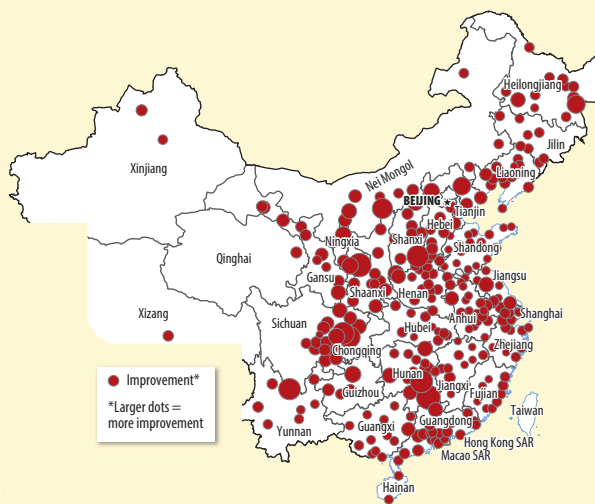
Such improved intercity connectivity is redefining the level of economic integration and accessibility for most Chinese cities. First-, second- and third-tier cities are gradually being connected through modern transport infrastructure and benefit from a broadened range of alternative services for both freight and passengers. Disparity in accessibility among cities in China has dropped as a result of transport investments over the past decade with the coefficient of variation dropping by nearly 50 percent (box 2.9). The development of the expressway network has facilitated growing exchanges between firms leading to agglomeration benefits. Based on econometric analysis in Guangdong, it is estimated that the real wage rate would increase by 10 percent when the economic mass

### BOX 2.9 Improvement in intercity accessibility (2000–10)

The map shows the change in accessibility in 287 prefecture-and-above level cities in China during 2001–10. The size of the dots is proportional to the magnitude of improvement in accessibility measured in terms of economic mass. Three groups of cities experienced significant improvement in economic potential during this period, as joint outcomes of different types of transport infrastructure development.

Cities that are located along a belt from northeast to southwest China, the frontier of the “Grand West Development” national strategy, have experienced the greatest improvement in economic potential. These cities have benefited greatly from the expansion of expressways and conventional railways to remote regions. The second group of cities in mid-to-north China most likely benefited from the expansion of the conventional railway system, completion of the expressway network, and opening of new airports (such as Changzhi, Qingyang, and Erdos). The third group consists of those cities that lie along the high-speed rail lines. A typical example is the Wuhan-Guangzhou line running from middle to south China.

Source: Fang 2013.



IBRD 40997 | JUNE 2014  
This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.



### BOX 2.10 Impact of highway connection on Guangdong Special Economic Zone

A recent study estimated the productivity elasticity with regard to spatial proximity to economic mass in Guangdong implying that a doubling of the economic mass would raise productivity by 10 percent. The study, which reviewed the relationship between agglomeration and productivity in Guangdong, was based on economic and travel time data for 88 county and urban districts from 1999 to 2009. The estimated elasticity is just above the consensus range for developed countries (3–8 percent) and is 2.5 times that of the United Kingdom (3.5 percent) (Rosenthal and Strange 2004; Rice and others 2006).

These results are consistent with the markedly different development trajectories taken by the initial three special economic zones (SEZs) set up in Guangdong. Shenzhen, adjacent to Hong Kong SAR, China, and thus exposed to that large economic mass at the time, flourished: it grew from a sleepy border town to a metropolis of over 10 million residents, and its annual average economic growth rate during 2000–08 was 15 percent. Zhuhai, next to Macau but

otherwise more distant from the main economic centers, had a growth rate of 13 percent a year in the same period. By contrast, Shantou was designated the third SEZ in Guangdong on the strength of having strong familial connections to overseas business communities in Europe and the United States, despite being more than 450 kilometers away from the provincial capital, Guangzhou. It was not connected to the national expressway network until after 2003. It has had the slowest GDP growth among all Guangdong municipalities (9 percent a year for 2000–08). Meanwhile, those municipalities that are physically close to Guangzhou and Shenzhen, such as Dongguan, Foshan, Qingyuan, and Zhongshan, achieved the highest growth rates over this period, all over 15 percent a year (although from lower bases). The more buoyant innovation associated with higher domestic business and consumer demand in Shenzhen contrasts strongly with the backwater development in Shantou over the past decade.

Source: Salzberg, Bullock, Jin, and Fang 2013.

(measured as the number of jobs in connected cities divided by the cost of travel to those cities) doubles (box 2.10) (Roberts and others 2012; Salzberg, Bullock, Jin, and Fang 2013. High-end service sectors (finance and information technology) and the tourism industry appear to be benefiting the most from improved accessibility,<sup>9</sup> but manufacturing is also gaining from the expanding ease of road connection with other firms.

Accessibility brought by high-speed rail is also redefining business interactions. A case study on the Wuhan-Guangzhou HSR corridor indicates that the regional urban hierarchy in South China is evolving toward a more interwoven structure, with remarkable growth in interprovincial trips between third-tier cities and upper-level cities that they do not belong to administratively (Fang 2013).

Cities have also invested massively in expanding their inner connectivity. Estimated investments in urban connectivity (road, bridge and metro) amounted to RMB 902 billion (including RMB 194 billion for

metro), or 1.8 percent of the GDP of 657 cities in 2011 (64 percent of total investments by the cities). Road networks in cities have expanded from 2.4 billion square meters to 5.2 billion square meters and by 159,617 kilometers to 294,443 kilometers between 2000 and 2010, reaching about 13.21 square meters per inhabitant. The metro networks grew from 117 kilometers in 2000 to 1,755 kilometers in 2012 in 16 cities. Moreover, metro systems in 20 additional cities have been approved or are currently under construction, and the total length in operation is scheduled to reach 6,000 kilometers by 2020. Cities also placed growing emphasis on bus transport during the period. The total length of bus lines in operation increased from 126,000 kilometers in 2006 to 521,000 kilometers in 2011. Total annual bus and trolley ridership reached 67.0 billion in prefecture-level cities, growing 8.5 percent a year. The total ridership of urban rail in 2012 reached 7.1 billion growing at 31 percent a year (*China City Statistical Yearbook*

2011, 2012; Li 2013; *China Statistical Yearbook* 2007–12).

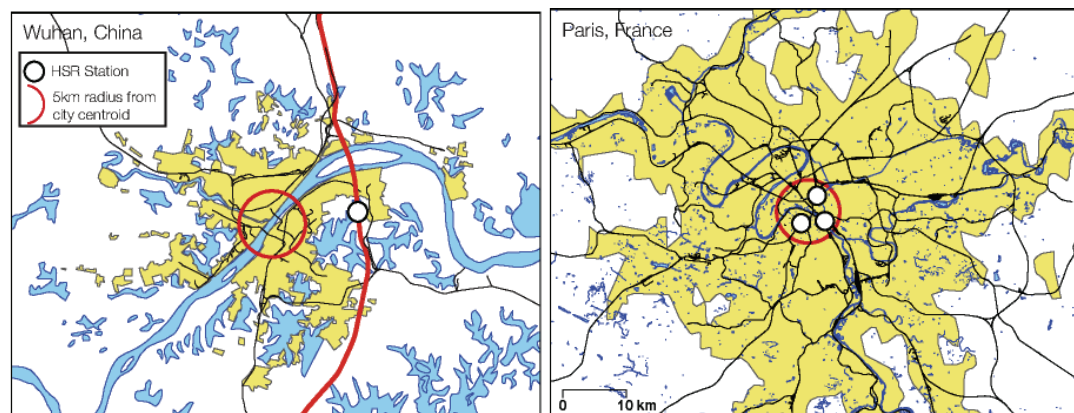
Despite such improvements, much remains to be achieved to ensure sustainable connectivity. At this stage, land use and transport plans are often not sufficiently aligned to address current and future economic needs. Densities in the central areas of Chinese cities do not vary sufficiently across the urban space to reflect the availability of transport network and mass transit. Uniformly regulated FAR values suppress location premiums from being reflected in the price of land. When they vary, FAR values are not publicly available on citywide maps as guides to developers but are the subject of detailed planning at the block level, an approach that fails to signal the value of land based on location and leads to its suboptimal use. Such approach undermines the development of strategically located high-density nodes around mass transit stations and leads to the development of high density areas unsupported by mass transit and prone to traffic congestion. As cities in China continue to expand spatially, suburban housing uncoordinated with transport infrastructure will also increase automobile use, energy consumption and travel time.

The coordination between land use and access and mobility policies is always most effective in the early stages of motorization, when worst excesses are potentially avoidable through proper planning. Chinese cities are rapidly developing their public transport

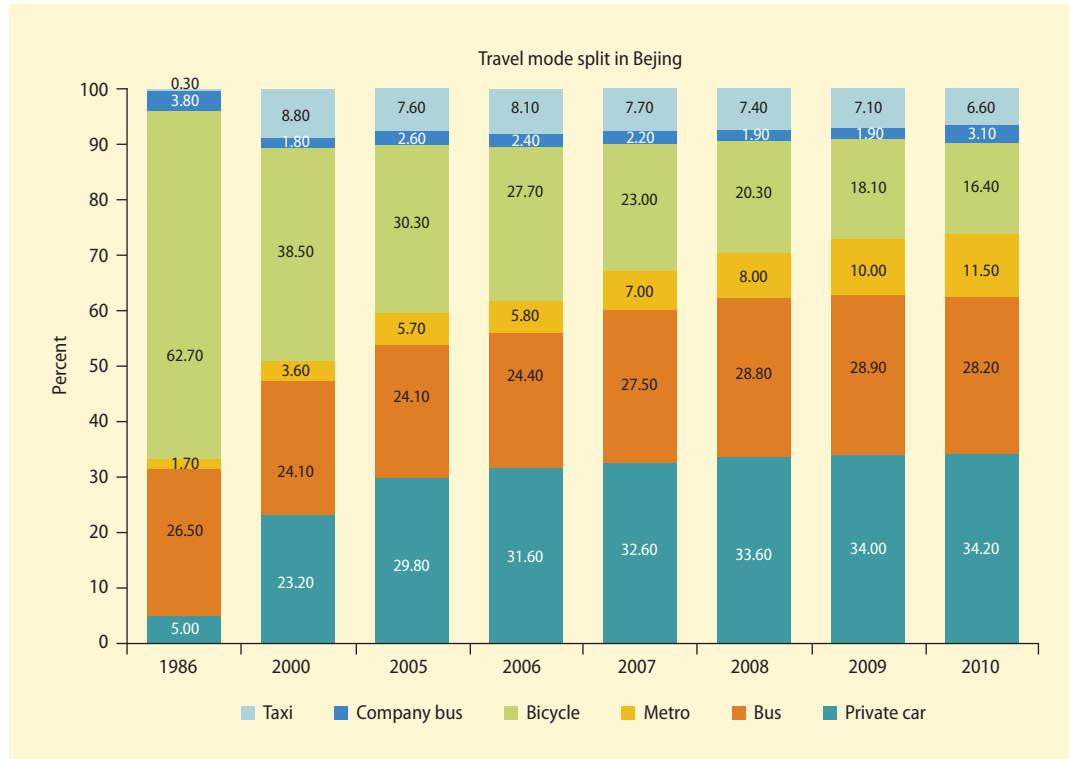
networks at present. These networks require a large upfront investment and will likely require substantial operational subsidies in the future. To improve the effectiveness and efficiency of such systems, land use planning will need to foster high densities of residence and employment along mass transit routes to ensure high ridership.

Where major hubs such as HSR stations have been created, land use planning often fails to leverage the connectivity gains those generate. Many cities in China have actively embraced a new, peripheral station location as a catalyst for the development of a new urban district, sometimes located as far away from the city centers as airports are (figure 2.10). Such stations are easier and cheaper to build than central stations but they require substantial accompanying measures. In the short run, a peripheral location will dampen rail ridership and hinder connectivity, with longer and more challenging access times and more difficult transfers to conventional trains and long distances buses. This effect may be mitigated to some degree by urban development migrating to HSR stations, even those located outside of the existing urban core, but that presupposes close attention to supportive planning and development processes. Current evidence indicates that the dual role of stations, as transport node and core urban economic space, generating substantial potential for agglomeration economies, has not yet fully been leveraged by many cities. In

**FIGURE 2.10** Station locations in Wuhan and Paris



Source: World Bank 2013b.

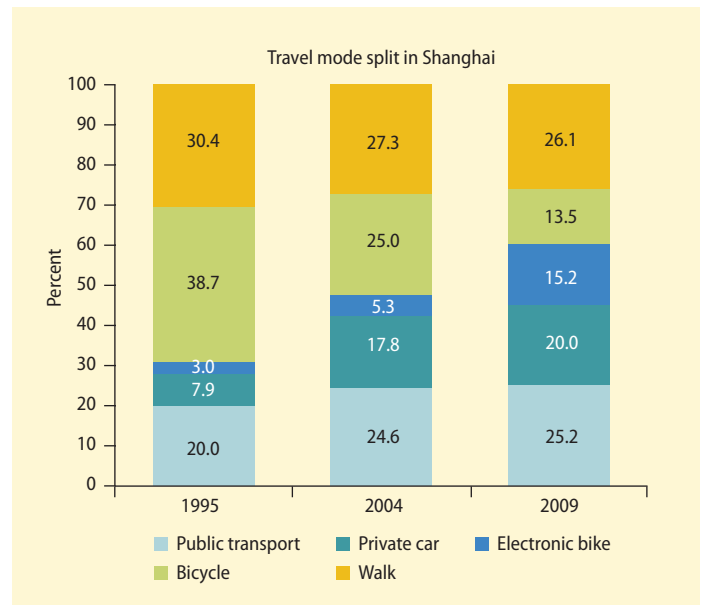
**FIGURE 2.11** Travel mode shares in Beijing, 1986–2010

Source: Beijing Transport Research Center 2007–11.

such cities, only the node function is considered, with limited emphasis on concentrating activities around stations.

### Rising economic costs of connecting cities

Urban mobility is plagued by long commutes; overcrowded public transport rides at peak hours; and a high or growing level of congestion, energy consumption, air pollution and traffic accidents. This pattern is symptomatic of large cities with rapidly growing car and truck traffic. In first- and second-tier cities, the rapid growth in the vehicle fleet has overwhelmed growth of the road network and strongly contributed to growing congestion levels and longer commutes (figures 2.11; 2.12). Overall, China counted more than twice as many vehicles per square meter of urban roads in 2010 as in 2000. The urban road network that enabled high average travel

**FIGURE 2.12** Travel mode shares in Shanghai, 1995–2009

Source: Shanghai Urban and Transport Planning Institute 2011.

speed when car use was low can no longer be expected to do so. The average commuting time is estimated at 52 minutes in Beijing, 48 minutes in Guangzhou, and 47 minutes in Shanghai (China Academy of Science 2010), and travel speed fluctuates widely depending on the time of the day. Short of taking preventive actions, this pattern, prevalent in large cities, is likely to appear in most other Chinese cities over the next two decades as their car ownership continues to grow rapidly.

Time lost to congestion and associated higher fuel use cause by far the highest external, or indirect, costs from transportation, followed by air pollution, traffic safety, and noise pollution. International estimates of total indirect costs from road transport range from 5 to more than 40 cents a kilometer (Proost and Van Dender 2011). This high level of externalities is prevalent in China, as reflected in two studies estimating the indirect costs from transport in Beijing. Mao and others (2012) put the figure at 4.2 percent of GDP for congestion costs only, while Creutzig and He (2009) put it a 7.5 percent to 15.0 percent of GDP for all types of externalities, most of which are created by private car use.

Despite renewed emphasis on public transport, greater integration among transport modes needs to be achieved if public transportation is to remain attractive against car transportation. Chinese cities have benefited from major investment in metros, bus rapid transit, and bus systems since the issuance of State Council Directives 46 and 64 on public transport, and each component of the public transport system is usually of good quality, taken individually. But door-to-door trips by public transport are inconvenient because of poor physical and service integration, often characterized by excessive transfer distances, mismatched schedules, separate ticketing systems, or lack of easily accessible transfer facilities, all issues that Chinese cities are starting to address. These problems are caused mostly by institutional fragmentation at the city level, where different agencies are responsible for each different aspect of urban transportation (metros, buses, road construction, traffic management, land use).

On the freight side, road transport dominates the transport of semifinished or finished

products as in most other countries, even over long distances, generating high pollution and contributing to relatively high logistics costs. Road transport accounts for 78 percent of the 41.2 billion tons of freight moved in 2012, and 35 percent of freight ton kilometers. However, the relative lack of development in the freight industry leads to much inefficiency (ADB 2012b). Some estimates suggest that 40 percent of trucks run empty for intercity trips, and that it takes on average 72 hours to load and unload a truck (Clean Air Asia 2013). Short-haul truckers frequently return home empty and long-haul truckers have to wait an excessive amount of time to pick up a return loads, a wait estimated to cost truck operators between RMB 700 and RMB 1,000. Further, of all road transport emissions in China, freight trucks account for 36 percent of carbon monoxide, 60 percent of nitrogen oxides, and 76 percent of particulate matter (Ministry of Environmental Protection 2012).

The breadth and depth of logistics services could be improved on several measures.

According to a 2012 review by the Ministry of Transport and the Asian Development Bank, the logistics industry is highly fragmented (ADB 2012b). Aside from a few large and modern logistics companies catering to the needs of large firms, the industry is populated by many low-cost providers with limited capabilities and resources, creating an unhealthy environment of distrust. The industry is faced with poor standardization and insufficient intermodal facilities. This is in part caused by national policy that favors large companies over the needs of the many small to mid-size companies and their logistic providers. It is reinforced by a body of law and regulations that regulate various aspects of logistics operations by transport mode making synergies across modes more difficult. The China General Chamber of Commerce estimates logistics costs in China at 18 percent of GDP, a relatively high level compared with 8 to 10 percent in advanced countries. In particular short distance trips within metropolitan areas have a high ton per kilometer cost (figure 2.13). As the economy becomes more complex and e-commerce expands, gaps in urban logistics and inter-urban multimodal transport have started to

appear, leaving cities with excess pollution and shippers with excess transport time and excessive logistical costs, due to high inventory and management costs.

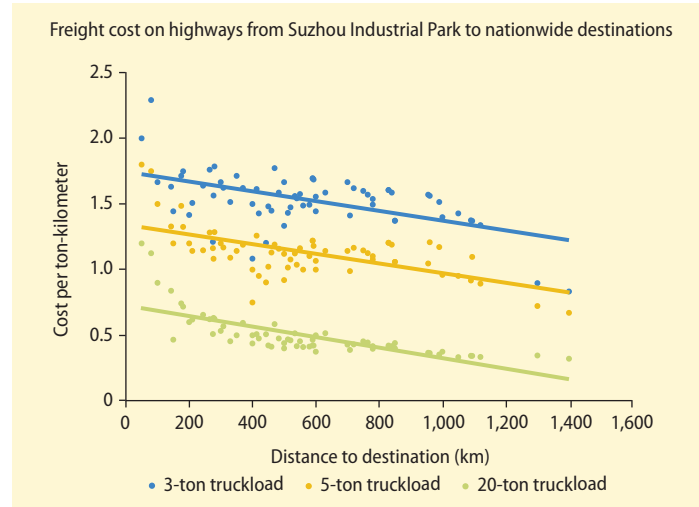
So what are some of the practical options for improving connectivity? First, the many public and private participants involved in connecting businesses and people will need to factor in more systematically the potential economic and social changes, sufficiently ahead of their occurrence, to adjust and align land use and transport plans. They will need to develop and optimize the infrastructure capacity to handle demand sustainably, as well as to optimize the delivery of freight and passenger services. Sustainable connectivity will need to be safe, clean, inclusive, economically efficient, resource efficient, space efficient, and resilient to major weather events, particularly those expected as a result of climate change. China has issued many policy statements to address these aspects, including the need to strengthen public transport or to better integrate various transport modes. Despite the progress to date, there is no room for complacency as the demands of the economy of 2030 and growing concerns over environment, social, financial, and economic sustainability call for yet further deep transformation in interurban and urban connectivity.

Based on international experience, the following key directions would support the goal of sustainably connecting people and businesses, while addressing some of the existing challenges:

- Articulate land use planning and transport infrastructure to respond to and prepare for economic changes.
- Develop and optimize freight transport focusing on resource efficient modes and interconnections, and increase efficiency in services.
- Rebalance passenger urban mobility toward public transport and nonmotorized transport, while making use of pricing mechanisms to manage travel demand.

Beyond those general directions, with the rapid development of mass transit and high-speed rail, Chinese cities will also have an

**FIGURE 2.13 Road transport cost per ton-kilometer**



Source: World Bank Survey of Freight Forwarders.

opportunity to create vibrant urban spaces around many of the new mass transit stations under development (World Bank 2013c). These stations, centered at the intersection of urban mass transit systems, will achieve their fullest impact if they are surrounded by a dense, fully integrated, mixed-use space, friendly to pedestrian and bikes. They could balance the water and energy needs of the various businesses they will host. The neighborhoods around these stations could be turned into lively and vibrant places at a human scale in the city and become a destination for outside visitors. They could mix people of different social background. While one could have a car in those neighborhoods, it would not be necessary for daily leaving. Beyond the metropolitan area, those stations would connect to one another through the high-speed rail stations, connected to the mass transit network. Only walking and mass transit would be required to go from one node in a city to the next in the next city. Such transformation could take place progressively based on market demand.

### Coordinate land use planning and transport infrastructure

The economic structure of 2030 will deeply influence connectivity needs (Chicago Metropolitan Agency for Planning 2013). The



needs of each city will be different and driven to a large extent by its economic characteristics. Resource-intensive primary production will require low transport cost and proximity. Intermediate manufacturing and production for regional consumption will require good supply chain connections. Final goods production for global trade will require reliability, flexibility, and export access. Service industries will need rapid connection to other cities for their staff like high-speed rail or air transport. In all cases, local consumption will also require good trucking access to the urban core for rapid delivery, particularly with China expected to be the largest e-commerce nation by 2015 with an estimated RMB 3.3 trillion in activity (Bain & Company 2013).

To maximize their success, cities need to align their economic comparative advantage, land use, and transport planning. That will enable firms to be deeply knit within their supply chains. It will also allow for proper sizing of connectivity, ensuring accessibility but also avoiding either excessive connectivity to places of limited economic value or insufficient connectivity to rapidly expanding economic centers. The planning task is complex, given the rapid evolution in clusters and the multiple agencies involved at the city level, but is essential to developing coherent long-term strategies. Planning can make effective use of city-level data and user feedback to adjust dynamically. City leaders are well aware that integrated urban planning is essential for sustainability for both freight and passenger movement.

#### *Planning for urban mobility*

Urban mobility solutions are complex and need close tailoring to local circumstances. Size, urban form, topography, and climate all determine the needs of a city and vary markedly from city to city. Cities that have made significant progress in improving their sustainable mobility have done so through a mixed strategy involving careful attention to land use consideration; development of good quality and efficient public transport systems, a hierarchical street and transport network, and a safe infrastructure for bikes and

pedestrians; and, for midsize to large cities, the introduction of pricing schemes like parking charges or congestion charges to manage travel demand and reflect both external impacts and limitation in system capacity.

The European Commission encourages European cities above a certain size to develop urban mobility plans, aligned with their integrated urban development plans. To that end, cities can access an urban mobility portal (<http://www.eltis.org>) that provides a rich array of tools and case studies. Such practices have been applied systematically for a long time in countries like France where urban mobility plans (*Plan de Déplacements Urbains*) covering all modes became mandatory starting in 1996 for cities of more than 100,000. While the plans are context specific, they are developed in the policy framework set by law (box 2.11).

#### *Working at different jurisdictional scales*

Such planning needs to take place at the right scale. Many countries have moved to a metropolitan scale, because economic boundaries now frequently extend beyond administrative ones. In China, improved highways and high-speed rail lines are redefining the notion of effective metropolitan regions that can be reached within a one hour. With the largest Chinese urban regions rapidly spilling beyond their traditional boundaries, such coordination of policies, investments, and services is best addressed at a metropolitan level to improve their overall economic efficiency. Since accountability for providing transport infrastructure and public transport becomes blurred when the natural boundaries of a transport region include more than one autonomous agency (Gwilliam 2011), opportunities to provide more diverse and integrated services risk being lost without proper coordination.

While different definition exists, metropolitan regions are generally identified as large concentrations of population and economic activity that constitute functional economic areas, spanning multiple local government authorities. As part of this study, about 49 core metropolises were identified in China in 2010, defined as metropolitan

### BOX 2.11 Urban mobility plan in France

Urban mobility plans were introduced in France in 1982 by law (Law on Inner Transport) and became mandatory following the Law on Air and Rational Use of Energy in 1996. Their role was strengthened through the Law on Solidarity and Urban Renewals, which required the coordination of the plan with urban planning. An urban mobility plan should seek to ensure a sustainable balance between the mobility needs of people and the protection of health and environment.

It should cover improvement in safety, reduction in car traffic, development of public transport and non-motorized transport, efficient management and oper-

ation of urban road network through sharing of space across modes and traffic information sharing, on street and off street parking management, transport and delivery of goods, integrated tariffs and ticketing for mobility, and incentives to companies to facilitate public transport and carpooling for their employees.

The Urban Mobility Portal of the European Commission collects good practice case studies and shares them to help cities learn from one another. See, for example, the Urban Mobility Plan of Lille 2011: [http://www.eltis.org/index.php?id=13&study\\_id=3080](http://www.eltis.org/index.php?id=13&study_id=3080).

Source: French Laws ([legifrance.gouv.fr/](http://legifrance.gouv.fr/)); Wikipedia.

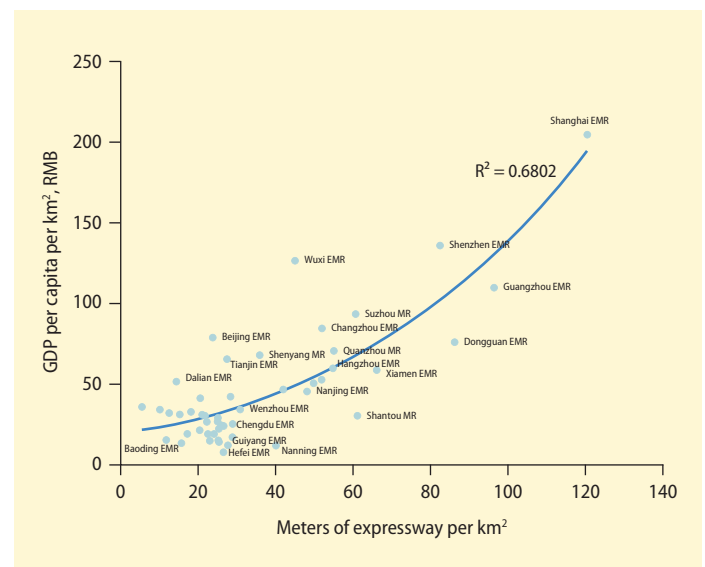
areas around cities with more than 1 million urban residents, where at least two-thirds of the population was urban (Chreod 2014). In 2010, these metropolises represented 45 percent of the total urban population, 57 percent of GDP, and 95 percent of population growth since 2000. Intrametropolitan connectivity appears to matter for most metropolitan regions, given the strong correlation between the stock of expressways and the highest productivity per land area (figure 2.14). Higher levels of connectivity appear to be allowing agglomeration economies to strongly manifest in these regions.

At the metropolitan scale, governments need to closely coordinate land use plans, infrastructure investments, and urban services. Political and economic competition among municipalities often impedes the coordination of planning, investment, and service provision across administrative boundaries. To address this challenge, cities, internationally, have started to combine land use and transportation planning under a single metropolitan entity charged with the development of a comprehensive plan. For example, the Chicago Metropolitan Agency for Planning was established in 2005 as a combination of the Metropolitan Planning Organization and the Northeastern Illinois Planning Commission. It now leads the implementation of

the “GO TO 2040” comprehensive regional plan, for Chicago and seven surrounding counties; the plan integrates transport with land use, housing, economic development, open space, and environmental and other quality of life needs.

At the urban scale, flexibility and responsiveness to changes and development of integrated solutions across government agencies

FIGURE 2.14 Economic density and stock of expressways, 2010



Source: Chreod 2014.



are needed. China has, in theory, a relatively rigorous urban planning process, but it is far looser in implementation. The actual planning process is often overwhelmed by the rapid pace of development. Approval of a master plan can take many years, by which time it already may be well out of date. In addition, the existing system of checks and balances is generally insufficient to ensure that master plans, when approved, are not arbitrarily modified by local government officials. Most master plans are not fully implemented within the time frame of the plan, which is usually 20 years. Practices at the city level are silo based; departments and agencies have varying missions, objectives, budgets, governance structures, and staff profiles; and these differences often hinder the types of cross-sector and interagency coordination needed for transit and land use integration.

*Articulating densities around mass transit and high speed rail*

The level of alignment of the mass transit system and road network with economic needs and land use directly affects the level of urban mobility requirements. Fragmented and single-use zoning development increases the need for connectivity. Easy and low-cost parking, low densities, and large streets encourage car traffic. Planning, when well done, can channel higher densities along high-capacity mass transit systems and around rail stations (box 2.12). Such increased concentration of activities and the resulting transport flows facilitate investments in transport infrastructure and walkable neighborhoods, resulting in more efficient mobility options.

Several opportunities exist to improve accessibility for essential services within the existing urban fabric through targeted increases in densities. To that end, planners should promote infill development that maximizes the use of existing infrastructure and services, including public transport, to encourage investment in the existing urban fabric. Planners should also direct growth to locations where it would support the provision of key community facilities such as schools and health facilities. An important tool that local governments have to direct

growth is their expenditures for capital improvements such as streets, parks, and schools. Linking those expenditures to a long-term strategic vision can be a powerful motivator for private investment consistent with the vision. That would include the development of a capital improvement program that specifies needed urban service improvements over time and identifies sources of funding.

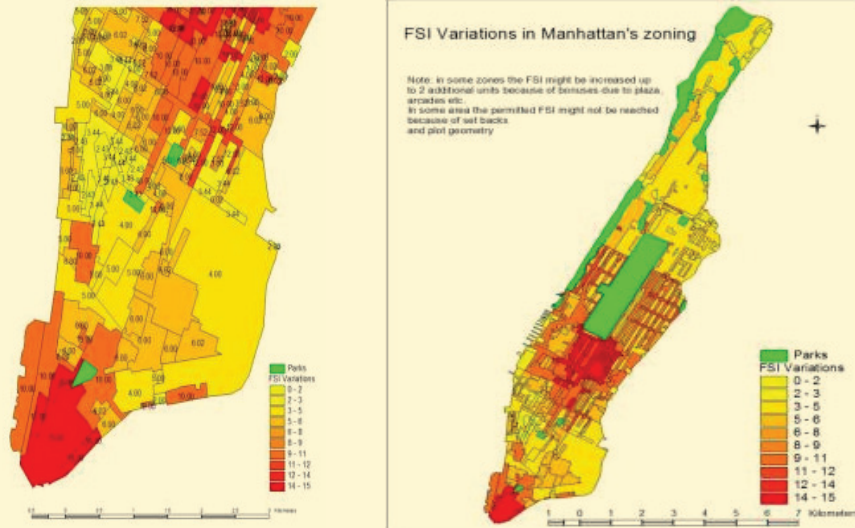
The evolution of the economy toward more services and innovation will lead to an intensification of exchanges and meetings among businesses in the service industry. The vast network of metro stations (an estimated 4,000 by 2020) and high-speed rail stations (about 180 currently) being built provides a unique opportunity to develop a highly interconnected and concentrated network of service firms at both the national and municipal scales. The transit-oriented development experiences in Hong Kong SAR, China; Japan; Korea; and Singapore have shown how the combination of real estate, a highly walkable environment, and mass transit solutions can lead to a transformation of the urban space (Calimente 2012; World Bank 2013c).

The precise value of such an integrated development would warrant a detailed analysis for all key stations, when submitting development plans. The development is likely to take place over long periods, and actual results will vary from station to station. A 500-meter radius around a typical metro station represents about 785,000 square meters of land and about 400,000 square meters for the train station (counting the space used by tracks and access and egress facilities). The potential for development depends on the function of the station, the floor area ratio (typically a ratio of 2 to 8 between the building floor area and the size of the land upon which it is built), existing development, the number of mass transit lines connecting to the station, and the business needs in each specific location. In a city like Nanchang, an order of magnitude for the gross floor area around a metro station is 2 million to 4 million square meters within 10 minutes walking distance, a percentage of which can typically be jointly developed with the construction of a station (Qu and others 2014).

### BOX 2.12 Increase flexibility and variation in floor area ratio (FAR) values as in cities like New York

New York has a wide range of variation in FAR values. The city spatial structure is one of the few monocentric cities in the United States, with two specialized central business districts (CBDs) in Manhattan. Thirty percent of trips are made by transit (60 percent in Manhattan). New York has the longest

metro network in the world. The FAR range of variation is 15 in CBDs and 10 along main avenues (left map). The residential Floor Space Index (FSI) varies from 0.6 in the suburbs to 10 in Manhattan next to CBDs (right panel).



Source: New York Planning Department 2011.

Success in transit-oriented development requires flexibility in the application of laws and regulations and close cooperation between the local government and the developer. In particular, government policies, land laws, and planning laws need to be well aligned. The combination of rail plus property development with little to no financial support from the city gives strong incentives to the developer to deliver high value. In Hong Kong SAR, China, the Mass Transit Railway (MTR) company gets involved early in urban planning to ensure that joint rail and urban development proposals are integrated in a sustainable manner. The preliminary planning studies for plots along the rail can be discussed jointly with the Planning Department and lead to the preparation of a master layout plan for the development

of these plots with application to the Town Planning Board for approval. Arrangements through detailed regulatory and design guidelines for real estate development, as in Singapore, offer another option.

#### *Accompanying measures*

Transit-oriented development needs to be complemented by close attention to the space allocated for pedestrians and bicycles compared with the space dedicated to cars in areas near stations. Cities like Paris, Seoul, and London have started to reduce the space for cars in their street landscape. They have converted former urban highways into pedestrian roads, and turned thoroughways into slow local roads. These conversions emphasize that driving and parking a private car is

a personal choice, not a basic civil right, and that the urban space needs to be shared.

In parallel, the management of travel demand can play a large role in reducing the roles of cars, as outlined in the Green Urbanization report. Regardless of the urban mobility capacity developed, traffic fluctuates widely by time of the day and day of the week. Attempts at accommodating peak motor traffic result in oversized and inefficient road networks. Cities like London, Paris, and Singapore have made owning and using a car an expensive choice, compared with using a well-performing public transport alternative. The use of higher pricing during peak demand periods has enabled cities to encourage a spreading of demand before and after such peak.

#### *Actions to connect people*

Considering the above, several follow-up actions would support China in meeting its connectivity goals:

- Set up Metropolitan Planning Offices for a number of pilot regions, with a mandate to optimize their land use and transport planning.
- Require cities, when submitting mass transit network plans for national approval, to provide land use plans demonstrating that densities are strategically distributed across a metropolitan area to match the availability of mass transit corridors and stations, with urban design facilitating access by bikes or walkers around these stations. The approved plan should be made public.
- Select, with cities, a number of promising metro stations and high-speed rail stations to implement transit-oriented development concepts in practice. Those pilots would include a variety of typical sites like mega-hubs, mass transit intersections, and various kind of stations. The implementation would be focused on understanding any legal and regulatory aspects that need to be addressed to bring the highest potential integration and redevelopment value, building on the rich experience of countries like Japan, Korea, and Singapore.

#### *Moving freight*

Intercity connectivity improvements are expected to be further pursued as part of the 12th and 13th Five-Year Plans and subsector plans, linking by 2030 all major cities of at least 500,000 inhabitants to express rail services and all cities of more than 200,000 inhabitants to expressways.<sup>10</sup> The 12th Five-Year Plan anticipates an investment of RMB 8.2 trillion (\$1.3 trillion) to upgrade the country's intercity transport (including rail). Road construction accounts for the main portion of the investment, followed by railways and inland transport. The strategies in place seek to address major network gaps by 2020–30 so that supply slightly surpasses demand and meets economic and social needs, through comprehensive transport planning and close integration. Such investments will put China in a competitive position compared with other large developed countries.

China can build on a number of proven strategies to avoid or reduce the need for road freight transport by shifting road freight to more energy-efficient and environmentally friendly modes like intermodal, rail, and inland waterway transport, and by improving the efficiency of vehicles through technology or management. Improved logistics for road freight include the use of articulated trucks (“drop-and-hook”); increased loading on return trips; better matching of vehicle capacities to loads; and increased use of logistics information platforms, consortia between freight companies, and freight consolidation centers. Ample international best practices exist on which China could build.

This approach can be combined with long-term policies requiring urban logistics to use vehicles with low environmental impact for the final urban delivery, similar to the ambitious goals for interurban and urban freight logistics set in other countries and regions. The European Commission, for example, aims to achieve essentially zero-emission transport in major urban centers by 2030 (box 2.13).

Such goals are worthwhile pursuing because they guide logistics providers in their investments. In the European Union, the main

**BOX 2.13 European Commission zero emission urban logistics**

In its 2011 White Paper “Roadmap to a Single European Transport Area: Towards a Competitive and Resource Efficient Transport System,” the European Commission laid out an ambitious agenda for freight mobility in Europe, in response to growing concerns over environment and economic efficiency issues. In particular it seeks to stimulate new transport patterns concentrating freight and passenger flows to enable more efficient connectivity drawing on a combination of transport modes. The plan will require structural changes to ensure that rail and river transport gain a greater proportion of mid- to long-distance freight.

The commission paper emphasizes the need to organize the interface between long-distance and last-mile freight transport more efficiently, by limiting individual deliveries, the most inefficient part of the journey to the shortest possible route. It anticipates that, with an intelligent transport system and real time traffic management, delivery time can be shortened and congestion reduced for last-mile distribution. This distribution could be performed by low-emission and potentially silent urban trucks (electric/hybrid) to allow a greater portion of freight delivery to take place at night.

*Source:* European Commission 2011.

policy thrust is to shift 30 percent of long-distance road freight (over 300 kilometers) to other modes such as rail or waterborne transport by 2030, and more than 50 percent by 2050, facilitated by efficient and green freight corridors, appropriate infrastructure, and a European multimodal transport information, management, and payment system.

Choices in allocations of investments across the different modes strongly influence choices by shippers. The shift in market share over the past 10 years in China to freight road traffic reflects in part higher levels of service quality compared with rail or river transport but also the greatly enhanced road network, while the railway and river networks remained too heavily congested for time-sensitive cargo. Rail container traffic accounts for only 1.1 percent of port traffic, for example, because most containers leave ports by truck.

Internationally, shippers have shown great responsiveness to the cost and quality of alternative services, when active market-based competition leads to the development of new services. Such experience is particularly relevant in the context of the shift of industrial activities to central and western China, which will require low-cost and efficient transport for manufactured goods to be price competitive. For example, in the United

States, the number of containers and trailers transported by rail has doubled since 1990 to 12.3 million units (half of it is for global trade) and now accounts for 22.7 percent of revenue for the major railways.

The challenge in improving freight logistics is to move from policy guidance to actual implementation. Logistics by nature involves many agencies with conflicting mandates. The solutions are quite technical, and the topic is seldom a high priority compared with passenger transport. China is no different, with responsibility split among 13 ministries and until recently a separate ministry of railways. Funds for river transport and interconnections have been limited. Policies, while suitable in content, are not legally binding and lack detailed measures and timetables for implementation. That has delayed the implementation in practice of many of the solutions being piloted, such as full trailer trucks, which despite their promotion are still prohibited on highways; a lack of standardization of drop-and-hook solutions means they are still unattractive investments for the market, and there are still gaps in intermodal transport facilities planning.

While the public sector plays a valuable role in setting the enabling environment for logistics, by nature, logistics is a private venture. The solutions proposed will work

only if they are commercially attractive. To that end, reaching a critical volume of cargo flow rapidly is a strong imperative, because it determines the service level that can be offered. The case of freight consolidation centers illustrates the challenge. While it is conceptually attractive to aggregate intercity freight before it is distributed to the various urban areas, very few consolidation centers have succeeded in practice, particularly when run by the public sector. Those that have succeeded have often been set up by large retailers that have extended their control back along the supply chain, generating economies of scale. The impact of publicly funded distribution centers at a metropolitan level needs careful review to avoid undermining the success of such market-driven initiatives.

Considering the above, several follow-up actions would support China in meeting its freight connectivity goals:

- Accelerate the development of the inland waterway system, freight railways, and their interconnections (ports) to ensure that these networks have sufficient capacity to carry time-sensitive goods.
- Improve agency cooperation through the existing Steering Committee under the China Green Freight Initiative (led by the Ministry of Transport), and engage more broadly with the private sector through associations like the China Road Transport Association, the China Communications and Transportation Association, and the Green Freight Asian Network, to understand the sector needs and status and to ensure better tailoring of policies.
- Revisit the current practice of having consolidation centers built and operated by the

government and encourage large-scale distributors to play such role.

- Consider the redevelopment of underused but well-connected industrial zones into urban logistics centers.
- Consider introducing market competition for the provision of rail container traffic by an international shipping line to accelerate innovation and service improvement and introduce modern technology.
- Accelerate the setting of standards to facilitate the introduction of modern logistics practices, in particular intermodal transport and urban distribution.

## Financing China's cities

With China's political and fiscal decentralization process, local governments have become increasingly responsible for financing public services. That has imposed a great challenge to cities and towns because transfers from the central and provincial governments account for only 2 percent of the total public investment budget in cities and only about 10 percent in county towns (table 2.5). As a result, local governments have to raise the majority of the local revenues, and with limited available resources, they rely heavily on land conversion and concession revenues to support investment needs.

The strong urban planning framework in China, together with increased land revenues played an important role in promoting China's urbanization, industrialization, and economic growth by financing better infrastructure standards and services and securing the provision of necessary public goods. Compared with most countries, China has done remarkably well in managing the rapid urbanization process and providing the infrastructure investments necessary to keep pace with the population growth. All four indicators of urban infrastructure increased over time in both cities and county towns (table 2.6). The level of urban infrastructure, however, has been higher in cities than in county towns.

The level of wastewater treatment coverage in particular shows exceptional growth since 2001 in cities and especially in county towns. This strong growth in environmental infrastructure is a reflection of increasing

**TABLE 2.5 Sources of fiscal revenues for financing investment in public service facilities, 2011**

Percent

	Cities	County towns	Separate towns
Central government	1	7	6
Provincial government	1	3	10
City (county) government	95	85	32
Town government	0	5	52
Other sources	2	0	0
RMB million	1,178,172	262,408	79,910

Source: China Urban-Rural Construction Statistical Yearbook 2011.



**TABLE 2.6 Provision of basic infrastructure services in urban areas**

	1990	1995	2000	2005	2010
Water coverage rate (%)	48.0	58.7	63.9	91.1	96.7
Wastewater coverage rate (%)	14.9	19.7	34.3	52.0	82.3
Road surface per capita (m <sup>2</sup> /person)	3.1	4.4	6.1	10.9	13.2
Urban population with access to natural gas (%)	19.1	34.3	45.4	82.1	92.0

Source: China Urban-Rural Construction Statistical Yearbook 2011.

environmental consciousness that has recently focused more attention on sewage treatment plants and industrial wastewater treatment. By the end of 2011, close to 1,600 wastewater plants treated 33.8 billion cubic meters of wastewater, or about 84 percent of all wastewater. There are still urban-rural gaps, but the gap is slowly closing, with wastewater coverage reaching 84 percent in cities compared with 70 percent in county towns.<sup>11</sup> The percentage of separate towns (that is, towns not connected to the facilities of cities or county towns) with industrial wastewater treatment plants or facilities is less than 55 percent compared with 90 percent in cities and over 60 percent in county towns.<sup>12</sup>

How do China's cities sustainably bridge the gap between readily available resources and investment needs? What sources should they tap? A good place to start would be to coordinate urban financing with urban planning. Next, Chinese cities need to move away from their reliance on land sales and leases and move toward a sustainable property tax system and trading of development rights. Third, cities can strategically redevelop existing urban areas to generate financing for infrastructure and other durable structures.

### **Synchronizing planning and financing of cities to encourage densification**

Relying primarily on quantity regulations, municipal governments have rapidly urbanized land and developed industrial estates and new towns, often in excess of need to demonstrate economic development and to generate revenues locally. The national government has actually passed regulations to protect agricultural land and control overconversion of rural land, but these have produced unintended consequences—a fragmented urban

periphery as growth leapfrogs over protected areas, weakened coordination of land use with public transportation, and reduced incentives to intensify land use within the city. The fragmentation of built-up areas at the urban fringe has become worse since the early 1990s (World Bank 2008).

City planning has not been coordinated with available financing, a situation that has had considerable bearing on the increasing inefficiency in capital allocation. Urban master plans are made for a horizon of 25 years, while capital investment planning covers a horizon of 5 years. Land use planning is done every year, with limited or no consultation with other planning units. Now consider fiscal decentralization, which gave city governments functional and fiscal responsibilities for urban development (economic development and employment, in addition to more traditional responsibilities for the provision and management of a municipality) without providing much leeway to generate their own revenues. Without a sustainable financing mechanism and with a growing imbalance between fiscal power and expenditure needs, the municipal financing system is unsustainable (Wu 2013). Local governments also require a balanced budget and are not allowed to borrow, except under highly restrictive conditions.

The lack of sustainable financing mechanisms does more than simply constrain China's cities financially. Overdependence on land revenue has created rapid urban expansion and fragmented land use. After more than a decade of rapid growth in off-budget financing for urban development, cities need to move toward more sustainable and forward-looking municipal finance mechanisms. To support this move, the national and city governments need to reform policies on two fronts.



First, they need to refine the timing of various plans so that development and land use planning are synchronized. In the absence of sufficient funds, the local governments can coordinate and adjust plans accordingly as a package rather than piecemeal. Second, local governments should be provided with more options to raise revenues locally and should rely on recurring revenues that enable long-term planning, such as property taxes, a value added tax (VAT), tariffs on services, and eventually access to borrowing and issuing bonds.

A well-designed property tax system and other innovative land financing mechanisms also can mitigate overdependence on land concession revenues. The diaspora bond market, a stable and cheap source of external finance, can create an alternative source of financing. It is often used when countries have limited access to international capital markets. India and Israel have each raised more than \$35 billion by tapping into the wealth of their diaspora communities. For diaspora investors, these bonds offer the opportunity to help their country of origin while also providing an investment opportunity (Ketkar and Ratha 2010). In addition, any investment will be under the watchful eyes of the investors, and investment will also be efficient, based on market demands.

### **Property taxes to encourage redevelopment and increase revenues**

In many countries, property taxes have become the predominant source of revenue for local governments. In addition, property taxes allow cities to recoup the increases in land value that result from development and provide a very good alternative source of funding for land sales or development rights. In advanced economies, property taxes account for up to 70 percent of the revenues generated by local governments. Property tax revenues increase together with land values as a result of investments and improvements in infrastructure, amenities, and overall development of the area. As such, property taxes are a very good proxy for the benefits taxpayers receive from local services provided by local governments.

Property taxes reduce distortion in land markets and stimulate more efficient use of land. An important benefit of a property tax is the incentive it creates to develop underdeveloped or vacant land, thus increasing land transactions. In the 1980s, low property tax rates in Japan provided incentives to own land rather than other assets (stocks or security) but not to develop that land; increasing the property tax was an effective instrument to control ownership of unused land and hikes of property prices (OECD-CDRF 2010). Property taxes could have a similar effect in China, helping to contain sprawl and to create incentives for developing vacant land or redeveloping land toward more efficient and productive uses. They also could entice homeowners to rent their vacant properties to collect the revenues needed to pay taxes.

The correction of distortions in land pricing would help limit overallocation at the urban periphery. Most studies of land use in China have recommended reduced distortions and greater transparency in the pricing of land use rights to increase both equity and land use efficiency. As is common in most countries, land use plans will continue to dictate the conversion of rural land and the use of urban construction land. Private developers should be able to bid competitively for all land, and information on the transactions and value should be made available to the public. Land subdivision regulations should assign costs more clearly to developers, municipalities, and higher levels of government for various levels of infrastructure. With more transparent systems and a competitive market, land on the periphery would become more expensive, making its use more efficient and higher in quality. Reducing distorted incentives by pricing serviced peripheral land at market rates would go a long way to obviate the need for land conversion quotas. Limiting developers to serviced land and use of subdivision regulations to make them pay for services (a standard planning practice in market economies) would reduce the amount of land being developed.

Land value capture mechanisms should replace land leases to finance infrastructure

development. Experiences in cities like Hong Kong SAR, China, and Tokyo show that “capture value”—an infrastructure financing concept that seeks to capture land value created by new infrastructure, particularly transit—is effective not only for sustainable finance but also for more efficient and sustainable urban development. Value capture is particularly well suited for financing transit infrastructure in dense, congested settings, where a high premium is placed on accessibility and where the institutional capacity exists to administer the program. Accessibility benefits, which get capitalized into land values, present enormous opportunities for recapturing some of the value created by transit investment.

While China has experimented with some level of property taxes, issues arise because the fundamental ownership rights legally belong to the state. In a practical sense, however, long-term land use rights are traded as an alternative for ownership rights. It would be possible to tax this “land use right.” Because there is currently no property tax in China, real property assets have an advantage compared with other assets, which neither encourages owner to develop their land nor reduces the incentives for speculation and land banking. Introduction of a property tax in urban areas would reduce these distortions.

In addition to raising revenue, different financing instruments can contribute to more compact urban development. To finance infrastructure, local governments in developed countries apply an array of instruments, including tax increment financing, impact fees, development charges, land conversion fees, and related instruments. All these instruments use current, or anticipated future increases in, land value to finance infrastructure in the area to be developed. Taxing vacant land more, for example, especially in urbanized areas, can promote densification. Property owners should pay the full costs of developing land on the outskirts of the city, including being charged appropriately for access to infrastructure networks.

Development impact fees can direct development toward areas already served by infrastructures. Development impact fees are one

of several types of fees levied on developers requiring them to contribute land, facilities, or funding to help pay for off-site capital improvements. The main purpose of impact fees is to help finance off-site impacts and infrastructure costs of development, but they also can be used to encourage more efficient development patterns. Cities can discourage development through higher impact fees in areas without infrastructure and encourage development through lower fees in areas already served by public facilities (Nelson and Duncan 1995).

Incentives for infill and brownfield redevelopment can facilitate the reuse of industrial lots in cities. Incentives for developers can encourage high-density urban development in city centers, but this development must still respond to demand. On the one hand, redevelopers face many barriers, including high land prices, limitations on land use, and the costs of demolishing and cleaning up existing facilities. On the other hand, brownfield redevelopment offers many benefits, such as urban revitalization, increased asset value of the site and its surroundings, increased tax base, increased employment, environmental protection, effective use of existing infrastructure, and prevention of urban sprawl.

A split-rate or two-rate property tax is another approach that promotes infill and redevelopment in urban areas. Under such a system, a higher tax rate is applied to land values and a lower rate for improvement values such as buildings. This reduces the tax burden on land-intensive uses (such as apartment buildings) and increases the tax burden on land-extensive uses. A split-rate property tax would provide the incentive of lower taxes for capital investment in building improvements and tax away the speculative value of holding undeveloped property within the urban growth area, thus promoting infill and redevelopment. Experience in several communities in Pennsylvania indicates that a split-rate property tax can be an effective tool to stimulate central city revitalization (Hartzok 1997) (box 2.14). Similar taxes have also been implemented in Sydney; Hong Kong SAR, China; and cities in Denmark and Finland.

### BOX 2.14 Split-rate property taxes in Pittsburgh

The city of Pittsburgh in Pennsylvania state adopted a split-rate tax system 100 year ago in 1913, where it taxed vacant land owners twice the rate it taxed owners of developed property. In 1979, the city expanded the system, and it now taxes vacant landowners a whopping six times more than its taxes owners of developed property.

The result is that Pittsburgh has a more compact development pattern than many cities because its tax policy discouraged leapfrog development. Instead of hurting the economy, the split-rate tax system has encouraged development: Pittsburgh had a 70.4 percent increase in building permits in the decade after expanding its split-rate tax system.

### Innovative finance mechanisms to foster infill development

Traditional instruments of finance to support densification and redevelopment such as the property tax and user charges can be complemented with more innovative instruments such as betterment fees, where the capital investment costs associated with given infrastructure improvements are recovered from those benefiting from the improvements. This system is widely used in Colombian cities. Another option widely used in U.S. cities is tax-increment financing, where local

governments borrow against the future anticipated increase in property taxes that result from certain types of urban infrastructure improvements.

Another innovative approach is providing development rights—based instruments such as the sale or auction of development rights—the Certificates of Additional Construction Potential (CEPACs) widely used in urban operations in São Paulo, Brazil, are an example (box 2.15). These certificates allow the construction of additional floor(s) above the current codes in designated areas in return for a payment to a general fund

### BOX 2.15 Auctioning of land development rights: CEPACs in São Paulo, Brazil

Traditionally, prevailing densities in São Paulo Municipality have been uniformly low, with the floor area ratio in the city's master plan ranging from 1.5 to 2.5—meaning for any given land parcel, the maximum permissible built area ranged between 1.5 and 2.5 times the plot area. Such artificially low densities for a city with the land market and demand characteristics of São Paulo had several consequences, including high land prices, sprawl and serious congestion, and the prevalence of underused or underdeveloped properties in desirable areas.

To increase the density within specified areas, São Paulo Municipality issues tradable certificates (called certificates of additional development potential, or CEPACs), which are sold in phases through electronic auctions. Developers use the CEPACs to redevelop an existing property to its higher density potential or change the land use to another permissible use. Usually, developers acquire the property

they are interested in redeveloping and then apply for a building permit accompanied and the appropriate number of CEPACs to redevelop the property in question to its new development potential and land use. The proceeds from the sale of the CEPACs are used for infrastructure improvements required to sustain the increased development density in the area. Overall, CEPACs generate as much as \$200 million a year for infrastructure improvements, roughly equivalent to 11 percent of the annual property tax revenues in 2009 (Sandroni 2010).

CEPACs are useful in that they enable local governments to recover up-front the funds they need to finance urban infrastructure improvements in the given location where the development rights are sold. The phased sale of CEPACs and the use of an auction as the disposition method allow local governments to gauge the market and assess the extent to which the market supports densification.

for infrastructure improvement in the city. Another option is an impact fee, where issuance of a building permit for certain land uses or developments likely to generate an additional negative impact on the city—usually congestion—are made conditional on payment of a fee to finance the infrastructure improvements needed to offset the adverse impact. Impact fees are used in cities as diverse as São Paulo and San Francisco). New York City has used a similar system, which provides additional building space in return for a developer-financed infrastructure improvement; the fees have raised revenues to finance 3.5 million square feet of public spaces, arcades, and façade improvements in the city.

## Key actions moving forward

### Urban planning and the role of stakeholders

Urban planning in market economies differs greatly from urban planning in centrally planned economies. In market economies, successful urban master plans leverage market forces to support strategic objectives for socioeconomic development. The city uses master plans to regulate land use. Because the value of a piece of land is determined by both its location and its land use, master plans enable the private sector to fairly price land by providing clarity on permissible uses. The private sector buys, sells, and uses the land in accordance with the permissible use.

As China increases the role of market forces in shaping development, urban planning will continue to be an important tool to guide development and create more efficient and sustainable cities, but the role of various stakeholders will have to change to allow more flexibility and market intervention (table 2.7). Instead of leading development, the government should play a regulatory role to ensure minimum standards and encourage competitive allocation of land among different developers, including industrial developers, to optimize land use and encourage the most productive use of land. Urban planning should be done at the lowest level, empowering local governments, which can make

strategic decisions, but the plans should make strategic links with regional development and investment plans.

Local governments should become more active players in the process, promoting a continuous dialogue among all stakeholders on the best solutions to make cities competitive as well as attractive locations for people and investment. Developers and citizens should also become more active players in the urban planning process. The private sector should be able to purchase land in an environment of clarity of rights, develop it according to demand, and then trade it freely. Market demand is critical to this process. In the current system, planners focused on defining land use in isolation often become pure designers, applying abstract predefined schemes to a spatial plan.

Urban planners should have a city management approach and define smart regulations, focused on a few parameters that leave room for the natural evolution of cities. Interacting with other experts, they can forecast market dynamics within a reasonable time horizon, usually not more than 10 years. Urban planners should also develop innovative tools to assess environmental constraints to development and potential risks, and introduce economic instruments to guide development and leverage land value more efficiently to provide infrastructure. In that sense, land in peri-urban areas still should be regulated carefully, but developers should be able to purchase land use rights and develop land that has been allocated for urban use at the fringe in a more competitive process.

### Relax control and increase flexibility, accountability, and transparency

Comprehensive land use planning (the master plan) has been an effective tool used in many countries to control disordered conversion of rural into urban land. A comprehensive plan is largely a policy statement of the future land use and development goals. It serves primarily to mitigate conflicts between different land uses and helps coordinate transport development with housing, recreational, and commercial activities. The 1947 Finger plan of Copenhagen epitomizes such an approach,

**TABLE 2.7** Role of different agencies and stakeholders

	Current planning system	Modern planning system
Vision	Urban planning is an end, a tool to achieve a layout, making concrete a crystallized image of the cities that planners have in mind.	Urban planning is a means, a tool to help cities perform “functions,” having long-term objectives of urban sustainability in mind, while ensuring flexibility and allowing change.
Methodology	Urban planning is a top-down and ad hoc exercise, managed at the government level with little interaction with other stakeholders and consideration for actual demand and processes to permit changes over time.	Urban planning has a bottom-up approach; it is a dynamic process mainly driven at city level, aimed at connecting and financing cities for socioeconomic development and ensuring basic quality of life and environment.
Land	Land is a free resource, without value, to be owned only by the public sector and leased to others under very strict land use controls that are primarily supply driven.	Land should be seen as a limited, valuable resource, to be owned, developed, and used by a multiplicity of actors, depending on demand, with the public sector acting as a regulator. With a market approach, land is allowed to be traded freely and transparently. Property rights are guaranteed, and transaction costs within land markets are kept within acceptable limits.
Results	Cities easily become locked into outdated patterns with, for example, high percentages of industrial and underdeveloped land in prime locations because changes in land use, floor area ratios, and ownership are very bureaucratic and therefore discouraged.	Cities should be considered from an evolutionary perspective, leaving strategic choices for their future open. Rather than prescribing and locking the city into a certain image to be achieved, urban planning encourages exploring innovative solutions, including those to finance interventions at a scale larger than individual plots.
Urban plan features	Plans include detailed drawings to be implemented over time, accompanied by volumes of regulations. Since planning is conceived as a gigantic, once-and-forever exercise that is approved at the highest level of government, plans are not easy to update or adjusted to meet evolving needs and improvements in infrastructure and accessibility.	Planning tools are sophisticated and dynamic. There is usually a higher-level planning, aiming at ensuring rights of way for future infrastructure and maintaining what are defined “land invariables,” that is, rivers, natural resources, and conservation areas. In addition, a lower, more flexible level of planning addresses land subject to development, for housing, retail, industries, and agriculture. While the former layer is usually less subject to change, as invariables do not vary overtime, the latter layer can be more easily updated, giving the option of adjusting plans to the evolving needs and development of the city.

Source: Based on a contribution by Ellen Hamilton, World Bank.

because it combines land use regulation and transit-oriented zoning. The plan sought to control sprawl and maintain a compact urban form through a principle of accessibility. The general idea was that large office workplaces would generally be located within 600 meters of the closest public transportation station. China should continue to control suburban development by comprehensive land use planning but should consider these reforms:

- Regulating the conversion of rural to urban land at the national and provincial levels, but allowing for direct transaction between private developers and collective owners.
- Delegating authority to municipalities for city planning and land use control plans.
- Requiring a more detailed fine-grain planning at the plot level instead of superblock or higher level. Mixed-use zoning should be applied more widely.
- Improving coordination between transport and land use plans and intensifying land use based on access and capacity of transport systems (giving priority to public transport).
- Strengthening strategic and regional development plans beyond the administrative boundary of a single municipality, to which a city plan should conform.
- Emphasizing governance in the planning process, as a consensus-building mechanism between levels of governments, and involving the public in the process.



- Including a more detailed and long-term financing plan based on revenues from government, the private sector, and income and other revenue generated by the delivery of infrastructure services

The land conversion within a municipality should prioritize conversion within urban growth boundaries and along growth corridors. The fragmentation of the urban fringe leaves patches of farmland served by expensive infrastructure networks while development leapfrogs beyond the built-up edge. Infrastructure and transportation routes should guide development and reinforce growth vectors with infrastructure delivery being given priority in nodes (such as suburban subcenters).

Land use policy is an important facet of strategic planning that requires continual adjustment to market forces and their impact on land. Ignoring market forces in land development projects includes, for example, not considering the annual effective demand for housing or the competitive supply of housing in local markets. Without this assessment, governments tend to convert far too much land than is warranted by market conditions. To adequately measure urban land development, cities should keep data on the number of housing units built in the past year, land and housing prices, rents for office buildings and factories, infrastructure deployment patterns, land subdivision patterns, and so on. Without this information, the private sector, in turn, may overbuild in markets that do not have an appropriate demand.

A more comprehensive approach to metropolitan planning would use FAR variations as part of a strategic spatial strategy consistent with consumer demand for accessibility and efficient functioning (high ridership with financial viability) of the mass transport network. The planning and development of specific corridors would need a long-term horizon, setting land uses and building densities today with a view to future use. Along with public transit improvements, corridors could be assigned higher development intensities. To support the growth of strategic corridors with sufficient developable land, local governments could channel land conversion

quotas to these areas by allowing transfer of land conversion quotas from slower-growing counties outside the corridors.

The FAR regulation could be used by municipalities to channel growth to desired locations and enable the emergence of high-density nodes. By using FAR regulations to discriminate between land with different location premiums, municipalities can create the variations in the value of land that would encourage efficient use. Thus, locations in the proximity of mass transit stations can be allowed higher FAR values to encourage densification.

Citywide zoning maps should show the allowed FAR variations by zone to provide accurate valuation guides to developers. In cities with functioning land markets, FAR values are closely linked to local demand for floor space, being higher where demand is higher. In turn, higher demand will result in higher land prices, which act as the signals that drive efficient land use. In China, urban master plans need to show FAR values to enable developers to compare the value of different locations. Currently, FAR values are specified only at the individual block level rather than as part of the publicly available master plan documentation, and there seems to be no explicit spatial strategy to guide the FAR values used in the detailed plans.

### **Strengthen market forces to create livable and diverse cities**

Government policies should be size neutral and not favor specific regions. The changes in the distribution of city sizes in China are the beginning of an expected concentration that happens as part of the urbanization process and is observable everywhere in the world. During the next 20 years, this concentration is likely to increase further as China reaches an urbanization rate of 75 percent or higher. Countries like Japan and the United States have achieved a high level of urbanization and economic growth with reasonable levels of concentration, while Korea has done the same with high levels of scaling and concentration of its urban system. The challenge for China during the next 20 years will be to support



### BOX 2.16 Planning and management to reduce risks from natural disasters

Climate change will aggravate existing risks in coastal cities. China is home to two of the world's 10 most vulnerable cities in terms of number of people exposed to coastal flooding: Guangzhou and Shanghai. Natural disaster risk management needs to become an integral part of urban planning and management, since disasters are frequently the consequence of poor planning and management. Three aspects are particularly important. First, hazard proofing new urban infrastructure should be standard procedure, but it is frequently ignored. The incremental costs are often marginal and could be easily integrated into the designs. Hazard proofing includes implementing structural engineering standards for public buildings, but also sizing of drainage systems for peak events, or developing steeply sloped land without increasing the probability of landslides.

Second, maintenance of infrastructure and good basic service provision reduce the severity of hazard events and prevent further indirect damages.<sup>a</sup> In many cities, especially smaller ones, public services such as water, sanitation, sewerage, lighting, and health services are not adequate, affecting household welfare, converting everyday hazards into disasters (Bull-Kamanga and others, 2003). For instance, where drainage networks are poorly maintained, even moderate floods can cause deaths from waterborne diseases and cross contamination between water and sewer lines. Roads on steep terrain that are not kept in good condition can increase erosion and landslide risk. These “institutional” efforts of achieving mini-

mum standards in service delivery should form the bedrock of hazard risk reduction strategies.

Third, urban master plans, in particular zoning, need to prohibit settlement in the most hazardous areas. As cities are rapidly expanding and their economies are growing, it is paramount that these plans incorporate assessment of natural hazards to avoid costly disasters in the future. A recent study in the Yangtze River Delta shows that cities that maintain a high degree of compliance with master plan measures, in particular with preservation zoning, had a smaller amount of urban land located in high-risk zones (Saehoon and Rowe 2013). In addition, special attention should be given to the more vulnerable poor people and towns that are often disproportionately exposed to higher risks. While enforcement of zoning laws may limit development in hazardous locations, it can cut poor people off from labor market opportunities by forcing them onto cheaper land far from the city center.

Public policies should facilitate the development of market-based instruments for better managing disaster risk, provide the right regulatory environment, and selectively intervene where clearly defined social and environmental externalities exist. Common institutions that allocate property rights, manage land use, monitor zoning compliance, and disseminate credible information on hazard risk are fundamental building blocks for balancing gains from economic density with risk from natural hazards.

*Source:* Based on Lall and Deichmann 2009.

a. The poor record on infrastructure maintenance has been highlighted by Estache and Fay 2007, among many others. At 4 percent of GDP, estimates of required maintenance expenditures equal those required for new infrastructure investment.

the pursuit of a concentration pattern while articulating density with transport systems within metropolitan regions. Cities should avoid fragmented development and sprawl and improve connectivity between cities so that the agglomeration economies will benefit all types and sizes of cities. Medium and small cities can support and benefit from the economies and markets of nearby large cities.

The pricing of land use rights needs to be less distorted and more transparent. The pricing system could be reformed along the

following lines: First, urban land use rights for the development of industrial, commercial, and residential areas should be allocated through a competitive bidding process, and the subsidized pricing of industrial land should be completely abandoned. Second, land subdivision regulations should clearly assign costs for various levels of infrastructure to developers, municipalities, and higher levels of government. Third, agriculture land needs to be priced based on its economic value so that displaced farmers receive higher

compensation, making development on the periphery more expensive, and thus more efficient in land use terms and higher in quality. Adjusting the current pricing of agricultural land for conversion into urban land to more closely reflect market prices, combined with an increase in FARs, would certainly increase the economic efficiency of urban land. That would be preferable to the current land conversion quotas, which cause spatial distortions in the development of Chinese cities.

Reducing the size of city blocks and urban plots would allow more potential buyers to participate in the process and increase the number of land transactions (and revenue) over time. The substitution between land and capital inputs is restricted by the predetermined and inflexible floor area ratios as well as by the fact that land prices are linearly correlated with the floor area ratio.

Revise the existing urban planning codes and infrastructure standards to ensure they more demand driven and service oriented. Redefine official norms, building codes, and urban planning codes and revise technical standards for urban road and other infrastructure planning to allow for more flexible and demand-based designs and avoid oversizing of infrastructure. The urban street codes need to be immediately revised based on function and hierarchy of streets within urban fabric.

Update the urban planning process. China would benefit from a major review of its urban planning systems. Such a review would facilitate the move to more efficient land use. The misalignment of Chengdu's planning with on-the-ground outcomes in the 1990s was a reflection of this failure to undertake urban land use planning based on a full awareness of the demographics, urban economic function, market forces, and major planned public investments. Recent research by the Urban Planning Society of China reveals that the urban planning certification and continuing education system has weaknesses and is not providing the necessary knowledge base to address rapid urban growth.

Creating a land use right transfer system that allows rapid growing cities with high demand for land to purchase land use rights of surplus urban construction land in

underdeveloped urban expansion areas might help reallocate urban construction land at the national and regional level more efficiently. It also offers an opportunity for urban construction to be returned to rural land use.

City clusters could be fostered by improving connectivity and regional coordination. Coordination mechanisms or regional authorities at the metropolitan level could be created to increase the efficiency of public service delivery in critical areas such as public and mass transportation, water and sanitation, waste management and housing. Managing scarce regional water resources and building energy- and cost-efficient waste systems will similarly require more cooperation among county, district, and sometimes municipal governments. The challenge for Chinese cities will be to facilitate such cooperation across sectors and jurisdictional boundaries without significantly compromising the strong culture of implementation that has been at the core of economic development in the past three decades. Often in China, the best solutions will likely be local, involving context-sensitive and pragmatic answers to particular issues, rather than wholesale changes in approach. It will be important to identify such solutions as they emerge and find ways of mainstreaming them across cities.

Investments should continue in regional transport infrastructure (such as highways, railways, and other transport systems) to improve connectivity and the flow of capital, goods, people, and services. Regional economic development plans should be developed, and local plans be required to link to them. Pricing mechanisms should be introduced to address critical environmental resource constraints (water, air, land) at the regional level.

Metropolitan land use and transportation planning should be integrated and employment and residential patterns aligned accordingly. Municipal governments need incentives to stop treating cities as pools of state-owned assets (especially land) that need to be monetized and to integrate land use and transportation planning for long-term efficiency. Large metropolitan areas should accelerate development of mass transit systems aligned

with compatible land use. FARs should be based on distance and accessibility from main public and mass transport systems to encourage densification along corridors and critical transport nodes. Such systems should rely on full or partial private ownership so that transit system operators have incentives to coordinate the network with employment and residential patterns in order to maximize revenues. The governments would need to ensure, through development policies and investment programs, that there is supply of affordable land in areas of market demand. High-density nodes linked by rapid transit systems would reduce congestion, pollution, and travel cost. Currently, many systems in China, such as Light Rail Transit (LRT) Line 1 in Wuhan, align poorly with land use, employment distribution, and residential densities.

## Notes

1. "China produces most home appliances," *China Daily*, October 3, 2012.
2. Coastal provinces include Beijing, Fujian, Guangdong, Hainan, Hebei, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin, and Zhejiang. These provinces are home to 41 percent of China's population.
3. Dongguan, Foshan, Guangzhou, Huizhou, Jiangmen, Shenzhen, Zhaoqing, Zhongshan, and Zhuhai.
4. In land use and zoning plans, the term refers to limits imposed on the FAR ratio.
5. For example, if the plot of land is 100 square meters and the building coverage ratio is 60 percent, then the first floor of the constructed building can be up 60 square meters.
6. This was based on draft research paper prepared by Shuai Ren for this report.
7. The project financed by the Energy Foundation & China Sustainable Cities Program is supporting the revision of the Chenggong New Town Master Plan, a future administrative and employment center for the Greater Kunming region, as a "low-carbon city."
8. While this section does not cover virtual connectivity, high-speed communication networks will play a critical role for innovation and service industries by facilitating the transfer and exchange of knowledge, the virtual delivery of services, and seamless exchanges among companies.
9. Based on Fang (2013), who estimated elasticity of urban economic performance to inter-city accessibility using panel data of 260 prefecture-and-above level cities during 2001–10.
10. This section builds on a joint Clean Air Asia-World Bank Report 2013.
11. *China Urban-Rural Construction Statistical Yearbook 2011*, tables 1-1-1 (for cities) and 2-1-1 (for county towns).
12. See <http://green.sina.com.cn/news/roll/2011-06-13/220022633293.shtml>.

## References

- ADB (Asian Development Bank). 2012a. *Asian Development Outlook 2012: Confronting Rising Inequality in Asia*. Metro Manila, Philippines: Asian Development Bank. <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=577389>.
- . 2012b. "Transport Efficiency through Logistics Development: Policy Study." ADB, Metro Manila, Philippines.
- Afilal, A., and S. V. Lall. 2014. "The Value of Agglomeration Economies across Chinese Cities." Informal report.
- Au, Chun-Chung, and J. Vernon Henderson. 2006. "Are Chinese Cities Too Small?" *Review of Economic Studies* 73 (3): 549–576.
- Bain & Company. 2013. *China E-commerce Report*.
- Baum-Snow, N., and M. Turner. 2012. "Transportation and the Decentralization of Chinese Cities."
- Beijing Transport Research Center. Various years, 2007–11. "Beijing Transport Development Annual Report."
- Black, Duncan, and J. Vernon Henderson. 1999. "A Theory of Urban Growth." *Journal of Political Economy* 107 (2): 52–284.
- Bourdic, L. 2011. "Urban Density and Private Transport Energy Consumption—From Global Trends to Local Solutions." MSc Thesis, Imperial College, London.
- Bourdic, L., and S. Salat. 2012. "Street Patterns in Paris." Working Paper, Urban Morphology Institute, Paris.
- . 2013. "The Cost of Fine Grain Design vs. Superblocks in China." Working Paper, Urban Morphology Institute, Paris.
- Brown, D., M. Fay, J. Felkner, S. V. Lall, and H. G. Wang. 2008. "The Death of Distance? Economic Implications of Infrastructure Improvement in Russia." World Bank, Washington, DC.

- Bull-Kamanga, L., K. Diagne, A. Lavell, E. Leon, F. Lerise, H. MacGregor, A. Maskrey, M. Meshack, M. Pelling, H. Reid, D. Satterthwaite, J. Songsore, K. Westgate, and A. Yitambe. 2003. "From Everyday Hazards to Disasters: The Accumulation of Risk in Urban Areas." *Environment and Urbanization* 15 (1) (April 1): 193–204. doi:10.1177/095624780301500109.
- Calimente, John. 2012. "Rail Integrated Communities in Tokyo." *Journal of Transport and Land Use*.
- Cai, W., and J. V. Henderson. 2013. Distorted capital markets in China: the bias towards political cities and state owned firms. Background paper for *Urban China*, World Bank, Washington, DC.
- Campos, C. 2012. "The Geographical Concentration of Industries." Regional Economic Analysis, June 20, 2012.
- CDRF (China Development Research Foundation). 2010. *China Development Report 2010*. Beijing: CDRF.
- CMAP (Chicago Metropolitan Authority for Planning). 2013. *The Freight Manufacturing Nexus: Metropolitan Chicago's Build-in Advantage*. Chicago: CMAP.
- China Academy of Science. 2010. "China New Urbanization Report." Informal report.
- China Statistics Press. 2011 and 2012. *China City Statistical Yearbook*.
- China Statistics Press. Various years, 2007 to 2012. *China Statistical Yearbook*.
- Chreod. 2014. *China's Metropolitan Regions*. Washington, DC: World Bank.
- Ciccone, A., and Robert E. Hall. 1996. "Productivity and the Density of Economic Activity." *American Economic Review* 86 (1): 54–70.
- Clean Air Asia. 2013. "China Green Freight Policy and Institutional Analysis Report." prepared for the World Bank.
- Creutzig, F. and D. He. 2009. "Climate Change Mitigation and Co-benefits of Feasible Transport Demand Policies in Beijing." *Transportation Research Part D: Transport and Environment* 14 (2), 120–131.
- Desmet, Klaus, and M. Fafchamps. 2004. "Employment Concentration across US Counties." CEPR Discussion Paper 4689. CEPR Discussion Papers. <http://ideas.repec.org/p/cpr/ceprdp/4689.html>.
- Du, H., and S. Li. 2010. "Migrants, Urban Villages, and Community Sentiments: A Case of Guangzhou, China." *Asian Geographer* 27 (1–2).
- Duranton, G., and D. Puga. 2000. "Nursery Cities: Urban Diversity, Process Innovation, and the Life-cycle of Products." Working Paper dpuga-00-01, University of Toronto, Department of Economics. <http://ideas.repec.org/p/tor/tecipa/dpuga-00-01.html>.
- Estache, A., and M. Fay. 2007. "Current Debates on Infrastructure Policy." Policy Research Working Paper no. 4410, World Bank, Washington, DC.
- Fan, J. 2007. "Industrial Agglomeration and Difference of Regional Productivity." *Frontiers of economics in China*. 2: 346–361.
- Fang, W. 2013. "Dispersion of Agglomeration through Transport Infrastructure." PhD Thesis, Massachusetts Institute of Technology, Cambridge, MA.
- Frenchman, D., J. Wampler, and P.C. Zegras. 2011. *Designing Clean Energy Cities: New Approaches to Urban Design and Energy Performance*. Massachusetts Institute of Technology, School of Architecture and Planning, School of Architecture, Making the "Clean Energy City" in China (Project), MIT-Tsinghua Joint Urban Design Studio, Energy Foundation, China.
- Fujita, M., V. Henderson, Y. Kanemoto, and T. Mori. 2004. "Spatial Distribution of Economic Activities in Japan and China." In *Handbook of Urban and Regional Economics*, vol. 4. V. Henderson and J. F. Thisse, eds.
- Gihring, T.A. 1999. "A Potential Tool for Urban Growth Management." *APA Journal*.
- Glaeser, E.L. 2011. "Rethinking the Federal Bias toward Homeownership." *Cityscape* 13 (2): 5–37.
- Gwilliam, K. 2011. *Developing the Public Transport Sector in China*. Washington, DC: World Bank.
- Guoyong, Li. 2013. "Status Quo and Challenges of China's Urban Rail." Speech at the 2013 China Urban Mass Transit Forum, June 3, Shanghai. [http://zt.cnautonews.com/cglt2013/ldjh/201306/t20130603\\_203191.htm](http://zt.cnautonews.com/cglt2013/ldjh/201306/t20130603_203191.htm).
- Hao, P., S. Geertman, P. Hooimeijer, and R. Sliuzas. 2012. "Spatial Analyses of the Urban Village Development Process in Shenzhen, China." *International Journal of Urban and Regional Research* DOI:10.1111/j.1468-2427.2012.01109.
- Hartzok, A. 1997. "Pennsylvania's Success with Local Property Tax Reform: The Split Rate Tax." *The American Journal of Economics and Sociology*, April 1997, 56(2), pp. 205–13.
- Hashiguchi, Y., and K. Tanaka. 2013. "Agglomeration and Firm-level Productivity: a Bayesian Spatial Approach." IDE Discussion Paper 403, Institute of Developing Economies, Japan External Trade Organization (JETRO). <http://ideas.repec.org/p/jet/dpaper/dpaper403.html>.

- Hartzok, A. 1997. "Pennsylvania's Success with Local Property Tax Reform: The Split Rate Tax." *The American Journal of Economics and Sociology*.
- Jacobs, J. 1969. *The Economy of Cities*. New York: Vintage Books.
- Ketkar, S. L., and D. Ratha. 2010. "Diaspora Bonds: Tapping the Diaspora during Difficult Times." *Journal of International Commerce, Economics and Policy* 1 (2) 251–263.
- Klako Group. 2004. "China's Pearl River Delta." *China's Invest Monthly Newsletter*, June. [www.klakogroup.com/en/china-invest-monthly-newsletter/chinas-pearl-river-delta](http://www.klakogroup.com/en/china-invest-monthly-newsletter/chinas-pearl-river-delta).
- Kolko, J. 1999. "Can I Get Some Service Here? Information Technology, Service Industries, and the Future of Cities." SSRN Scholarly Paper ID 985712, Rochester, NY, Social Science Research Network. <http://papers.ssrn.com/abstract=985712>.
- Lall, S.V., and H. G. Wang. 2011. "Balancing Urban Transformation and Spatial Inclusion in China." *An Eye on East Asia and the Pacific* 6, World Bank, Washington, DC.
- Lall, S., and U. Deichmann. 2009. "Density and Disasters: Economics of Urban Hazard Risk." Policy Research Working Paper no. 5161, World Bank, Washington, DC.
- Li, Guoyong. 2013. Interview with Mr. Li Guoyong from the National Development and Reform Commission, China. [http://www.chinadaily.com.cn/hqgj/jryw/2013-08-14/content\\_9848776.html](http://www.chinadaily.com.cn/hqgj/jryw/2013-08-14/content_9848776.html).
- Licciardi, G. and R. Amirtahmasebi. 2012. *The Economics of Uniqueness: Investing in Historic City Cores and Cultural Heritage Assets for Sustainable Development*. Urban Development Series. Washington, DC: The World Bank.
- Lin, Y., B. de Meulder, and S. Wang. 2011. "Understanding the 'Village in the City' in Guangzhou: Economic Integration and Development Issue and their Implications for the Urban Migrant." *Urban Studies* 28(16) 3583–3598.
- Lin, Y. and B. de Meulder. 2012. "A Conceptual Framework for the Strategic Urban Project Approach for Sustainable Redevelopment of 'Villages in the City' in Guangzhou." *Habitat International* 36: 380–387.
- Liu, Y., S. He, F. Wu, and C. Webster. 2010. "Urban Villages under China's Rapid Urbanization: Unregulated Assets and Transitional Neighborhoods." *Habitat International* 34: 135–144.
- Lucas, R. E. 1993. "Making a Miracle." *Econometrica* 61: 251–72.
- Mao, L., Zhu, H., and Duan, L. 2012. "The Social Cost of Traffic Congestion and Countermeasures in Beijing." *Sustainable Transportation Systems*: 68–76. <http://dx.doi.org/10.1061/9780784412299.0010>.
- Ministry of Environmental Protection. 2012. *2012 China Vehicle Emission Control Annual Report*.
- Nelson, A.C., and J.B. Duncan. 1995. *Growth Management Principles and Practices*. Chicago, Ill.; Washington D.C.: Planners Press, American Planning Association.
- OECD-CDRF (Organisation for Economic Co-operation and Development and China Development Research Foundation). 2012. "Trend in Urbanization and Urban Policies in OECD Countries: What Lessons for China?" Background Paper.
- Proost, S., and K. Van Dender. 2011. "What Long-Term Road Transport Future? Trends and Policy Options." *Review of Environmental Economics and Policy* 5 (1) pp. 44–65.
- Qu, L., Y. Gao, A. Salzberg, and G. Ollivier. 2014. "Walkability Analysis for Chinese Transit Oriented Development: A Case Study in Nanchang." Transportation Research Board Annual Meeting 2014 Paper #14-0888, Washington, DC.
- Rabinovitch, Simon. 2013. "Fear of Missing Out Fuels China Property Market." *Financial Times*, September 18, 2013. <http://www.ft.com/intl/cms/s/0/3d6870d6-204a-11e3-9a9a-00144feab7de.html#axzz2fKJbYRbZ>.
- Rice, P.G., A.J. Venables, and E. Patacchini. 2006. "Spatial Determinants of Productivity: Analysis for the Regions of Great Britain." *Regional Science and Urban Economics* 36: 727–752.
- Roberts, M., U. Deichmann, B. Fingleton, and T. Shi. 2012. "Evaluating China's Road to Prosperity: A New Economic Geography Approach." *Regional Science and Urban Economics* 42: 580–594.
- Wu, F., F. Zhang, and C. Webster. 2013. "Informality and the Development and Demolition of Urban Villages in the Chinese Peri-urban Area." *Urban Studies* 2013 (50): 1919.
- Rosenthal, S.S., and W.C. Strange. 2003. "Geography, Industrial Organization, and Agglomeration." *The Review of Economics and Statistics* 85 (2): 377–93.
- . 2004. "Evidence on the Nature and Sources Of Agglomeration." *Review of Economics and Statistics* 85: 377–393.
- Saeboon K., and P.G. Rowe. 2013. "Are Master Plans Effective in Limiting Development in China's Disaster-Prone Areas?" *Landscape and Urban Planning* 111: 79–90.



- Salat, S., F. Labbé, and C. Nowacki. 2011. "Cities and Forms: On Sustainable Urbanism." CTS Urban Morphology Laboratory.
- Salzberg, A., R. Bullock, Y. Jin, and W. Fang. 2013. "High-Speed Rail, Regional Economics, and Urban Development in China." China Transport Topics No. 08, World Bank, Beijing.
- Sandroni, P. 2010a. "A New Financial Instrument of Value Capture in São Paulo: Certificates of Additional Construction Potential." In *Municipal Revenues and Land Policies*, Gregory K. Ingram and Yu-Hong Hong, eds. Cambridge, MA: Lincoln Institute of Land Policy.
- Sandroni, P. 2010b. A New Financial Instrument of Value Capture in São Paulo: Certificates of Additional Construction. Conference Paper. [https://www.lincolnst.edu/pubs/2064\\_A-New-Financial-Instrument-of-Value-Capture-in-S%C3%A3o-Paulo](https://www.lincolnst.edu/pubs/2064_A-New-Financial-Instrument-of-Value-Capture-in-S%C3%A3o-Paulo).
- Shanghai Urban and Transport Planning Institute. 2011. "Shanghai 5th Comprehensive Transport Survey Report."
- Song, Y., and Y. Zenou. 2012. "Urban Villages and Housing Values in China." *Regional Science and Urban Economics* 42: 495–505.
- Song, Y., and X. Pan. 2009. "Toward Better Plans to Guide Smart Development in Chinese Cities." In *Smart Urban Growth for China*, Y. Song and C. Ding, eds. Cambridge, MA: Lincoln Institute of Land Policy.
- Song, Y. 2012. "Planning institutions: China." In *International Encyclopedia of Housing and Home, Vol 5*, Susan J. Smith, Marja Elsinga, Lorna Fox O'Mahony, Ong Seow Eng, Susan Wachter, and Sasha Tsenkova, eds. Oxford: Elsevier Ltd.
- Zhi L. 2013. "Planning and Policy Coordination in China's Infrastructure Development." Background Paper, EAP Infrastructure Flagship Study, World Bank.
- Wang, L., C.C. Li, Q. Ying, X. Cheng, X.Y. Wang, X.Y. Li, L.Y. Hu, L. Liang, L. Yu, H.B. Huang, and P. Gong. 2012. "China's Urban Expansion from 1990 to 2010 Determined with Satellite Remote Sensing." *Chinese Science Bulletin* 57 (22): 2802–2812. doi:10.1007/s11434-012-5235-7.
- World Bank. 2008. "The Spatial Growth of Metropolitan Cities in China: Issues and Options in Urban Land Use." Informal report.
- World Bank. 2009. *World Development Report 2009: Reshaping Economic Geography*. Washington, DC: World Bank.
- . 2011. "Climate Finance in the Urban Context." The World Bank issues brief #4 of *Development, Climate and Finance*.
- . 2013a. *Planning, Connecting, and Financing Cities—Now*. Washington, DC: World Bank.
- . 2013b. "Regional Impacts of High Speed Rail in China—Identification, Quantification and Outlook." Background Paper, World Bank, Washington, DC.
- . 2013c. Discussions during the "Transforming Cities with Transit and Financing Transit with Land Values Workshop." Beijing, China, November 1, 2013.
- . 2013d. China Transport Topic, Note 8.
- Wu, F., F. Zhang, and C. Webster. 2013. "Informality and the Development and Demolition of Urban Villages in the Chinese Peri-urban Area." *Urban Studies* (50): 1919.
- Wu, L. (2013): China's System of Municipal Finance: Origins, Impacts, and Agenda for Reform, unpublished.
- Zhao, P., B. Lu, and J. Woltjer. 2009. Conflicts in Urban Fringe in the Transformation Era: An Examination of Performance of the Metropolitan Growth Management in Beijing. *Habitat International* 33 (4): 347–356. doi: 10.1016/j.habitatint.2008.08.007
- Zheng, S., F. Long, C. Fan, and Y. Gu. 2009. Urban Villages in China: A 2008 Survey of Migrant Settlements in Beijing. *Eurasian Geography and Economics* 50 (4): 425–446.





## Inclusive Urbanization and Rural-Urban Integration

### Inclusive urbanization: Vision, major challenges, and key reforms

#### Introduction

China has undergone a remarkable transformation, with the movement of over 260 million migrants from rural areas to urban areas. Driven largely by this rural-to-urban migration, China's urban population is projected to reach 1 billion by 2030. These migrants have seized the opportunities offered by urbanization, leaving their agricultural jobs and taking up more productive and higher-paying jobs in cities. Through this process, China has managed to sustain high wage growth, achieve even higher productivity growth, and reduce poverty on an unprecedented scale (World Bank and DRC 2013).

However, two closely related sets of inequalities pose challenges to making urbanization inclusive: a new dualism within the urban population and the old dualism of urban and rural disparities. First, newcomers to the cities—the migrants with nonlocal *hukou* status—are often excluded from access to urban services because of their *hukou* status and may face greater financial and administrative challenges in accessing

quality services.<sup>1</sup> Second, large gaps exist in the quantity and quality of public services across provinces and between rural and urban areas. The challenges are intertwined, because if people move to the cities to receive better public services instead of moving to find productive jobs, congestion and unemployment result. Examples of this type of urbanization can be found around the world. Conversely, if people do not move even though there are jobs for them (for example, because they cannot afford essential services in urban areas even with better jobs), efficiency losses and slower growth result, and the human capital of citizens will be underutilized and underdeveloped (Cai and Wang 2010; Wang, Zhu, and Ma 2008).

China also faces the challenge of improving labor market integration and strengthening labor market institutions to help overcome the new and old dualisms. An inclusive and efficient labor market would allow migrants to find the best matches for their talents and would provide the supportive training and learning infrastructure to help them continue this productive matching as the economy evolves. Supportive labor market institutions would mediate the interests of diverse stakeholders in this market and would balance policy objectives with respect

to national social objectives and economic efficiency.

The Chinese leadership is well aware of these challenges and presented social policies to address them in the 12th Five-Year Plan (2011–15) and *China 2030* (World Bank and DRC 2013). The main social development challenges identified by the 12th Five-Year Plan include rising inequality of income and wealth, disparities in opportunities and in access to affordable and quality services, disconnected rural and urban systems, and poor quality and undersupply of basic public services for poor and vulnerable groups. In light of these challenges, the vision of the Five-Year Plan is to build, improve, and promote equalization of access to basic public services (that is, education, employment, health care, pension, social assistance, and housing) for all citizens, to build a harmonious society and maintain social justice and fairness. Similarly, *China 2030* (World Bank and DRC 2013) envisages promoting economic freedom through equal opportunities for all citizens to access quality public services (that is, not limited by place of birth, gender, or other factors) and basic security from deprivation to prevent any irreversible loss of human potential.

This report builds on the policy options laid out in these documents and attempts to translate them into actions, using the prism of addressing both the new and the old dualisms. It analyzes and provides policy alternatives to answer three interrelated questions that are key factors in advancing the inclusive urbanization agenda in the next decade:

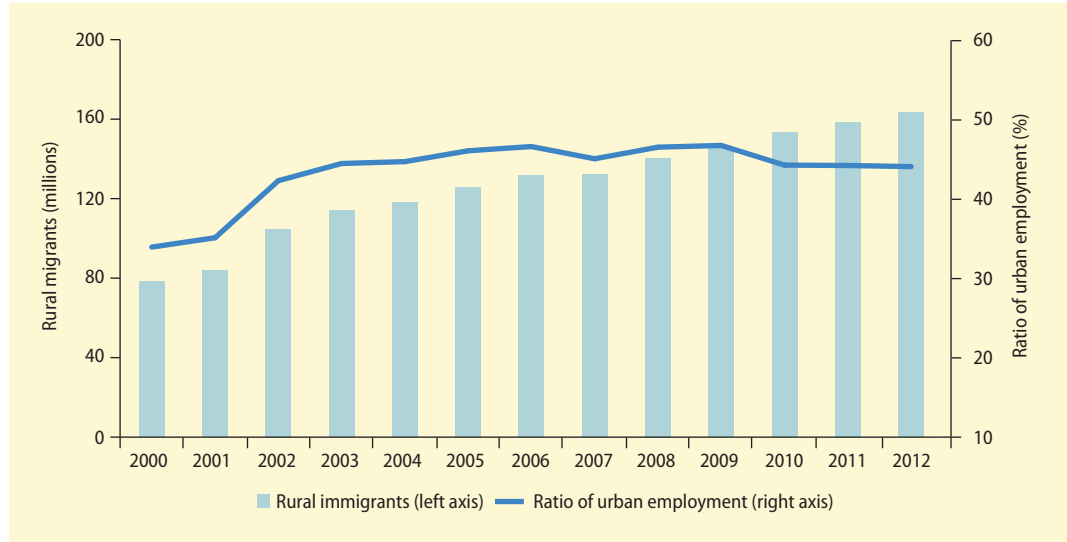
- How can access to basic social services in urban areas be equalized among migrants and local hukou holders?
- How should this equalization proceed across the vast and diverse spectrum of rural settlements; townships; counties; and small, medium, and large cities in China?
- What policies will support building a labor market that is productive and inclusive for all?

The structure of the report is as follows. The remainder of this section provides a brief overview of the current social context,

including demographic shifts and the profile of migrant workers, as well as opportunities and challenges for urbanization. It then describes the overall vision for inclusive urbanization and rural-urban integration, providing a picture of where China could be if the necessary reforms can be implemented successfully. The second section then focuses on the challenges and options in ensuring equitable access to social services in urban areas, starting with the shift from the hukou system to a modern residence-based system. That section looks at the current “urban standard” of social services in China’s urban areas (that is, education, health, pensions, social assistance, and welfare housing) by reviewing how services are financed and delivered as well as analyzing the cost of extending services to migrant populations. The third section takes a broader view of social policy reforms in China, discussing the need for rural-urban integration and equitable service delivery across the country. It covers the areas of education, health, pensions, and social assistance programs as well as addresses the cross-cutting issue of accountability in social services delivery. Finally, the fourth section focuses on reforms for ensuring an inclusive and productive labor market, specifically in the areas of skills accumulation (that is, technical and vocational education and training [TVET] and higher education) and key labor market institutions (that is, wage setting, labor taxation, labor law, and labor dispute mediation).

### **The social context and challenges and opportunities for urbanization**

Over the past three decades, China has experienced the world’s largest internal migration in history, which has been instrumental to the country’s growth and poverty reduction. Employment of rural migrant workers, nearly all working in urban areas, more than doubled from 79 million in 2000 to 163 million in 2012. China also had 99 million local rural (nonagricultural) workers in 2012—together totaling 262 million migrant workers (NBS 2012a). By 2013, rural migrant workers accounted for 44 percent of total urban employment (figure 3.1). This labor migration

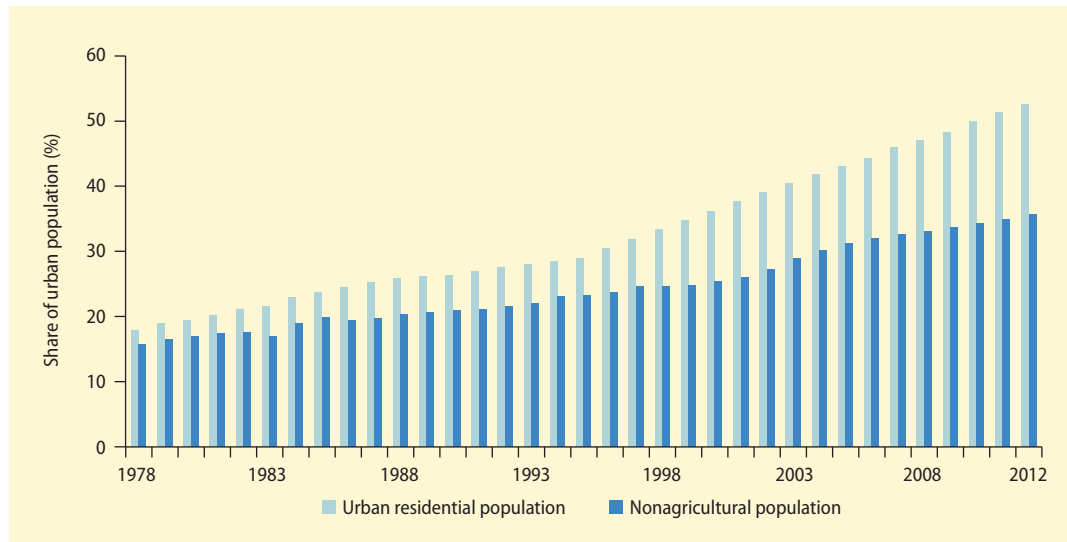
**FIGURE 3.1** Rural-to-urban migration trends in China, 2000–12

Source: NBS 2012a, 2012b.

has contributed to the structural transformation of the economy and the integration of the labor market, and it has played an important role in reducing poverty and narrowing the income gap between rural and urban areas.

The hukou household registration system has given rise to unique characteristics in China's internal migration. In most countries, the processes of industrialization and urbanization have involved rural workers migrating

and settling down to become urban dwellers once they find jobs in cities. In the Republic of Korea, for example, rural-to-urban migrants become as socially mobile as urban natives within the first generation.<sup>2</sup> In contrast, China's rural migrant workers have behaved more like guest workers—accepting lower wages, migrating without their families, living in dormitories, and having limited access to urban public services (figure 3.2).

**FIGURE 3.2** Trends in urban resident population and population with nonagricultural hukou, 1978–2012

Source: National Bureau of Statistics, various years.

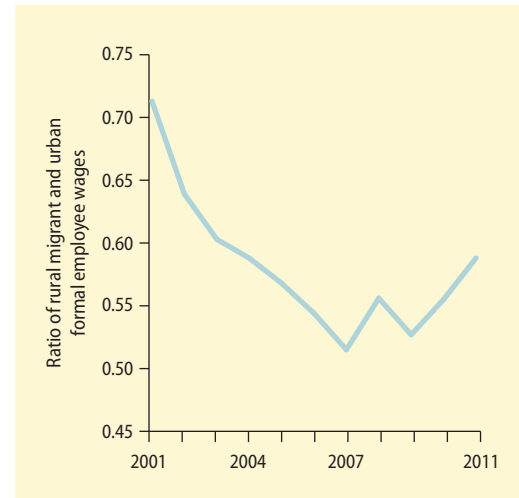
As China continues to urbanize rapidly, significant economic restructuring is taking place. China is reorienting its growth model from a capital-intensive and export-oriented one toward one driven more by deeper human capital and total factor productivity, increased domestic consumption, and movement up the value chain. On the demand side, many new jobs are now generated inland in response to industrial policy, reducing the cost of migration for new migrant workers. Economic restructuring and industrial upgrading have intensified the destruction of low-skilled jobs and the creation of semiskilled and skilled jobs, necessitating human capital development among the current workforce.

China's urbanization coincides with major demographic shifts that have significant implications for migrant workers as well as for the broader economy. In particular, the excess rural surplus labor is nearly exhausted—China is reaching its Lewis turning point. China is also experiencing rapid population aging, which will place greater strain on family support networks and challenge social programs, pensions, and health care. Population aging also has implications for the labor supply because the pool of available labor has begun to shrink.

In response to these economic and demographic trends, wages of migrant workers have started to increase rapidly. The end of so-called cheap Chinese labor has already been documented (Li and others 2012). The recent increase in relative wages of migrant workers marks a reversal from the pattern of 2001–07, when migrant wages substantially lagged those of urban formal employees. From 2007 to 2012, rural migrant wages increased by an average of 17.1 percent annually in real terms<sup>3</sup> (figure 3.3).

Moreover, the wage differential between migrant and long-term urban resident workers that is unexplained by differences in human capital has diminished considerably, which suggests improved labor market integration. Results from the 2001 and 2010 editions of the China Urban Labor Survey (CULS) show that the negative impact on wages of being a rural migrant declined to just 13 percent in 2010 and disappeared after accounting for differences in their job

**FIGURE 3.3** Relative wages of rural migrants and urban formal employees, 2001–11



Source: National Bureau of Statistics.

Note: Formal real wages are average urban wages reported in *China Statistical Yearbook* (2012); rural migrant wages are from National Bureau of Statistics' rural household surveys and rural migration monitoring surveys.

characteristics.<sup>4</sup> This result means that by 2010, rural migrants were not systematically paid less within the same sector and ownership type. Instead, lower wages for rural migrants were due to migrants working in lower-paying sectors and ownership types.

The demographic profile of the rural migrant labor force is changing, with migrant workers generally being older and better educated than the overall rural labor force. The average age of rural migrant workers rose from 34.0 years in 2008 to 37.3 years in 2012. In terms of educational attainment (table 3.1), in 2012, 5.7 percent of rural workers had three-year college degrees or above, 4.7 percent had completed vocational high school, 13.3 percent had completed regular high school, and 60.5 percent had completed middle school. In comparison, only 1.4 percent of local farmers had three-year college degrees or above, 1.5 percent had completed vocational high school, 8.0 percent had completed regular high school, and 47.0 percent had completed middle school.

Migrants are increasingly bringing their children or their entire families with them when they migrate. The National Bureau of Statistics (NBS) monitoring survey of rural

**TABLE 3.1 Educational attainment of rural workers in 2012**

	Local farmers	Rural migrant workers	Local rural migrant workers	Rural out-migrant workers	Young migrant workers
No schooling	8.3	1.5	1.0	2.0	0.3
Primary school	33.8	14.3	10.5	18.4	5.5
Junior middle school	47.0	60.5	62.0	58.9	57.8
Senior middle school	8.0	13.3	12.8	13.8	14.7
Technical secondary school	1.5	4.7	5.9	3.3	9.1
College and above	1.4	5.7	7.8	3.6	12.6

Source: NBS, *National Monitoring Survey Report for Rural Migrant Workers 2012a*.

Note: Young migrant workers are those 30 years of age and below.

migrants reports that 20.7 percent of rural migrants left home with their entire families in 2012 (NBS 2012a). However, this figure does not capture the many cases in which multiple family members migrated while at least one family member stayed behind to farm the land or maintain the family's claim to collective land or other benefits. The CULS found that among the children of migrants enrolled in school, the share that went to school in the city increased from 41 percent in 2001 to over 70 percent in 2010.<sup>5</sup>

Although the majority of rural migrants are still concentrated in medium and large cities, intra-provincial migration has increased significantly. As shown in table 3.2, in 2012, 30.1 percent of rural migrants worked in provincial capitals or municipal provinces, and 34.9 percent worked in prefectural cities—about the same proportions as in 2009. Intra-provincial migration increased from less than 47 percent in 2009 to more than 53 percent in 2012. This increase could reflect the rapid development of second- and third-tier cities as well as greater diversity among migrants, including not only young, single people but also married and older individuals who may

have greater family ties or responsibilities that make them reluctant to migrate far away.

These trends point both to an opportunity and to an urgent need to reform hukou and other institutions that constrain mobility and impede access to social services, as well as to improve social service delivery across the entire country. For urbanization to succeed, people need to move freely, but the hukou system still defines their residence status and rights to access public services. China's decentralized fiscal system—in particular, the mismatch at the local level between resource availability and social spending responsibilities—also creates distortions because it does not allow money to follow people. A sustainable financing framework for local governments to provide mandated services, as in the case of providing education for migrants, is absent. Furthermore, fragmented social security arrangements that lack portability of benefits discourage both mobility and formalization in the labor market.

China's urbanization can create new opportunities for efficiency in social service delivery. With urbanization comes denser cities and the ability to provide services to more concentrated populations, which allows for efficient pooling and risk sharing for social services in urban areas. Cities also have a better pool of health and education providers, and the possibilities for knowledge networks within cities and learning externalities are much greater than in rural settings. Furthermore, the points of educational supply and labor market demand (firms) are closer, providing greater possibility of exploiting real-time feedback from the demand side. The potential for outreach is also higher,

**TABLE 3.2 Distribution of rural-to-urban migrant workers by city level, 2009–12**

City	2009	2012
Municipalities under the central government	9.1	10.0
Capital cities	19.8	20.1
Prefectural cities	34.4	34.9
County-level cities	18.5	23.6
Towns	18.2	11.4

Source: NBS, *National Monitoring Survey Report for Rural Migrant Workers 2009, 2012a*.



with shorter distances and connection times between facilities and their users. In addition, the natural risk pools of jurisdictions (which are more efficient for risk sharing across health and old-age insurance) are larger in urban areas, with fewer coordination challenges in moving to higher levels of pooling (for old-age security and pensions).

Urbanization can also foster greater labor market efficiency. In the labor market, a significant advantage of urban settlements is that the high agglomeration of activity provides workers and businesses with a wide range of options if they possess or require skills.<sup>6</sup> Urban settings imply more formal sector employment than is found in rural areas, and the need for labor market institutions (wage setting and collective bargaining) is greater. A formalized labor market also allows for the development of more efficient social insurance institutions.

At the same time, urbanization brings the challenge of building cohesive communities in cities with more migrants. Higher demand has intensified the competition for urban services, and infrastructure pressures from expanding urban populations are more difficult to manage because of the cost of land and congestion. In addition, the types of people coexisting in cities have become much more diverse; for example, expanding urban areas have a diversity of dialects among migrants and differences in students' grade-level readiness as a result of varying educational quality in rural areas. Service delivery providers need to tailor their services to accommodate these diversities while keeping the quality of provision at a level acceptable to long-term residents. Notably, social conflicts have ignited in recent years; for example, labor disputes, largely involving migrant workers, nearly doubled between 2005 and 2012 (Gallagher and others 2013).

### **The vision for inclusive urbanization and rural-urban integration**

China's vision for inclusive urbanization builds on two main principles:

- *Free movement of people to seek and maximize economic opportunities*, allowing peo-

ple and society to achieve maximum benefit from the human potential of China's population, and

- *Equitable access to basic social services and social protection across space*, allowing all citizens full integration into urban life.

To achieve China's vision for inclusive urbanization and rural-urban integration, social policy reforms will need to follow some cross-cutting guiding principles:

- *Provide appropriate incentives for citizens and service providers.* Residence rules should not encourage mobility that does not lead to higher productivity of working household members. Policies need to be consistent with the strong incentive to work and to build human capital across the life cycle, while discouraging welfare dependency. Service providers also need to be given the right incentives, with built-in checks and balances that conform to professional ethics. The current incentive structure in health and to some extent education encourages public providers to act as profit-maximizing private sector entities—for example, one-third of hospital admissions in China are considered unnecessary, and school selection fees drive a further funding wedge between “key schools” and regular schools. A workable incentive framework is needed for local authorities to provide equitable access to basic social services and social protection.
- *Redefine the roles of the state, private sector, communities, and households to support a successful transition.* The urbanization process is creating opportunities for the private sector to provide higher-end services financed through user fees and, in doing so, share the fiscal burden faced by local governments. Private provision and public-private partnerships could play a bigger role in education and health. The role of government would need to be recalibrated accordingly, with a transition from administrative measures to market measures in some domains and a more direct state role in others. Stronger state capacity to set policies, license, and regulate will be needed, along with greater attention to the

financing and provision nexus and potential unbundling of who finances and who provides. Governments at all levels will face challenges as they seek prudent balances between state- and market-based solutions.

- *Improve affordability and efficiency.* Reforms should be consistent with fiscal constraints and promote more efficient use of public resources. Social sector budgets will face increasing pressures as economic growth gradually slows, the population ages, and program coverage continues to rise. Addressing these challenges will require greater efficiency in service delivery and value for money in public spending, within a sustainable fiscal framework. Those changes, in turn, require new information and tools to assess efficiency and create new incentives through budgetary and other channels. Effective policies will increasingly need instruments for both the supply and demand sides of service delivery. Reforms should also promote greater accountability of administrative systems, service providers, and citizens to help ensure efficient use of public resources.
- *Develop an integrated approach to deepening social policy reforms.* Although a basic social service system has already been established in China, it is fragmented across space and rural and urban areas, in part because of the highly decentralized financing arrangements. Not only has this fragmentation caused barriers in access to urban public services and transfers of social entitlements, but it has also resulted in low pooling and inefficient financial resource management, threatening the sustainability of social services. As China continues to urbanize rapidly and move toward high-income status, further reforms need to focus on integration and harmonization of social policies and programs.

High-level mandates alone will be insufficient for achieving the desired outcomes. The 12th Five-Year Plan explicitly addresses social service provision for migrant workers and rural-urban integration, as well as setting quantitative targets for implementation. Nonetheless, policy-driven duality—whereby formal policies still treat long-term residents

and migrants differently—remains, along with some areas of divergence between official policy and its implementation on the ground (for example, the experience of urban schools that are mandated to accept migrant children). This divergence is related in part to the behavior, attitudes, and incentives of local actors; for example, the urban old-age security system is open to migrants and mandated under labor legislation, but migrants, employers, and providers often behave as if it is not available.

Policy and practice must focus increasingly on three different levels. First, high-level policies can promote more equal treatment of migrants and local hukou populations. Second, specific supporting reforms can facilitate the realization of high-level policies, such as reforms of intergovernmental finance. Third, nuts-and-bolts reforms of administrative systems and delivery platforms can aid in effectively implementing policy reforms.

### **Reforms needed to achieve China's vision**

As discussed in the remainder of the report, key reforms related to the household registration system, public finance, service delivery, and labor market institutions are needed to achieve China's vision for inclusive urbanization and rural-urban integration. Realizing China's vision will require efforts to ensure equitable access to social services both within urban areas and across rural and urban areas nationwide as well as to foster an inclusive and productive labor market. Key reforms are summarized briefly below.

#### *Ensuring equitable access to social services in urban areas*

The key reform needed is a shift from the origin-based hukou system to a modern residence-based system for defining eligibility for basic services. This reform is critical to promoting inclusive urbanization. Making the residence-based system meaningful will involve providing current residents with access to the urban standard of social services, which includes nine years of free compulsory education, access to basic public

health care services, social security (medical and old-age pensions) for formal sector workers and for residents in rural and urban areas, a social assistance program for rural and urban areas, and some welfare housing system in urban areas.<sup>7</sup> Although enacting this reform will require additional fiscal resources, the costs should be manageable. The lower bound of the annual cost estimates of extending this package to cover current rural migrants within the next one to two years is 1.22 percent of 2012 gross domestic product (GDP). The cost increases to 2.51 percent of 2012 GDP, under the assumption that all “left-behind” children move with their parents to the cities, and it increases to 3.14 percent of 2012 GDP if, in addition to the cash flow cost of extending the urban old-age security to migrants, the discounted accrued liability costs are accounted for. Accounting for both of these costs and changing the assumptions about the increase in medical cost and social housing coverage, the total cost could increase to 4.53 percent of 2012 GDP in 2015 and to 4.78 percent of 2012 GDP in 2020.<sup>8</sup>

*Undertaking social policy reforms to foster rural-urban integration*

To be truly consistent with the goals of efficient urban development and rural-urban integration, efforts must extend beyond equalizing access within urban areas, with a longer-term goal of equalizing access to basic social services across provinces and urban and rural areas. A national minimum package of social services and social insurance that is guaranteed by the central government would be a basis for this equalization. In the short term, higher levels of government could consider subsidizing cities for the increased costs of services to migrants. In the medium term, fiscal system reforms for both revenues and expenditures will be necessary to finance the national minimum package of public social services, irrespective of location. Such standards must be carefully calibrated to fit the fiscal resources China has available, and they should be phased in. At the same time, a gradual change in the intergovernmental fiscal system should provide the necessary resources

to localities with more expenditure needs than revenue capacity. Local authorities could top up this package for their residents, and the private sector could also help create fiscal space through high-end medical services, private third-pillar pensions, and private schools.

Sectoral policy reforms in health, education, pensions, and social protection, as well as cross-cutting reforms in accountability for service delivery, could help contain costs and increase the efficiency of service provision. Such reforms include the following:

- *Education.* Efforts are needed to narrow the disparities in the quality of basic education and to expand access to senior secondary and early childhood education. Financing reform would help set minimum standards for every level of education and ensure central transfers for equal access to quality education for poor rural localities and disadvantaged children. Demand-side mechanisms that stimulate competition and allow higher levels of private provision will also improve education access and quality. In addition, teachers’ incentives need to be realigned to improve quality of instruction and strengthen school management. Peer-tutoring programs, computer-assisted learning programs, after-school support, and support targeted to help migrant students and their families will further support the integration of migrant children.
- *Health care.* A stronger urban health care delivery system is needed to meet the expected increase in demand. This system could be achieved by improving primary health care services and coordination among providers; integrating and ensuring portability of health insurance to allow citizens to choose the best treatment; strengthening health promotion and illness prevention in urban settings; and implementing effective cost containment and quality improvement measures. Provider payment reform should replace the dominant fee-for-service payment system with a diagnosis-related group-based system, which has a proven track record internationally for containing the costs of inpatient care.
- *Pensions.* Pension reforms are required to facilitate labor mobility, narrow the gaps

in pension benefits, and cope with an aging population. In the short run, national guidelines could help make the transfer of pension rights and benefits easier between schemes and locations. In the long run, the urban workers' pension scheme could be reformed by introducing a notional defined-contribution (NDC) design while developing a financing strategy to resolve the legacy costs outside the reformed pension system. These reforms would lower the existing high contribution rates, provide stronger incentives for employers and employees to contribute, and realize the objective of a targeted replacement rate. Migrant workers with wage income and labor contracts can be encouraged to join the reformed urban workers' pension scheme to reduce the government subsidies needed for the rural residents' pension scheme. Pooling could begin first at the provincial level and then be expanded to the national level, supported by an integrated national data management system. Finally, gradual reforms in retirement age and indexation would help ensure the adequacy of pension benefits and sustainability of the pension system.

- *Social assistance.* Reforming China's social assistance program (*dibao*) and other social assistance programs requires consolidation, standardization across space, and harmonization with antipoverty interventions in poor counties and other social programs. Most high- and middle-income countries apply a unified formula for determining eligibility for national welfare programs while maintaining some flexibility, including regional cost-of-living adjustments. China could gradually move toward a more systematic approach in determining eligibility thresholds from county (city) to prefecture, from prefecture to province, and finally to a nationwide setting.
- *Accountability for service delivery.* More sophisticated service delivery and ambitious equalization goals call for greater accountability for outcomes, cost-effectiveness, and transparency. Three broad channels can be used to promote accountability: government, citizen based, and choice or market based. Government systems can encourage

better performance from service providers by linking budgetary transfers to the performance of subnational governments. Human resource management and compensation systems and facility-based management initiatives could also become more performance based. Regulation, accreditation, and licensing systems for providers are increasingly important tools and are expected to be core elements of the modern and diversified system of social service provision in China. Citizen-based channels could be strengthened by providing more public information on service delivery costs and performance and by harnessing information efforts to generate citizen oversight and feedback on service delivery performance. Another channel for citizen involvement is more direct incorporation into management and oversight institutions. Choice- and market-based channels will require greater reliance on demand-side financing of services where appropriate as well as greater public purchasing of social services.

#### *Strengthening institutions for an inclusive and productive labor market*

An inclusive and productive labor market for all will allow people to seek and maximize economic opportunities and will help unleash the potential of labor mobility. Geographic, occupational, and sectoral mobility could be supported by measures such as the following:

- *Building a modern system for upgrading the human capital of workers, both on the job and in learning institutions.* Investment in skills development should focus increasingly on lifelong learning and continuous upgrading of workers' skills throughout their careers. Policies should promote a more modular and competency-based technical and vocational education and training (TVET) system, broaden ongoing experiments with demand-side financing of training, encourage private sector training providers to enter the training market and provide a more level playing field for them, and build institutions for skills accreditation to make skills certification

more portable and relevant to employers. Tertiary education reforms should focus on increasing the labor market relevance of higher education. Such reforms would include greater autonomy and accountability for universities and would explore the potential for private provision and financing of higher education. An overarching reform needed across TVET and higher education is to increase articulation between the technical and academic streams so students can shift between them with due credit for competencies acquired in either system.

- *Strengthening labor market institutions that can facilitate efficient labor market transactions, balance wage and productivity growth, and mediate labor disputes.* As a starting point, the basic function of the minimum wage will need to be reoriented from a minimum income guarantee to an instrument of collective bargaining and administrative labor market policy intervention. Labor taxation reforms could help reduce the tax burden on workers and employers, and there is potential for reducing the pension, unemployment, and housing contributions. These measures would require accompanying reforms of the overall tax mix across factors of production and financing. Monitoring the medium-term impact of the Labor Contract Law will become meaningful to China's competitiveness and job creation. Legitimate interests of both workers and employers should enter the considerations of policy making and legislation so as to balance flexibility and security.

Inclusive urbanization can bring a range of positive economic and social benefits to China. Urbanization that is inclusive can help China rebalance its economy, maximize human capital to sustain its competitiveness, narrow welfare gaps, and promote social cohesion. In this context, inclusive urbanization is not only an issue of equity and social cohesion but also a crucial underpinning of the country's evolving economic model, which will depend on maximizing human resource potential to move China from middle-income status to high-income status.

## Ensuring equitable access to social services in urban areas

To achieve China's vision for inclusive urbanization, the current urban standard of social services can be extended to migrant populations. This section discusses one of the most critical elements of the necessary reforms: the shift to a residence-based permit system that will delink access to social services from hukou. It draws lessons from local experience as well as international practices and lays out various considerations and policy options for adopting the residence permit system. The section then examines the barriers migrant populations face in accessing the current urban standard, focusing in particular on financing arrangements and delivery systems for compulsory education, health care and insurance, pensions, and social assistance and welfare housing. Finally, building on these findings, the section suggests a framework for cost sharing and incentives for municipal governments to integrate migrants into urban areas.

### Context and challenges

For migrants and their families, access to publicly financed services in urban areas has been regulated by hukou, which has limited their mobility and reduced their welfare. The original rationale was that migration for work was temporary and that families of migrants would stay behind and access services in rural areas. Although this was true in the early stages of China's economic transition, the situation has changed dramatically over the past couple decades. Rural-to-urban migration has become more permanent, with the majority of migrants having no aspirations to return to rural areas (Cai and Wang 2010). In addition, a second generation of migrants, born and raised in cities, have no attachment to the rural areas from which their parents migrated.

Hukou reform has been undertaken gradually since the early 1980s in response to the evolving economic and social situation. In particular, since the late 1980s the mobility restriction function of hukou has largely been eliminated. Starting in 1997 and culminating



in a 2001 national policy, measures were gradually introduced to encourage selected rural migrants to apply for urban hukou in small cities and towns—the “small city free” policy (M. Y. Wang 2002). In 2006, the State Council promulgated a milestone document that provided a comprehensive policy framework for the fair treatment of rural migrant workers in cities with respect to their entitlement to social services, including employment, training, education, health, social insurance, housing, and family planning services. All fees levied on rural migrants were removed, such as temporary residence fees and management fees, family planning fees, urban expansion fees, and management and service fees (L. Wang 2010).

Most recently, the State Council formulated a national policy on hukou reform in 2011 and issued reform guidelines linked to the city’s administrative level.<sup>9</sup> These guidelines set differential approaches to granting local hukou in cities, depending on a city’s administrative level. In towns and county-level cities, migrants can apply for permanent local hukou for themselves and family members (spouse, unmarried children, and parents) if they have legally stable employment and a residential apartment (including leased). Cities that are facing major strains on their overall carrying capacity can specify conditions for the scope and years of legally stable employment and designate places of dwelling. In prefecture-level cities, migrants can apply for permanent local hukou for themselves and family members if they had legally stable employment for over three years, lived in a legally stable place of residence, and contributed to social insurance for a certain number of years. These requirements can be lowered in central and western provinces if local conditions allow, and they can be increased in cities facing serious pressures on carrying capacity. In municipalities directly under central management, vice-provincial-level cities, and other large cities, strict quota control policies will continue (Wang, O’Keefe, and Song 2013).

The State Council also requested that the concerned institutions take steps to improve the registration of temporary populations in

cities and called for gradual rollout of the residence permit system. The unified national residence permit system will be residence based rather than origin based and will delink access to social services from hukou.<sup>10</sup> If access to social services is delinked from hukou, then for rural migrants, the remaining function of their rural hukou is to show their rural land rights. This is an important and potentially lucrative right—rural land values in developed areas are high, and rural hukou holders could receive a windfall from land conversion.

These reforms are an important step toward rural-urban integration and equalization of access to social services across the country, which will improve the welfare of the population and benefit the economy as a whole. A residence-based approach for access to social services will encourage mobility and give workers an incentive to move to places where they can earn the highest returns on their labor, which will improve allocative efficiency in the labor market and help enhance productivity. At the national level, removing all mobility restrictions will play a major role in narrowing rural-urban and regional income gaps.<sup>11</sup> Furthermore, making social entitlements available to all workers and their families in their areas of their residence will help deepen the human capital base, promote a healthier workforce, and alleviate social tensions.

Although a residence-based system is a more efficient and fairer system for regulating access at the local level, the full benefits are realized at the national level, which may reduce local government incentives for such investments. The full benefits of increased population mobility, optimal allocation of labor resources, and improvements in the stock of human capital are realized at the national level, whereas the costs of providing these social services are largely borne by local governments in receiving areas. Moreover, the uncertainty of returns to investing in mobile workers further reduces the incentives for such investments. Local governments therefore have little incentive to provide free or subsidized services to migrant families under the current intergovernmental fiscal system.<sup>12</sup>



The introduction of a modern residence system needs to be national and unified, accompanied by a change in intergovernmental fiscal responsibilities that would promote fiscal sharing arrangements for social service provision for all residents. The reform needs to be led firmly by the national authorities and accompanied by change in the intergovernmental fiscal arrangements that would ensure funds for minimum standards of social service benefits. It should also hold local authorities accountable for providing services to all residents. The operating principle of such fiscal reform should be “money follows people” and could be implemented through a national net-settlement system or other reforms of intergovernmental fiscal responsibilities. This would encourage all cities to use residence-based rules for access to public resources through an incentive-based approach rather than through command and control.

The concerns of urban residents regarding eligibility for social services in the cities should also be taken into consideration. Urban residents are concerned about potential deterioration in service quality in cities if their localities must absorb the costs of service provision for migrant populations.<sup>13</sup> Managing such perceptions may be a significant element of the reform agenda and will require actions to improve services for all.

### **A modern residence system—An institution to regulate access at the local level**

The shift to a modern residence system will be a challenging process that could benefit from lessons of experience. This section highlights some relevant experiences with similar reforms to date, both within and outside China, to provide insight into the challenges in granting residency and to point to possible solutions. Building on these lessons, the section discusses some of the major elements to be considered for China’s residence permit system, including sequencing and phasing of reforms, political economy considerations, and other factors that may affect the reform process.

### *Local experiments and international practices*

With encouragement from the central government, many provinces in China have piloted hukou reforms and, more recently, the parallel residence permits. One such reform has been the unification of hukou registration undertaken by 15 provinces by 2009. However, in the absence of supporting entitlement reforms, this reform has remained largely symbolic. Some provincial pilots have involved liberalization of hukou within their administrative jurisdiction, with or without exchange of rural and urban entitlements. Chongqing, for example, adopted the “exchanging three rural clothes for five urban clothes” policy—the rural clothes being homestead land, farmland, and contracted forestland, and the urban clothes being pensions, medical insurance, housing, employment, and education. A similar localized hukou conversion pilot in Chengdu did not require the exchange of rural and urban entitlements. In a number of large cities and provinces such as Shanghai, Shenzhen, Zhejiang, Guangdong, Jiangsu, Chongqing, and Chengdu, parallel residence permits have been adopted, linking provision of social services to these permits rather than to hukou status (World Bank and DRC 2013).

The conditions of the residence permit system differ across cities, as described in box 3.1. Some cities offer easier access to residence permits but more limited access privileges, whereas others offer a better package of entitlements but have stricter criteria for obtaining a residence permit (for instance, Shanghai). Other cities mix the two approaches for individuals with temporary residence permits and those with permanent and fuller entitlements (for instance, Zhejiang).

The experiences of other countries and the European Union (EU) during its enlargement provide useful insights on rules for establishing residence and the associated benefits. In the EU, a “right to reside” is linked to one’s employment status for the working age economically active population from EU member states other than the one where one is born. Workers and self-employed people have the right to reside without any conditions but must have the proper documentation

### BOX 3.1 China's experience with residence permits

Guangdong is the largest migrant-receiving province, housing nearly 30 million migrant workers. The provincial government introduced the residence permit card in early 2010 to manage the floating population in all cities of the province. Guangdong also is the first province to replace the traditional hukou quota system with a point system for hukou conversion, gradually lowering the conversion criteria for migrants. The points are calculated based on education, vocational certificates and profession, years of social insurance contribution, charitable activities such as blood donation and volunteer work, and government awards. Between 2010 and 2011, about 696,000 migrants were converted through the point system.

In Shenzhen (one city in Guangdong), a permanent residence card is granted to nonlocal hukou residents over 16 years of age who are employed, have investments, own properties, are overseas returnees, or possess “creative talents.” A “temporary residential card” is granted to those who do not have jobs, investments, or private property in Shenzhen. Permanent residence cards allow migrant workers to enjoy the same housing, medical, educational, and pension benefits as those with local hukou. Shenzhen issued 5 million such cards by the end of 2008.

In Chongqing, a residence permit seeker must have a job and must have worked for five years in the central city of Chongqing or for three years in a township within the municipal boundary. They can become registered residents only in the places where they have been working. The package includes free access to compulsory schooling, the same subsidies for health and retirement insurance plans that urban residents

receive, unemployment insurance in the formal sector, and free or subsidized vocational training. Using a lottery, authorities in Chongqing give residence permit holders access to subsidized public housing rentals, with the subsidy covering about half of the market rental price. In the three rounds of lotteries to award subsidized public housing rentals, more than 100,000 people were granted subsidized rental units. These subsidized public rentals are also open to long-term residents who do not own residential property, allowing for the creation of mixed neighborhoods. At this time, only intraprovincial migrants are eligible for subsidized rental units.

Shanghai introduced a point system in 2013 to allow people with stable employment in the city to apply for a residence permit. Points are calculated based on the resident's age, years of experience, and social insurance contributions in Shanghai, as well as educational and technical qualifications. Residents who make a significant investment in Shanghai, or who otherwise contribute to boosting local employment, earn 100 points; those providing false information lose 150 points. Those residents who violate the family planning policy or have a record of criminal offenses are disqualified. A total of 120 points is required for a residence permit holder to be entitled to social benefits such as social insurance and to the right to have their children take the national college entrance exam in Shanghai. The health insurance subsidy and the subsidy for social housing are not automatically provided to residence permit holders.

In 2013 Tianjin promulgated its point system (to take effect in 2014), and Beijing announced that it will formulate its residence permit system in 2014.

*Source:* World Bank staff compilation based on policy directives and documents of various provincial authorities.

to prove their status, such as a certificate of employment or proof of self-employment.<sup>14</sup> In the case of students or economically inactive individuals (for example, unemployed or retired), the right to reside involves proving that they have comprehensive sickness insurance as well as sufficient resources to not become a burden on the host EU country's social assistance system during their residence.<sup>15</sup> The “right to permanent residence” requires five years of continuous legal residence in the host EU country, and once acquired, it is not subject to the conditions

mentioned above. One can lose the right to permanent residence only through an absence of more than two consecutive years, although the directive stipulates reasons for when such an absence is acceptable.

EU migrants to member states enjoy privileges such as access to social assistance, education, and health care, which make the residence rules meaningful. The general working principle is that EU citizens and their family members residing in the territory of another member state enjoy treatment equal to that of nationals of that host country. Box 3.2

provides details on the eligibility of EU migrants for various social benefits in member states.

In the United States, the *bona fide* and *durational* residence requirements regulate local access. Bona fide residency simply requires that the person establish residence

before demanding services that are restricted to residents.<sup>16</sup> Durational residency obligates a person to show that, in addition to being a bona fide resident of the state, he or she has resided there for a stipulated period of time. For example, to be able to send their children to public primary and secondary

### BOX 3.2 European Union migrants' eligibility for social benefits in member states

Goals set out in the European Union (EU) treaties are achieved by several types of legal acts, including regulations, directives, recommendations, and opinions. A *regulation*, such as a social security regulation, is a binding legislative act and must be applied in its entirety across the EU. A *directive*, such as the right to education, is a legislative act that sets a goal that all EU countries must achieve. However, deciding how to achieve that goal is up to the individual countries.

*Right to education (under EU directive):* Children of EU migrants are entitled to attend school in any member country under the same conditions as nationals of that country. They have the right to be placed in a class with their own age group, at the equivalent level to their class in the country of origin (regardless of language proficiency) and to receive free language tuition in both the language of the new country and the country of origin.

*Right to health care (under EU regulations):* Insured individuals moving temporarily to member states are entitled to necessary medical treatment upon presentation of a European Health Insurance Card, issued by the competent authority of their home country. Treatment is provided by public health care providers and is subject to the same user fees charged to local permanent residents of the host country. For those residing for longer periods of time, European Commission regulations on social security coordination provide that all insured persons are entitled to health care (including long-term care benefits) provided for under the legislation of the Member State in which they reside. These benefits are to be provided by the institution of the place of residence in accordance with their statutory conditions, procedures, and rates, as though the beneficiaries were insured under the host country legislation.

*Right to social security or insurance (under EU law):* Social security benefits have to be granted to people from other EU member states once their place

of "habitual residence" is confirmed in the host country. Such benefits (sickness, maternity and equivalent paternity benefits, old-age pensions, preretirement and disability benefits, survivors' benefits and death grants, unemployment benefits, family benefits, benefits in respect to accidents at work and occupational diseases) vary considerably from one member state to another. The EU provisions do not harmonize them but instead provide for their coordination, aided by establishment of common rules and principles that have to be observed when applying national laws. Every member state is free to decide who is to be insured under its legislation, which benefits are granted, under what conditions (for example, based on residence, employment or occupational activity, completion of certain periods of insurance), how these benefits are calculated, and what contributions should be paid. The principal rule is that employees (and the self-employed) are covered by the social security system of the country in which they are employed (work), irrespective of where they live or where the employer is based. For the unemployed (students, retirees), their right to social security is determined in accordance with the legislation of their country of residence.

*Right to noncontributory social assistance and housing assistance:* The EU rules on social security coordination do *not* apply to (a) social and medical assistance benefits normally granted on the basis of one's means, (b) taxation, and (c) certain special cash benefits that are noncontributory and aimed at ensuring minimum resources for those without other means of support. Such assistance is provided by and at the expense of the institution of the country of residence and in most cases is paid to people whose pension or income is below a certain level. The EU directive on equal treatment (2000/43/EC) applies to a wide range of spheres, including housing, and prohibits discrimination, but responsibility for implementing the directives in its legal framework is left to each member country.

Source: European Commission website, <http://ec.europa.eu>.

school for free, families must establish bona fide residence (actual physical presence plus intent to remain there) in the school district. However, for eligibility to pay lower in-state (resident) tuition at public higher education institutions and to access state education grants, most U.S. states enforce a durational residence requirement of at least one year (excluding any time as resident to enroll for the sole purpose of attending an educational institution).

Japan uses two distinct registry systems to manage citizen information: (a) the basic resident registry (*Jūminhyō*) and (b) the family registry (*Koseki*). The basic resident registry lists sociodemographic information (name, address, date of birth, gender, nationality, status of residence, and so on), along with information related to social benefits and insurance. Registering in the basic registry is required when accessing various social services, including registering children at a local school district or starting or renewing national health insurance membership. It basically serves as proof of residence, such as for opening a bank account or applying for government permits. Since 2002, *Jūminhyō* information has been available electronically through the *Jukinet* electronic registration system, which is used by more than 1,700 local governments in Japan. The system has helped simplify procedures for moving in or out of the country and for obtaining a residence registry card, and has eliminated the need to attach a copy of the resident's record in administrative procedures. In December 2008, it also eliminated the need for pensioners to annually confirm eligibility for benefits, because the basic resident registration network reports directly to the Japan Pension Service on behalf of the pensioner. In contrast, the *Koseki* is the formal record of a family's (rather than an individual's) history and is mainly used as proof of citizenship. It is not normally used to verify information or required to obtain government services (Sen 2014).

### *Lessons and concerns*

China's pilots point to a number of challenges in granting residence, but the pilots and international experience also suggest

some solutions. The main lessons and issues include the following.

### *Large city bias*

Rules for accessing residence permits are most restrictive in large cities, where rural migrants are concentrated. In large cities (Beijing and Shanghai are prime examples), strict conditions are imposed on the entry of migrants. At the same time, in small and medium cities, social services and social protection are less generous, contributing to the limited success of the policy in attracting migrants there.

### *Selection of migrants with desired characteristics*

There are systematic differences in the treatment of migrants based on their socioeconomic status, which runs counter to the government's goal of reducing inequalities. This situation is especially true in larger cities, where reforms have generally focused on selecting migrants with the desired characteristics and on attracting high-skilled and wealthy individuals (B. Zhang 2012; Zhang and Tao 2012). In many cities, the result has been that mainly the better-off migrants are able to obtain local hukou, thus widening the welfare gap between local and nonlocal hukou holders. Poorer migrants are excluded in a variety of ways, in some cases by explicit entry barriers regarding skills, investments, or income. Other cities achieve rationing of hukou through strict interpretation of requirements for income or work and place of residence—for example, by excluding those renting apartments and those without formal employment. Other cities impose stricter time requirements for granting residence, for instance, five years of prior residence for low-income people versus two years or none for others.

### *Cities as welfare magnets*

Local governments are concerned about becoming magnets for so-called benefits tourism. Local governments in richer areas or areas with higher-quality services fear that residents from other jurisdictions may move in to shop for benefits. Long-time residents show or prove their connectedness to the

local government by paying taxes and paying into the social insurance system, which also allows services to remain fiscally sustainable.

Internationally, the evidence of welfare benefit-induced geographic mobility is mixed. For example, little evidence has demonstrated that immigrants within the EU receive excessive welfare support relative to natives. The general findings are that immigrants are either as likely or less likely to be receiving support, and no strong link is seen between welfare generosity and immigration (Dustmann, Frattini, and Halls 2010). However, strong evidence from Brazil indicates that rural dwellers tend to move to the cities for better social services.<sup>17</sup> Furthermore, strong evidence from the United States showed that rural-urban migration has net positive effects on cities, despite the initial concerns about fiscal costs and possible negative effects. In the United States in 1967, one of every five urban residents over age 14 had migrated from a rural area. Although such migration imposed short-term fiscal costs, in the long run, migrants paid more into the system than they had taken out of it (Petersen and Sharpe 1969). Their economic gains, though low during the migrants' first five years in cities, increased rapidly thereafter (Wertheimer 1970).

#### *Social tensions and competition for urban services*

Local urban residents in China have concerns about potential impacts on service quality if their localities must absorb the costs of service provision for migrant populations. One survey of local residents in Guangzhou shows that more than half of urban residents agree that rural migrants deserve the rights to enjoy health insurance, have compulsory education, join the labor union, and vote. However, about the same number are against migrants applying for unemployment compensation, dibao, and low-rent housing (Liu 2008). Another study, conducted in 2010 using the 2005 National Comprehensive Social Survey data, found that residents from places with better public service provision and higher public service quality tended to be more reluctant to accept migrants (L. Wang 2010). The study also found that urban residents

with lower socioeconomic backgrounds were more reluctant to accept migrants, as were residents of cities with higher employment pressures.

These concerns are not unique to China, and animosity toward migrants is documented across many societies.<sup>18</sup> The United States and the EU, both large unions with diverse residents and high migration, had to manage these processes. These tensions often arise from the perception that migrants compete for scarce jobs and are a drain on resources in the form of publicly funded services. Conflicts between migrants and residents are likely to be more intense when the receiving area is ethnically homogenous and migrants and native populations are easily identifiable, when migrants dominate certain economic activities, and when migrants fare better than natives. Some findings also show that antipathy toward foreigners is correlated with the proportion of migrants in the population.

Managing these perceptions will be a significant element of reform for China. The national government has a distinct role in this process as a mediator of stakeholder interests. Some strategies for national and local governments include improving services for long-term urban residents and migrants alike, allowing private provision of high-end services within the appropriate framework, and encouraging remedial programs for migrants so they can join the mainstream.

#### *Elements of the residence permit system for China*

These experiences suggest that the shift from the hukou system to a modern residence system should be national and unified. It should be based on a phased strategy and involve consultations with various stakeholders to explain the strategy for reform. Some key steps and considerations in undertaking such reform are described below.

The shift from the hukou system to a modern residence system for defining eligibility for basic services will involve several steps. These steps include the following:

- *First*, the central government will need to define the principles and national frame-



work of the residence-based system, including the system by which local governments should grant residency to people living in a specific locality and the sequence of entitlements that accrue upon attaining a residence permit. It may not be practical to expect common levels of eligibility criteria in the short to medium term, but the central government should set minimum guidelines for local governments to follow and create a time-bound pathway for extending access privileges.

- *Second*, under the national framework, local governments can define the qualifying periods to move from one step of the entitlement sequence to the next. As discussed above, many localities have already implemented localized residence permit systems with different approaches and requirements. In the initial phases, it is unlikely that all social entitlements of current local residents could accrue immediately upon obtaining a residence permit, but for fundamental rights, the requirements should be very simple and low.
- *Third*, the conditions and requirements for obtaining a local residence permit should converge over time, supported by broader reforms such as fiscal and tax system reform, equalization of public services, and rural-urban integration.
- *Fourth*, the residence system should be facilitated by an information technology (IT) platform based on a set of national standards for exchanging population data across jurisdictions, building on the unique national identification (ID) and social security cards.

Although full convergence of residence permit policies may take a decade or more, establishing an elaborated national framework for residence permits is an urgent priority. Negotiations with subnational authorities will be required to balance the desire for common national standards with local discretion. Reforms also need to be accompanied by a change in intergovernmental fiscal responsibilities that would promote fiscal sharing arrangements for social service provision for all residents. The operating principle of such fiscal reform should be “money

follows people,” which could be implemented through a national net-settlement system or other reforms of intergovernmental fiscal responsibilities.

In developing this national framework, one important issue to consider is the extent to which it should have common standards for all types of urban settings. To date, the national authorities have promoted a variable strategy for obtaining hukou depending on city size and status. It could be argued that making acquisition of local hukou in smaller cities easier can help promote agglomeration effects in regions where market forces may not be as strong drivers as in more prosperous areas. However, global practice has shown that closer convergence of qualifying conditions for obtaining local residence permits across all types of cities would help achieve truly unified citizenship, although this is unlikely to be politically feasible in the short to medium term and is best considered a longer-run policy goal.

Another consideration is the core criterion to be used for determining residence when granting a residence permit. The key question is whether residency for a prescribed period should itself be sufficient or if some additional criterion should be applied, typically a period of employment. International experience is not definitive on this question, with variation across and even within countries and jurisdictions. For China, a residence permit system based purely on period of residence is unlikely to be workable in the short to medium term in larger and affluent cities for a number of reasons:

- *Political economy*. Local hukou residents and local authorities would be reluctant to accept such a mandate, particularly without an overhaul of the intergovernmental fiscal system to better match local revenues and fiscal transfers with the total population residing in a city.
- *Gaps in the current registration system for movement to or from different areas*. Although in principle migrants must register their new residence within three months, in practice, tracking such movements fully between areas and even within districts is difficult.



- *Incentive structure.* A purely residence-based system may weaken incentives for migrants to participate in formal sector employment and accompanying social security, labor protection, and other schemes.

For cities where demand for migrant workers exceeds supply, political economy factors will differ, and the desire to expand the local workforce may outweigh the second and third considerations.

If a permit system based purely on residence is not feasible for the foreseeable future in larger cities, an argument can be made to make some entitlements subject to a period of residence only (perhaps 6 to 12 months). The obvious entitlement that should be based on residence alone is basic education for children of migrants. This already has a clear basis in national policy, minimizes intergenerational transmission of inequality, has substantial lifetime externalities beyond the city, and would minimize the problem of left-behind children. Basic health care services is another example.

Beyond that very limited set of basic entitlements that should vest quickly and be based on residence only, other entitlements could be subject to a work requirement of some form. Formal sector social insurance schemes already link entitlements to contributions through the employer. The more complex entitlements are resident pension and health insurance schemes, dibao, and social housing. For migrant workers in formal employment, the issue is one of simply deciding the appropriate prior period of residence and employment and the extent to which that period differs across entitlements. Migrant workers in informal employment pose a more difficult case, as verification of employment is challenging.

Another consideration is the extent to which the national framework should prescribe the sequence for all cities to follow in granting entitlements to migrants and the criteria for prioritization. A case can be made for mandating a common national sequence for entitlement acquisition, rather than giving cities total discretion to specify conditions for acquiring certain entitlements. A common national sequence could be based on some

guiding socioeconomic principles, such as the following:

- *Entitlements that generate externalities beyond the individual city should be given priority.* As mentioned above, the most obvious example is basic education, given the national economic benefits of a well-educated population. Another example is the basic public health care package, as vector and disease control in one area has impacts beyond that jurisdiction, given the mobility of populations. A third example might be employment services, given the economic benefits of better matching workers and jobs.
- *Entitlements that increase the possibility for families to live together should also be prioritized.* Basic education is again an example. Evidence on crime rates and other socioeconomic issues among left-behind children is persuasive, as are the costs of divorce and family problems with split families. Facilitating family co-residence may also help address emerging challenges such as child care costs and the growing need for home-based care of elderly people.
- *Entitlements that are largely self-financing, such as urban worker pensions, health insurance, and unemployment insurance, should be immediately accessible to migrants.* Efforts will also be needed to promote their uptake among employers and migrant workers through policies and information systems that improve portability and accelerate higher-level pooling of contributions to lessen the spatial fragmentation of social insurance.
- *Entitlements that are primarily of a welfare nature should be considered later in the sequence, with the exception of short-term support, such as disaster relief or temporary social assistance, and probably specific groups such as people with disabilities.* The obvious examples of welfare entitlements are dibao and social housing. Although these entitlements should be part of the overall package associated with obtaining a local residence permit, for political economy, welfare dependency, and other reasons, policies may vest them only after a more extended period of residence and employment.

The rationale for including such prioritization in the national framework is to realize gains for the country that individual jurisdictions may not perceive as having socioeconomic benefits. Strong guidance to localities within the national framework would help promote fairness and common treatment countrywide. It would also prepare the ground for longer-run convergence across different types of cities in the detailed local criteria for residence permit acquisition. If the national authorities provide a fiscal transfer for a transitional period to assist cities in taking on enhanced responsibilities for basic services to migrants, adoption of the sequencing for entitlement acquisition could be a condition for cities to receive their central transfer.

Development of an IT platform will be important for providing quantitative information to facilitate fiscal allocations as well as for supplying data for monitoring and evaluation. Setting up the IT platform should start with establishing national standards for information systems and the exchange of data on mobile populations. A fully centralized national database seems overly ambitious at present, but a common platform will be essential. Such a system can serve as the information backbone of shared guidelines for social services, including a population registration system for the purposes of fiscal transfers. The system could rely on matching of the unique residence and individual identification, verification, and validation. Program eligibility can be consolidated to allow individuals to move and still receive benefits from another location, as well as to ensure that individuals are residents in only one place at a time. Box 3.3 describes current efforts to build China's resident population database.

Another factor that will influence hukou policy over the longer run is labor supply and demand. The discussion above assumes excess demand among migrants for local residence permits, at least in larger and more affluent cities. However, faced with a shrinking working-age population—and more specifically the shrinking pool of surplus rural labor—cities will increasingly compete to attract workers. If so, the conditions

for obtaining a local residence permit will become a potential source of competition between cities seeking to attract workers. This is already happening with respect to highly skilled or wealthy migrants, and recent experience in some Pearl River Delta cities suggests that similar labor market dynamics will increase competition for workers with midlevel and even lower skills over time.

In any reform of hukou policy, the set of complementary policies that will affect migrant demand for residence permits must also be considered. Perhaps the strongest is rural land policy and the implications of assuming the urban residence permit for land claims in areas of origin. Studies suggest that fear of losing rural land claims is a significant deterrent to migrants in converting their hukou.<sup>19</sup> A range of other policies, such as portability provisions (or lack thereof) in pension and health insurance schemes, may also affect demand for residence permits. The interaction of such policies with the proposed residence permit reform will need close attention.

### **The current urban standard of social services: Financing, delivery, and the cost of extension to migrant populations**

As China moves toward a modern residence permit system, it will be important to determine what the modality of service provision will be and to ensure adequate funding for the extension of services to migrants. Although providing the current “urban standard” of social services is critical to making urbanization inclusive, the costs of extending such services can place considerable strain on local government budgets. This section takes stock of progress in providing the urban standard of social services and describes the financing and delivery arrangements. It then proposes options for extending services to migrants and their families and provides indicative estimates of how much it would cost to equalize access to public resources within cities for residents with and without local hukou.

The current urban standard of social services, which goes beyond the current basic

### BOX 3.3 China's resident population information system—Setting up a comprehensive population management information database

Currently, the collection and management of data on the resident population in China relies on several sources of information. These sources include the Population Census (including the small-scale census), the Population Sample Survey System, as well as the information collected by various administrative departments, including most notably the Department of Public Security (the police department) compiled into a basic population information database. Vast improvements in the accuracy and sharing of information will be needed before these can be used for building a resident population database.

In the past, the police department was in charge of all household registration, which included information on births, deaths, temporary registration, and household migration, according to the Household Registration Rules of the People's Republic of China released in 1958. After the 1980s, with more and more people not living in the place where their households were registered, the accuracy of this system came under question. The 2003 Administration Approval Law made it no longer mandatory for citizens to show their birth control certificate to apply for a temporary residence permit, and cities also lifted the registration fee levied on migrants. Registration of the migrant population dropped precipitously, so local governments attempted to reform their population registration system through issuance of residence permits. Although registration is not universal for migrants, it remains a valuable source of data on

the resident population in China. Other government departments, such as health, education, labor, tax, and finance, have also set up their own population information systems.

Recent national and provincial-level pilots can inform the next steps in setting up the resident population database. In 2002, the government released the "National Informatization Leading Group's Guidance on How to Build E-government in China forwarded by General Office of CPC Central Committee and General Office of the State Council" and the "Special Plan for Informatization of the National Economy and Social Development," recognizing the basic population information database as one of the four major national databases. In 2004, the State Informatization Office, Ministry of Public Security, Ministry of Labor and Social Security, State Taxation Bureau, and National Standardization Management Committee jointly launched the pilot integration of basic population information from these departments for select cities and provinces (Hunan, Shanghai, and Yangzhou). In June 2007, the Ministry of Public Security developed an "Online System for Checking Citizen ID," offering ID services for banking institutions. In February 2009, the Ministry of Human Resources, Labor, and Social Security followed up by preparing to build a nationwide social security information inquiry system (using personal ID numbers as social security numbers) to help beneficiaries check their pension and benefits records at any time.

Source: B. Zhang 2010.

package of social services, varies by location. The current package of social services in urban China includes nine years of free compulsory education, access to basic public health care services, social security (medical and old-age pensions) for formal sector workers and for residents, a social assistance program, and a welfare housing security system. The 12th Five-Year Plan commits to a wide range of social services that go beyond the current package.<sup>20</sup> The current urban standard varies across China's provinces, regions, and cities and is financed from different sources, both public (central and subnational) and private.

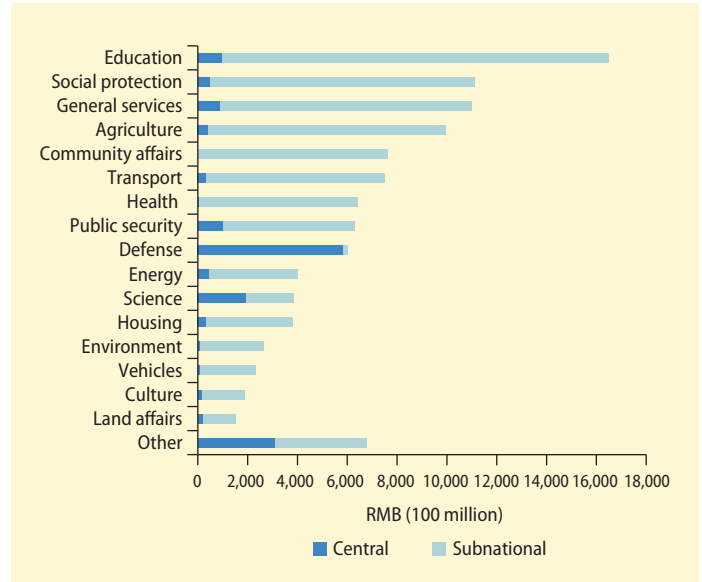
Financing of public social services is highly decentralized, with subnational governments accounting for 85 percent of total government spending. As shown in figure 3.4, China's subnational governments dominate every major functional category of public sector expenditure except defense, accounting for at least 95 percent of spending for most major functions of government (education, social protection, and health). In comparison, the average proportion of financing by subnational governments is 26 percent in transitional economies and 32 percent in Organisation for Economic Co-operation and Development (OECD) countries.

The fiscal relationship between the central government and provincial governments is defined by a system of tax sharing and transfers.<sup>21</sup> The fiscal relationship between the individual provinces and their subordinate units of administration (prefectures, counties, and districts) is complex. On the revenue side, each province has an arrangement for sharing certain taxes with its prefectures, which in turn have arrangements for sharing taxes with their counties. Responsibilities for providing social services are assigned to local governments at the subprefecture levels—counties and townships for rural schools and clinics, and districts and street offices for urban.

Until 2000, the system had no transfer mechanisms to ensure that local governments had sufficient resources to meet expenditure responsibilities, which amplified regional disparities. Subnational governments mobilized extrabudgetary resources to support continued service provision. Schools, hospitals, clinics, and other public service providers collected fees and donations and generated other revenues, including by running enterprises. Even in 2000, extrabudgetary resources financed as much as half of total expenditures in schools. Since fees and other extrabudgetary resources are tightly linked to per capita incomes, the high dependence on extrabudgetary financing has tended to widen regional disparities.<sup>22</sup>

Reforms of the 2000s sharply increased the amount of central government resources for the social sectors. For example, budget expenditures for universal compulsory education increased seven-fold in real terms from 2000 to 2010.<sup>23</sup> An essential package of health care, delivered through primary health centers with funding from the central government, was introduced in 2009. A nationwide voluntary rural pension scheme was rolled out, and the broad design was replicated in mid-2011 for urban residents, both subsidized by the central government. To support these policies, the central government has greatly expanded general inter-governmental transfers and introduced many programmatic transfers, starting its efforts with the rural sector where financing problems had been the most acute.

**FIGURE 3.4** Central and subnational expenditure by function, 2011

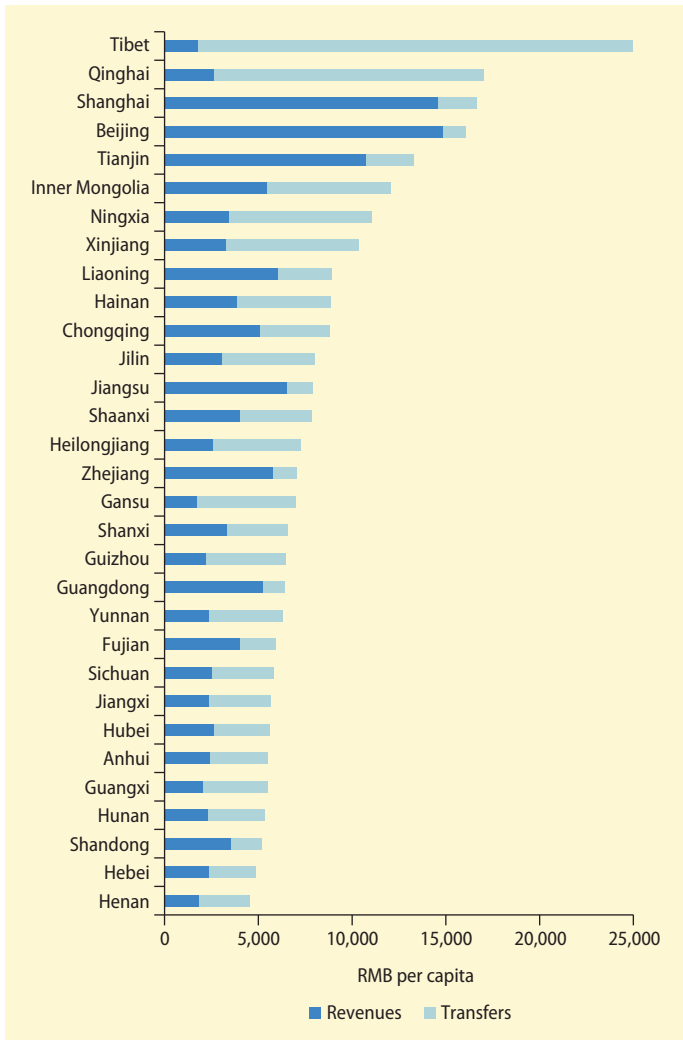


Source: NBS 2012 (China Statistical Yearbook 2012).

The large system of central-to-provincial transfers strongly targets resources for social services toward rural areas and the western and central provinces (figure 3.5). For example, for the Two Exemptions and One Subsidy (TEOS) program and the New Mechanism (described in box 3.4), the central government provides 80 percent of the costs for western provinces and 60 percent for central provinces but only a minor percentage for the eastern provinces except Beijing, Tianjin, and Shanghai. Differential treatment can also be seen in urban and rural compulsory education, with central transfers targeted almost entirely at rural schools. The universal exemption from miscellaneous fees was applied to rural schools starting in 2006 for the western provinces and in 2007 for all other provinces. In urban schools, the exemptions were mandated to begin in autumn 2008.<sup>24</sup> Notably, for urban schools, the cost of subsidies to offset revenue losses from fee exemptions are borne entirely by subnational governments, mostly at the lower levels (State Council 2008).

Therefore, left to manage within their own budget envelope, municipal governments in urban, migrant-receiving areas find it difficult to pay for social services for a floating population. These services are costly to

**FIGURE 3.5** Per capita subnational revenues and transfers, by province/region, 2011



Source: NBS 2012c.

provide, and central government policies on social service provision for migrants are often considered to be unfunded mandates. In Hubei province, for example, education absorbed an average of 24 percent of county-level budgets in 2007. In Wuhan and Huangshi municipalities, education accounted for 25 and 26 percent of district expenditures, respectively, reaching as much as 37 percent in some districts.

The subsections that follow take a closer look at the different types of social services in the current urban standard and the costs

of extending them to the migrant population. The subsections elaborate on the system of delivery; the cost of extending services to the migrant population; and financing frameworks for compulsory education, basic public health care, social security (medical and old-age pensions), social assistance, and welfare housing.<sup>25</sup>

#### *Access to compulsory education*

##### *Current status and challenges*

The current official policy on the right of migrant children to universal compulsory education is residence based, which represents a dramatic policy change that has taken place over the past two decades. In 2001, the State Council's "Decision on the Reform and Development of Basic Education" introduced the idea of the *two mainlys*: migrant children should be accommodated mainly locally and mainly in public schools. Several important policy documents followed in 2003 to 2005, starting with the Central Document No. 1 of 2003, issued jointly by the Communist Party of China Central Committee and the State Council, which emphasized the need to support the migration of farmers into cities and to ensure that their rights are respected and that discrimination ceases, which includes the right of their children to universal compulsory education. More recently, a 2008 State Council policy resolution extended free compulsory education to all schools and called on urban local governments to treat migrant children on the same basis as local children in allocating school expenditures, both for those enrolled in public schools as well as for those enrolled in *minban*<sup>26</sup> schools.

The urban local governments receiving migrants are required to establish a mechanism for guaranteeing funding for the schooling of migrant children and to provide financial assistance to schools that have enrolled more migrant children. In 2003, the Joint Notification issued by the Ministries of Finance, Labor and Social Security, Public Security, and Education, and the Family Planning Commission called for the establishment of a funding mechanism for public services for migrant workers by incorporating their



### BOX 3.4 Central government resources for compulsory education

*Education transfers.* In compulsory education, the central government introduced a program to provide free textbooks, which became known as the Two Exemptions [of the textbook fee and miscellaneous fees] and One Subsidy [boarding subsidy] or TEOS. The government extended the TEOS to all rural students in compulsory education, beginning with the western provinces in 2006, then all provinces starting in 2007. To ensure adequate funding for schools, the government introduced a new transfer, the “rural education operating cost guarantee mechanism” (often called the New Mechanism). As a long-term framework for upgrading the quality of school buildings, the School Safety Program was introduced, under which the central government provides subsidies for a portion of agreed maintenance and construction costs of schools. Starting in 2006, the government also rolled out a program to help resolve the education debts of subnational governments that had

borrowed for school construction, including those for many village schools.

*General transfers.* In terms of general transfers, the central government increased support for universal compulsory education in rural areas by supporting salary payments. One of the most important transfers is the wage adjustment transfer (WAT). First introduced in 1999 and intended only to offset the cost of the wage increase mandated by the central government, the WAT has grown rapidly over the past decade as public sector wages have risen steeply. It now accounts for the vast majority of wage payments at the subnational level. In Hubei province, for example, because teachers make up 60 percent of public employees at the county level, this transfer is a principal source of central government financial support for rural universal compulsory education.

*Sources:* Chen 2005; interview with government officials from the Comprehensive Department, Ministry of Finance, March 2013; and “State Council Notification on Deepening Reform of New Mechanisms for Ensuring Funding of Compulsory Education,” State Council (2005) No. 43, December 24.

expenditure needs—including for educating their children—into the scope of recurrent budgetary expenditures (Ministry of Finance and others 2003). A 2003 State Council circular also directed that fee levels for migrant children should be reviewed and reduced to be more in line with those for local students. For children of low-income migrant workers with unstable jobs and residences, financial assistance should be provided to defray fees, provide free textbooks, and so on.

Many migrant-receiving cities appear to have made great strides in enrolling migrant children in their public schools over the past decade. A Ministry of Education (MOE) survey found that in 2009, nearly 80 percent of the 9.97 million migrant children enrolled in urban schools were in public schools, and in 19 provinces, this share reached more than 90 percent (Yuan 2013). Similarly, a 2009 survey of migrant populations in Beijing, Shanghai, Shenzhen, Taiyuan, and Chengdu by the Family Planning Commission found

that 98 percent of migrant children ages 7 to 14 were enrolled in school. Among them, 69 percent were enrolled in public schools, 25 percent in private schools, and only 6 percent in “schools for children of migrant workers.”<sup>27</sup> In 2010, Shanghai became the first municipality to declare that it had achieved the aim of providing universal compulsory education places for the city’s migrant children (Yuan 2013). Longitudinal data assembled by the Research Institute for Community Education show that in Beijing, the number of school-age migrant children nearly tripled during 2001 to 2010. The rapid increases in migrant children in Beijing and their public school enrollment are shown in table 3.3.

However, China still has many left-behind children who are not enrolled because they remained in the villages or have dropped out of school. In some cities, the proportion of migrant children enrolled in public schools has stayed roughly the same, for example, at about 40 percent in Guangzhou (H. Wang



**TABLE 3.3** Enrollment of migrant children in universal compulsory education, Beijing municipality

	All students (number)	Migrant children (number)	Migrant children enrolled in public schools (number)	Migrant children as a percentage of all compulsory enrollment (%)	Share of migrant children enrolled in public schools (%)	Migrant children as a percentage of public school enrollment (%)
2001	1,338,904	150,000	99,571	11.2	66.4	7.8
2002	1,286,082	180,000	134,980	14.0	75.0	11.0
2003	1,239,976	240,000	170,839	19.4	71.2	14.8
2004	1,220,442	320,700	212,263	26.3	66.2	19.5
2006	1,121,033	370,000	255,846	33.0	69.1	25.9
2008	1,082,036	400,000	276,047	37.0	69.0	29.5
2010	1,058,998	438,000	306,668	41.4	70.0	33.7

Source: Yuan, Wang, and Ding 2013, table 2–3.

2013). Some indicative data in table 3.4 show the large gap between the potential number of migrant children who could be enrolled and the reported actual enrollment numbers.

Several barriers continue to keep migrant children out of the mainstream urban education system, including the following:

- *Capacity constraints in urban schools.*<sup>28</sup> Lack of capacity is a common reason given for not accommodating all migrant children in urban public schools. Migrant children are placed at the bottom of the waiting list for school places and are admitted only after urban (hukou-based) demands have been met. In cities with large migrant children populations, local officials cite the high cost of building new schools as a reason for not being able to absorb all migrant children.

- *High legal and regulatory barriers* (Montgomery 2012). In general, the procedure for migrant workers to enroll their children in a local school is complicated. They are required to submit many documents to the local education department—the typical number appears to be five, as reflected in the common reference to “the five documents,” although Foshan requires 16 and Ningbo requires 10 (Xinhuanet 2009). Table 3.5 summarizes some of the conditions for enrolling migrant children in public schools, including some hidden rules, such as having the necessary relationships or connections (*guanxi*). The common perception among migrants is that getting their children into urban public schools remains difficult.
- *High costs of schooling.* High costs continue to pose a barrier for many families. Despite the repeated calls to treat migrant children on an equal footing and abolish all “rental” and school selection fees, many public schools continue to levy them, often with local urban government approval. One recent survey on migrant education in Guangzhou found that annual costs were more than RMB 2,000 for over 60 percent of children in public schools, more than RMB 3,000 for 31 percent, and less than RMB 1,000 for only 15 percent (H. Wang 2013).<sup>29</sup> Migrant children who are not in public schools must usually pay tuition and other fees for the private schools they attend. Shanghai is the exception, with tuition exempted even in private schools (although only those approved by the government). Elsewhere, private schools receive little or

**TABLE 3.4** Status of migrant children enrollment in universal compulsory education in selected cities, various years

City/year of reporting	Total population (million)	Migrants (million)	Enrollment of migrant children (thousand)	
			Potential <sup>a</sup>	Actual <sup>b</sup>
Shanghai (2012)	24.3	10.5	1,155.0	500.0
Beijing (2009)	19.6	7.1	775.0	393.1
Guangzhou (2011)	12.7	4.8	523.6	362.4
Ningbo (2012)	7.6	2.3	251.7	289.0
Chengdu (2010)	14.1	2.6	288.3	173.8
China	1,370.5	221.4	24,356.9	12,000.0

Source: 2010 Population Census. Shanghai figures are from Beijing Foundation 2013.

a. Based on the average 11.1 percent share of the population enrolled in universal compulsory education in 2011. This is likely an underestimate because rural migrants have a higher birth rate and hence a younger age structure than the overall population.

b. Estimated from reported shares of migrant children and various news reports.

**TABLE 3.5** Conditions for migrant children's enroll in public schools, 2011

City	Share in public schools (%)	Eligibility requirements	Ease of enrollment	Hidden rules for enrollment
Shanghai	70	The five documents, including proof of immunization	Relatively difficult	Rely on <i>guanxi</i> (relationships)
Guangzhou	40	Residence for six or more months, stable job and income, graduated from local kindergarten	Very difficult	Large sponsorship fee
Kunming	55	Three documents, including Family Planning Certificate	Difficult	Rely on <i>guanxi</i> or large sponsorship fee
Beijing	70	The five documents, including a letter certifying that the child cannot be cared for in hukou jurisdiction	Relatively difficult	Good schools require large sponsorship fee

Source: Adapted from Yang 2011.

no government funding support, and the costs are borne largely by the students. In Guangzhou, where half of the enrolled migrant children are in private schools, a survey found that over 70 percent of them pay more than RMB 4,000 per year.

- *Policy requiring students to take university entrance exams in the province of their hukou.* The policy also discourages migrant children from enrolling in urban schools, especially junior middle school. Because schools' curricula differ across provinces, students who did not study in the local schools are often disadvantaged. As a result, migrant children may be kept in the cities through primary school but sent home for junior middle school.

In 2008, the central government introduced a program of fiscal incentives to reward provinces that have performed well

in providing free basic education to migrant children, although the subsidies seem small compared to the costs. The performance measures include total number of migrant children enrolled in school, proportion of migrant children who are enrolled in public schools, proportion of enrolled migrant children who are from outside provinces, and amount of fiscal input and subsidies provided. However, there is little information on how central subsidies for migrant children's education are distributed. Data from selected available reports are presented in table 3.6, which shows that financial assistance is available to the districts and counties that are the main recipients of migrant children, but that assistance covers only a minor portion of total costs.

Although reforms and increased central government injections have greatly improved the financing of universal compulsory

**TABLE 3.6** Assistance in financing migrant children's education

City	Source of assistance	Amount of assistance (RMB)	Date	Share of cost per child
Jiangsu	Central government	671,000	2008/11	RMB 813 per child
Nanjing	Central government, province, and municipality	37,000	2012	RMB 523 per child
Guangdong	Central government	500,000	2012	RMB 140 per child
Ningbo	Central government		2012	2–3%
Chengdu	Central government	4,500	2012	5%
Beijing	Municipality	100,000	2009	3.3%
Shanghai	Municipality	2,000 per child enrolled	2012	10%

Sources: World Bank staff field visit May 2013; Beijing Foundation 2013; H. Wang 2013; Yuan 2013.

education, these changes have not created a sustainable financing framework because of insufficient local government funds. The financing framework provides little central government assistance to municipalities to fund the integration of migrant children. In most municipalities, nearly all of the responsibility falls on districts and counties, which often have inadequate resources and lack the motivation to comply with central policy. Moreover, the financing burden on grassroots subnational governments is heaviest in the rich, coastal provinces. Under the current financing framework, these subnational governments receive scant assistance from central government funds for universal compulsory education since they are predominantly urban and eastern. For them, the current policies on education of migrant children are costly but largely unfunded mandates.

In principle, the system could be adjusted to make the funding that is currently aimed at rural schools follow the children who migrate to cities to help finance their transfer to urban schools. The New Mechanism (for nonsalary operating costs) is well designed for this purpose, because the funds are allocated on a capitation basis by school enrollment. However, most of the central transfers go to salary payments and thus cannot be reallocated.<sup>30</sup>

Another solution would be to revise wholesale the revenue and expenditure assignments for provinces and to give provinces a bigger role in both financing and managing service provision.<sup>31</sup> The current system of central government transfers is complex and non-transparent, making it difficult to identify all the transfers provided for compulsory education. As a result, local officials either overestimate or underestimate the amount of assistance received. The system is also administratively cumbersome and imposes high costs for monitoring and supervision.

### *Considerations for next steps in urban inclusive education*

Under the current delivery modality and cost structure of the urban school system, the cost of expanding access to compulsory education for migrant children who are in the cities with their parents is 0.98 percent of 2012

GDP. Under the assumption that all left-behind children will accompany their parents to the cities by 2020, the cost of extending compulsory education more than doubles to about 2.27 percent of 2012 GDP.

At present, public schools are qualitatively far superior to private schools in China, aside from the small number of elite private schools that most of the population cannot afford. This value is reflected in almost all conventional measures of inputs, such as school facilities and buildings, student-teacher ratios, and teacher qualifications. Numerous studies also confirm the superiority of public schools in educational outcomes. For example, Chen and Feng (2013) found that migrant students enrolled in private schools performed significantly worse than their public school counterparts in Chinese and mathematics.

In this context, improving access to public schools would certainly raise the quality of education for migrant children, but it is not the only way. Efforts to reform education services for migrant children need to include a mix of more concerted efforts to make public schools more accessible to migrant children as well as improve migrant schools to match public school standards. The relative importance of the two approaches will differ depending on current policies, status of integration, existing capacity of public schools, and so on. Political economy considerations are also important, and efforts will be needed to assuage the concerns of urban residents and the community at large and to address the unwillingness of public school officials to admit migrant children.

Some lessons for a more cost-effective solution to providing migrant children with access to education may be drawn from the Shanghai model, in which the government has actively provided financial and technical support. In 2008, when Mayor Yu Zhengsheng declared that Shanghai would strive to provide free universal compulsory education for all migrant children during the 11th Five-Year Plan period, the municipal government initiated a large program to build hundreds of new public schools. It also undertook a program to selectively purchase places in private schools to accommodate migrant children.<sup>32</sup>

Although Shanghai is not alone in relying on private schools to absorb migrant children, what distinguishes it as a model is that the government has taken an active role in helping to upgrade the quality of private schools with financial and technical support.<sup>33</sup> These efforts made it possible for Shanghai to be first in declaring success in providing universal compulsory education places for all of the city's migrant children in 2010 (Beijing Foundation 2013).

In light of the difficulties with cost containment in the public school sector, the Shanghai model for private schools may be worth considering in the search for more affordable, cost-effective solutions. At present, the private schools in Shanghai remain a second-best solution, since they are qualitatively inferior to public schools and are supported at a fraction of the cost of public schools. With continued improvements in quality and conditions, they could perhaps be converted gradually to public schools. Alternatively, they could develop as a separate stream and impose competitive pressure to bring improvements in public schools.

#### *Access to health care and insurance*

##### *Current status and challenges*

During the past decade, China has launched two waves of reform to improve access to health care, which have important implications for any efforts to expand coverage to migrant populations. The first wave, initiated in the early and mid-2000s, expanded health insurance coverage through the creation of subsidized rural and urban insurance schemes. Building on these earlier reforms, the government unveiled a more ambitious and comprehensive program of health system reform in 2009. Any effort to expand coverage to migrant populations must be viewed in the context of the organizational, financial, and delivery arrangements put in place or planned under those reforms, particularly for basic care access and insurance coverage.

Urban residents are covered for health care through two financing arrangements. The first involves direct or budgetary subsidies allocated to facilities to cover operating costs (for example, staff salaries), equipment

purchases, and infrastructure investments, including the provision of an essential package of public health and basic medical services as described below. The second consists of two urban insurance schemes: (a) a mandatory urban employee scheme (UEBMI), which covers formal sector workers and is financed mainly through employer and employee contributions but with a small government subsidy and (b) a voluntary urban resident scheme (URBMI), which covers urban nonworking residents and those workers (typically informal) not covered by UEBMI and is heavily subsidized by different levels of government.<sup>34</sup> Most migrants with rural hukou are covered by the voluntary and subsidized national rural scheme, the New Cooperative Rural Medical Scheme (NCRMS).<sup>35</sup>

The essential package of public health and basic medical services is delivered through community health centers (CHCs) to urban populations—including migrants—in their catchment areas. From the start, central government policy included migrants as recipients of the essential package of public health and basic medical services. The government specifies a national minimum standard for financing the public health and basic medical package. The package typically includes nine categories of services: health information system, health education, immunization, prevention and control of infectious diseases, child health promotion, maternal and geriatric health care, chronic diseases management, and the management of severe cases of mental health problems. The package has expanded over time to include interventions such as hepatitis B immunization, screening for cervical and breast cancer for women 15–59 years of age, and cataract surgery for poor patients.

The essential package is funded by a capitation grant based on the permanent population (including migrants) in the catchment area. On average, the capitation subsidy should be shared equally between central and local governments. In practice, however, the contributions of central, provincial, and local governments vary considerably.<sup>36</sup>

Whereas some CHCs have been converted to “fully funded service units” and

receive budgetary support for personnel and capital expenditures, most still depend on fees charged to patients, which may hinder access for migrants. Local governments often receive little assistance in financing primary care, including the essential public health and basic medical package. The burden falls most heavily on the municipal, district, and county levels and even the street offices of towns and townships). Nearly all CHCs attempt to make up the financial shortfall by charging fees for many basic medical services rather than reducing benefits. Although the percentage of total revenues from fees has fallen with the increase in government subsidies, in 2010, 63 percent of CHC revenues were derived from “business income” (CCHDS 2011).

With respect to insurance coverage, despite the government’s policy of open enrollment, available data indicate that coverage of urban insurance schemes is low among migrants. Although migrant workers can in principle enroll in URBMI, in many cities URBMI does not cover informal workers or migrants and targets local residents, including the poor, elderly, disabled, and children. Some URBMI schemes cover migrant children but not the migrants themselves (Harris and Wang 2012). Migrants with permanent employee contracts are eligible for coverage under UEBMI and pay a reduced premium of 2 percent of salary. However, the benefit package is shallow, and reimbursement rates are low (World Bank 2011). In 2008, about 31.3 million migrants (or approximately 21 percent) were covered by UEBMI (World Bank 2009). In addition, some cities—Shanghai, Chengdu, Shenzhen, Zhuhai, and Beijing—have created special schemes for migrants, but coverage is also limited and often requires high copayments.

According to government data, the majority of migrants are enrolled in NCRMS, but they are less likely to enjoy NCRMS benefits compared to their counterparts who actually reside in rural areas. NCRMS, which charges lower premiums than URBMI and has deeper benefits, is county based, and reimbursement arrangements occur there and are not portable for most rural migrants. Enrollees would first have to pay for care (in

urban facilities) then seek reimbursement from NCRMS upon visiting their county of residence, usually during long holidays (Meng and others 2012). Few can afford to wait many months for reimbursement. Therefore, though many migrants are covered by NCRMS, they cannot realistically and conveniently take advantage of benefits under the scheme when they access health services in urban areas.

### *Proposed options and corresponding rationale for migrant conversion to urban health insurance schemes*

Equalizing access to health care services for migrants in the cities implies incorporating them into one of the urban health insurance schemes. Although the 2010 insurance law calls for merging the three social insurance schemes into a single scheme, it is generally agreed that implementation will be a long-term endeavor, given the differences in institutional arrangements, benefit design, management systems, and risk pooling (World Bank 2011). Table 3.7 summarizes the major characteristics of the three schemes in terms of eligibility, sources of financing, fund management, and service packages.

The three health insurance schemes vary considerably in terms of fund collection and management, benefit package, health care utilization, and medical expenditures. As shown in table 3.8, UEBMI is the most generous, with premiums being seven times higher than in NCRMS and URBMI. Although co-insurance rates of the three schemes are similar, co-insurance levels and in turn out-of-pocket (OOP) spending as a percentage of total expenditures are much higher for NCRMS and URBMI. UEBMI has higher inpatient utilization, while outpatient utilization is similar across the schemes. Medical expenditures per outpatient visit under URBMI and UEBMI are two and three times higher, respectively, than those of NCRMS, while medical expenditures per inpatient visit are four times and five times higher, respectively.<sup>37</sup>

This analysis considers two options for incorporating migrants into the urban insurance schemes: (a) converting all migrants to

**TABLE 3.7 Summary of characteristics of the three health insurance schemes**

Schemes	Eligibilities	Source of fund	Location of fund pooling	Service package
NCRMS	Registered rural population	Government subsidies and individual contributions	County	Inpatient and outpatient care
UEBMI	Urban employees	Employers and employees	Municipal (prefecture) city	Inpatient and outpatient care
	Self-employed workers	Individual premiums	Municipal (prefecture) city	Inpatient and outpatient care
URBMI	Urban nonworking residents	Government subsidies and individual contributions	Municipal (prefecture) city	Mainly inpatient care

Note: NCRMS = New Cooperative Rural Medical Scheme; UEBMI = mandatory urban employee scheme; URBMI = voluntary urban resident scheme.

URBMI and (b) converting workers with wage income to UEBMI and those with non-wage income to URBMI. Cost estimates for these options include the financial requirements to operate and maintain the urban network of mainly primary care facilities that are the main providers of the essential package of public health and basic medical care

and to expand migrant enrollment in urban health insurance schemes.<sup>38</sup> In 2011, about 42 percent of government subsidies were allocated to budgets (for example, direct subsidies) that supported program implementation and facility operations and investments, including provision of the essential benefit package. Nevertheless, health insurance

**TABLE 3.8 Comparison of the three health insurance schemes**

Arrangements	NCRMS	URBMI	UEBMI
<b>Premium and fund pooling (2011)<sup>a</sup></b>			
Per capita premium (RMB)	246	269	1,960
% from individuals	20	30	96.5 <sup>b</sup>
% from government subsidies	80	70	3.5
Fund pooling	County	Municipal	Municipal
<b>Benefit package (2012)<sup>c</sup></b>			
Number of types of drugs in the list	1,138	2,150	2,150
Deductibles (RMB)	600	1,300	1,300
Co-insurance (inpatient care) (%) (policy)	30	30	20
Co-insurance (outpatient care) (%) (policy)	50	50	30
Ceiling (RMB)	75,000	100,000	100,000
<b>Health care utilization (2011)<sup>d</sup></b>			
Outpatient utilization (% last two weeks)	15.2	14.8	13.9
Outpatient visits (number, per capita, last two weeks)	1.7	1.6	1.6
Hospitalization rate (%)	8.5	9.4	12.8
<b>Unit medical expenditures (2008)<sup>e</sup></b>			
Medical expenditure per outpatient visit (RMB)	72	150	200
% of out-of-pocket spending (generalized data)	65	60	30
Medical expenditure per inpatient (RMB)	1,440	4,000	6,000
% of out-of-pocket spending	67	50	36.8

a. World Bank staff compilation based on statistical yearbook and statement reports from the Ministry of Health and Ministry of Human Resources and Social Security.

b. In the total fund from individuals, 76 percent from employers, 20.5 percent from employees.

c. Estimated based on plans of the insurance schemes of selected counties and municipal cities.

d. Based on data from a nationwide household survey conducted by the Ministry of Health in 2011.

e. Based on data from the national health services survey in 2008. The figures are median.



schemes are absorbing an increasing share of government subsidies. In 2011, 45 percent of total government health subsidies were allocated to health insurance schemes and medical assistance funds. These subsidies are calculated by applying 7 percent and 9 percent annual growth rates in medical spending to estimate financial requirements for both 2015 and 2020.

Assuming 7 percent growth in medical spending, improving health care access and expanding insurance coverage for migrants will require additional government financing (budgetary and insurance subsidies combined) of 0.11–0.15 percent of 2012 GDP in 2015 and 0.27–0.37 percent of 2012 GDP in 2020, depending on the insurance option selected. Assuming 9 percent growth in medical spending, government financing of 0.12–0.16 percent of 2012 GDP in 2015 and 0.32–0.46 percent of 2012 GDP in 2020 will be required. As described earlier, implementing robust cost-containment measures will require deepening health sector reforms.

The central government can help facilitate and stimulate improved access and insurance coverage for migrants by setting targets for rural-to-urban conversion, with the aim of achieving full coverage of both the essential package and enrollment in an urban insurance scheme. For the essential package, CHCs can enroll migrants and their families in their catchment areas and use tracer indicators to measure the effectiveness of access to the essential package (for instance, vaccinations, prenatal and well-baby coverage, registration of the chronically ill in disease management programs, reduction in waiting times). For health insurance, the government can set annual enrollment targets under the selected option while also setting benchmarks for increasing depth of coverage (additional benefits such as ambulatory care and chronic disease coverage) and reducing reimbursement rates.

#### *Old-age security*

##### *Current status and challenges*

China's pension system has reached two milestones in expanding its coverage. China

started to reform its pension system in the mid-1980s and undertook a major structural reform of its urban pension insurance scheme in the late 1990s. By the mid-2000s, the traditional work-unit-based social insurance program was transformed into a multipillar system. In late 2009, starting with rural areas, China rolled out a nationwide voluntary pension scheme that combines a matching contribution subsidy to an individual account with a basic flat pension benefit after retirement for workers who have contributed for 15 years. By the end of 2012, the voluntary pension schemes were established in all counties and cities for rural and urban residents.

Currently, China's pension system comprises four types of saving schemes: (a) the urban worker pension scheme, (b) the rural and urban resident pension schemes, (c) schemes for public service unit (PSU) employees and civil servants,<sup>39</sup> and (d) voluntary enterprise and individual pension savings arrangements. As this report was being finalized, the Chinese government announced that it combined the rural and urban resident pension schemes and allowed for the transfer of individual contributions from the resident scheme to the urban worker pension scheme. The main characteristics of the current schemes are presented in table 3.9.

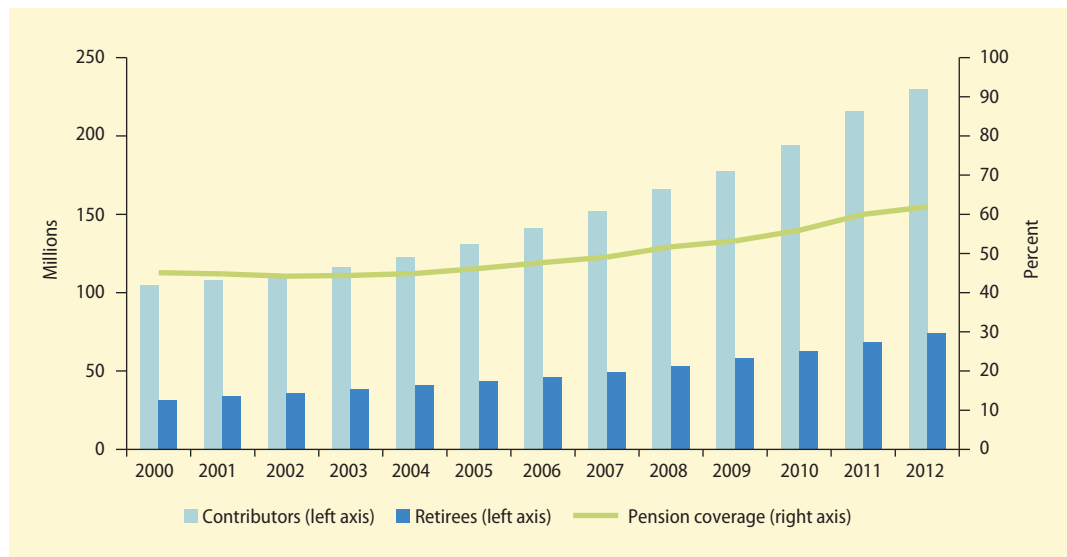
Pension coverage in urban areas increased significantly over the past five years. In urban areas, the number of contributors to urban employee pension schemes increased from 104.5 million in 2000 to 229.8 million in 2012 (figure 3.6). During the same period, total urban employment coverage increased from 45.1 percent to 61.9 percent. The number of urban retirees who received pensions also increased from 31.7 million in 2000 to 74.5 million in 2012. Among all urban workers who contributed, 16 million were from government and public organizations, accounting for 38.9 percent of total civil servants and PSU employees.

However, pension coverage among migrant workers, the self-employed, and workers in the informal sector has lagged. Based on administrative data from the Ministry of Human Resources and Social Security

**TABLE 3.9 Summary of characteristics of the major pension schemes in China**

	Urban Worker Pension Scheme (UWP)	Rural and Urban Resident Pension Schemes (RPS)
Eligibility/coverage	Urban enterprise employees (equivalent to formal sector workers, but excluding public sector workers), including migrant workers and the self-employed  Participation is voluntary for urban workers in the informal sector, the self-employed, and rural migrant workers	Rural and urban residents 16 years of age and older, excluding students
Financing	Individual contribution plus employer contribution	Individual contribution plus government subsidies and/or subsidy from rural collectives
Participation	Mandatory	Voluntary
Contribution	Individuals contribute 8% to the individual account and employers contribute 20% of payroll to the social pooling account	RMB 100–1,000, 1,500, 2,000 annually
Government subsidy	Governments provide subsidies to fill in the shortfalls of pension benefit expenditure	RMB 30 matching contribution to the individual account annually; RMB 55 basic monthly pension
Benefits	Accumulation in the individual account divided by 139, plus a basic pension from the social pooling account	Accumulation in the individual account divided by 139, plus RMB 55 per month basic pension
Individual account	Accumulated benefits from the individual account	Annuity from the individual account
Social pooling	Basic defined-benefit pension	Basic flat benefit
Vesting	15 years	15 years
Fund management	Partially pooled at the provincial level through an adjustment fund	Specific account at the county level

Source: World Bank staff compilation based on various policy documents.

**FIGURE 3.6 Pension coverage for urban workers in China, 2000–12**

Source: NBS, *China Labor Statistical Yearbook* 2012; Ministry of Human Resources and Social Security (MOHRSS) *Statistical Bulletin of Human Resources and Social Security Development* 2012.

(MOHRSS), the number of rural migrants participating in the urban employee pension scheme increased from 14.2 million in 2006 to 45.6 million in 2012. This represents an increase in the coverage rate from 10.8 percent to 27.8 percent, but it remains less than half of the coverage rate of urban workers. Data from the 2005 and 2010 China Urban Labor Survey (CULS) confirms that, although migrant worker participation in the pension system roughly doubled between 2005 and 2010, it reached only about one quarter of migrants, much lower than the 80 percent participation among local workers.

Two factors explain the low participation rate of rural migrant workers in the urban employee pension scheme: First, high contribution rates discourage both employers and workers. China has some of the highest social insurance contribution rates and labor taxation in the world. Although participation in the urban employee pension scheme is mandatory under the 2011 Social Insurance Law, employers have limited incentive to make the required matching contributions for their employees (Gallagher and others 2013; Giles, Wang, and Park 2013). Instead, they often collude with local governments and offer differential wage levels with and without social insurance contributions. Because most rural migrant workers are quite young and have unstable employment, making contributions for old-age income support is not a high priority for them. Therefore, they tend to choose the higher wage levels offered by employers for not participating in urban social insurance programs rather than the lower wage levels offered for participating. Employers also avoid making social security contributions by hiring workers through subcontracting companies that are not subject to the same requirements.

Second, historically, full social insurance rights have not been portable. Rural migrant workers could only withdraw accumulated funds from their individual accounts if they left the city where they made contributions. In 2009, the State Council initiated measures supporting the transfer of pension rights and benefits across provinces for the urban worker pension scheme in order to improve portability, but its implementation has been limited so far.

### *Options for extending pension coverage to migrant workers and their cost and financing*

In extending urban pension schemes to cover rural migrant workers, it is important to consider how the costs will be financed as well as how the legacy costs of the urban pension system will be addressed. Legacy costs are the costs associated with past service rights for civil servants and PSU workers who join the urban workers scheme (UWS) with accrued rights (the so-called *old men* and *middle men*). The legacy costs are financed from current contributions and necessitate large central government transfers to fill in gaps for provinces where the pension system runs deficits. From 2004 to 2011, government subsidies for the UWS increased from RMB 57 billion to RMB 207 billion, accounting for 2.0 percent of total general revenue and 0.5 percent of GDP in 2011. In 2011, 14 provinces could not cover their pension obligations and ran deficits (Zheng 2013). Following Dorfman and others (2013) and Wang and Dorfman (2014), this report recommends developing a financing strategy to resolve the legacy costs outside the reformed pension system.

Options for extending pension coverage to migrant workers could include participation in the urban employee pension scheme, the urban resident pension scheme (RPS), or some combination of both. Rural migrant workers are typically engaged in wage-based work with labor contracts or are self-employed. For wage-based rural migrant workers with labor contracts, it is reasonable to encourage them to participate in the existing urban employee pension scheme. Rural migrant workers who are not paid wages could perhaps join the urban resident pension scheme (that is currently being combined with the rural resident pension scheme).

Two types of costs are associated with rural migrant workers who join urban pension schemes:

- *Government subsidies for basic pension and matching contributions under the urban resident pension scheme.* Although the design of the urban resident pension scheme is similar to the rural resident pension scheme, local governments are encour-

aged to top up the pension subsidies based on local fiscal capacity. Wealthier cities tend to offer higher subsidies for basic pension and matching contributions. For each city, accepting nonwage rural migrant workers into the urban resident pension scheme requires additional subsidies from the city government.

- *Pension liabilities from social pooling accounts under the urban worker pension scheme.* The current design of the urban worker pension scheme has a larger social pooling account compared with the individual account in order to redistribute income across workers and between generations. Because the average wage of rural migrant workers is lower than the average wage chosen as a base for social insurance contributions, rural migrant workers would receive the benefits of income redistribution from the social pooling account. Given the pooling at city or county level and the pension account deficits in most cities, local governments would be responsible for those liabilities if the existing urban worker pension scheme does not change.

This analysis considers two options for incorporating migrants into urban pension schemes. In the first scenario, one-third of rural migrant workers participate in the UWS (the current baseline) and the rest participate in the urban resident pension scheme. In the second scenario, 80 percent of rural migrant workers participate in the UWS, and the rest participate in the urban resident pension scheme. The fiscal cost of integration under these scenarios is about 0.03 percent of 2012 GDP in 2015 and 0.06 percent of 2012 GDP in 2020. If both the government subsidies and future pension liabilities are annualized and discounted to their present values, in 2015 the cost increases to 1 percent of 2012 GDP in the first scenario and to 1.95 percent of 2012 GDP in the second scenario. In 2020, the cost would be 1.09 percent in the first scenario and 2.19 percent in the second scenario.

#### *Access to social assistance and welfare housing*

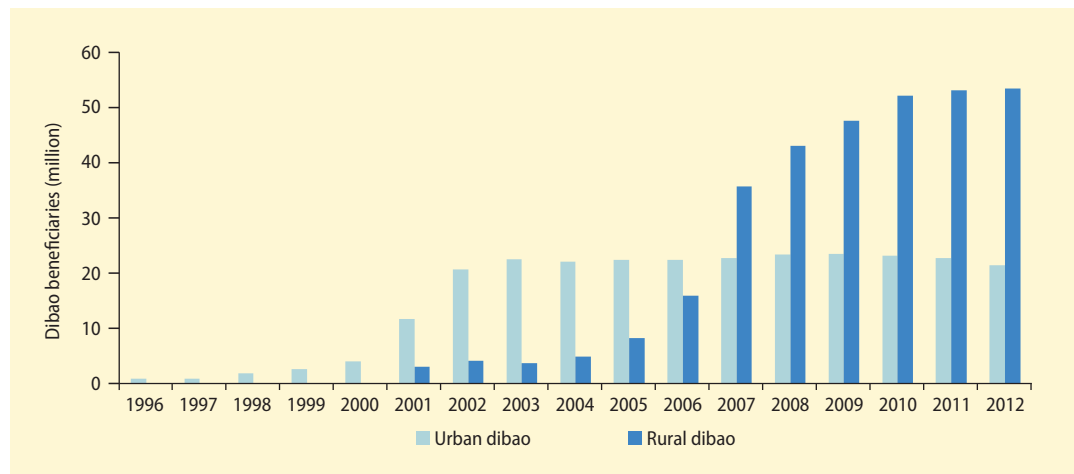
Although urbanization of poverty has been a policy concern for many countries, the massive internal migration in China has not

caused a rise in urban poverty. Studies show that in many countries in Latin America and South Africa (Ravallion 2002; Ravallion and others 2007), urbanization was accompanied by the increased prevalence of urban slums, crime, and violence (Rice 2008; Brenner and Theodore 2012). Using the CULS data in 2005, Park and Wang (2010) found that the difference in the poverty rates of migrants and local residents is relatively small in China. Including rural migrant families in urban dibao and welfare housing programs can help foster inclusive urbanization. The subsection following discusses the issues of eligibility and access to two welfare-enhancing programs: urban social assistance and welfare housing for the migrant population.

#### *Social assistance*

The dibao program has become the backbone of China's social safety net. Urban dibao was introduced in 1997 to assist in the reform of state-owned enterprises (SOEs) and provide income support for laid-off workers and their families, and then rural dibao was introduced as a national program in 2007. The dibao programs provide nonconditional cash transfers, with the aim to serve as the last resort of income support for poor households with per capita incomes below locally determined thresholds. The targeting approaches are based on an income-plus-asset test to measure actual household income, and the amount is determined such that it fills the gap compared with local dibao thresholds. By 2012, China had 23.4 million urban dibao beneficiaries, accounting for 3.0 percent of the urban residential population, and 53.5 million rural dibao beneficiaries, accounting for 8.3 percent of the rural population (figure 3.7).

From the perspective of local city governments, extending access to dibao and other social assistance programs poses an additional fiscal burden. Because these programs have been targeted at households with local hukou, rural migrants in cities are ineligible for the programs. Extending coverage to rural migrants after they meet eligibility and qualifying conditions should be considered, but the increased burdens on already stretched local government budgets will need to be addressed.

**FIGURE 3.7** Urban and rural dibao beneficiaries in China, 1996–2012

Source: 2012 China Social Statistical Yearbook; Ministry of Civil Affairs 2013; 2012 Statistical Bulletin of Social Services Development.

Although central transfers for dibao have increased substantially, the amount varies significantly by province, with receiving areas for rural migrant workers getting no central budgetary allocations. The urban and rural dibao programs were financed largely by local governments in the initial stages, but the central government has increased its public inputs and fiscal transfers significantly since then. For urban dibao, the share of central transfers increased from 29 percent in 1999 to 65 percent in 2012. Notably, the coastal provinces—the receiving places for rural migrants—receive no central budgetary allocations, while both the central and western provinces—the sending places of rural migrant workers—do receive allocations. For example, in Zhencheng city in the Pearl River Delta area of Guangdong province, 95 percent of funds for urban dibao and 85 percent of funds for rural dibao came from local government in 2012. In contrast, in Heilongjiang province, 70 percent of funds for urban dibao came from the central government, 16 percent from provincial government, and 15 percent from local city government in 2012. Within a province, the richer prefecture cities normally receive no or small budgetary allocations from the central and provincial governments, and the central and provincial governments play a much more important financing role for cities in lagging areas.

Managing the inclusion of rural migrant families in urban dibao and other social assistance programs also poses a challenge for local governments. Program thresholds and benefits differ significantly between urban and rural areas. With higher benefits in cities, the inflow of poor rural migrant families would place greater pressure on urban finance and could threaten the urban social assistance system. If dibao eligibility is linked to a residence-based approach, clear rules are needed on some minimum duration of residence, such as three to five years), with or without additional criteria such as employment status or housing status to prevent families from moving simply to take advantage of social benefits. Verifying the income and assets of migrants can be difficult, adding to the challenge of program administration.

Cost estimates of the extra financial resources needed if cities extend urban dibao to rural migrant workers are based on the same coverage rate as for the urban population with nonagricultural hukou, which is 4.6 percent. The total annual cost of extending dibao to the eligible migrant population would make up about 0.04 percent of 2012 GDP.

### *Housing*

Mainly as a result of the historical legacy, nearly 84 percent of urban households

holding local hukou live in homes they own, which is a very high rate of homeownership by international standards. This high level of home ownership is the result of government policies in the 1990s to liberalize the housing market by allowing occupants of work-unit housing to purchase homes at heavily discounted prices (Man, Zheng, and Ren 2011). Under the central planning system, housing was publicly owned and allocated through work units, resulting in low levels of investment in the housing sector, chronic shortages, substandard-quality housing stock, and poor living conditions for most urban residents, in part because the rent collected was not sufficient to cover maintenance costs (Y. P. Wang and Murie 1996). Not until 1998 did the direct production and allocation of housing by employers truly end, and even then, some employers continued to provide housing allowances so employees could purchase housing on the market. Gradually, housing was transformed from being a component of the basic social welfare package to which all urban employees were entitled to being a privately owned commodity largely supplied by the private sector (Man, Zheng, and Ren 2011).

With the market dominating housing production, housing prices have increased dramatically in recent years. The bulk of the housing supply is created through commercial housing development and is supplied through the private sector (figure 3.8). Returns on investment in the housing sector have been dramatic in the past 20 years, with prices across urban areas doubling between 1999 and 2010 and increasing by more than fivefold in cities like Shanghai and Beijing. These prices are fueled by rising land prices, which are the primary source of fiscal revenue for local governments. This trend has made the Chinese housing market severely unaffordable (Man, Zheng, and Ren 2011).

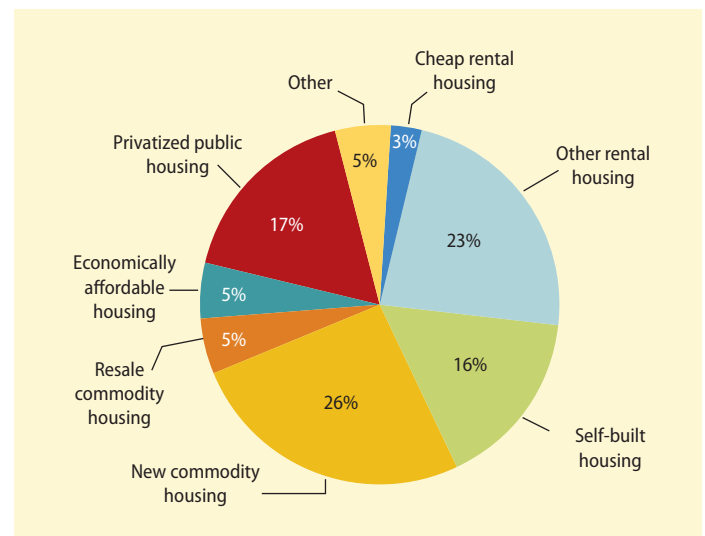
Affordability, rather than residence status, now poses the biggest barrier to having access to good-quality housing. People who did not benefit from privatization—such as the urban poor, young entrants into the labor market, and rural migrants—suffer most from the lack of affordable housing (Li 2012; Zhang and Chen 2013). Studies show that in

several large cities, such as Guangzhou and Shanghai, long-term urban residents and urban migrants have similar access to housing (Huang and Jiang 2009; Li 2012; Logan, Fang, and Zhang 2010; Zhang and Chen 2013), suggesting that hukou type matters less than income.

Privatized public housing accounted for the largest form of government assistance in access to housing, but since this form of housing is a matter of historical legacy, its impact will continue to decline over time. Although many of these privatized units are of low quality and will need replacing, many of the owners are unable to afford housing at current rates. In 2010, less than 10 percent of households had access to the subsidized home-ownership program—5 percent lived in homes purchased through the Economic and Affordable Housing Program, and 3 percent rented through the Low Rent Housing Program, which was meant to serve the poorest households.

The current investment in social housing is not reaching the intended beneficiaries. Government programs that aim to support home ownership have primarily benefited middle- and upper-income households. The recently introduced Public Rental Housing Program

**FIGURE 3.8** Modes of access to dwellings in urban areas, by household



Source: NBS 2010.



is a government rental program explicitly open to migrants without a local hukou, but it has primarily been used to attract talented professionals and is not serving low-income wage earners or the poor.<sup>40</sup>

The formal and informal rental markets provide an important source of housing, and their importance is likely to grow over time. Since housing is so unaffordable in many of China's large cities, the bulk of low-income housing is provided outside formally established government programs through collective housing (for example, dormitories provided by employers), private rental units in urban villages, or on the urban fringe. In Shanghai, for instance, only 5.5 percent of migrant households can afford to purchase commercial housing, and about 80 percent are renters.<sup>41</sup> Although prices in the formal rental market have been increasing steadily, rental rates are still growing at a significantly slower rate than housing prices.

Although the informal rental market is vibrant, innovative, and diverse, informal rental markets are inherently risky because tenants lack security and have few protections. Half of China's estimated migrant population live in about 50,000 urban and suburban villages across the country. Pockets of urban villages, such as the Gaojiabang area in Shanghai, provide low rents (and low quality) in areas with spontaneously increased density (Wu, Zhang, and Webster 2013). This informal residential market has led to fast growth of so-called small-property-rights housing, although renters have no legal protections with such housing and the government has issued many documents prohibiting them. Another example of informal rentals is the secondhand rental of municipal public rental units, part of the old housing stock that could not be privatized because the government considered their quality to be too poor. Despite their poor condition, all these represent desirable options for many migrants because they are affordable and located within the urban core. However, these units are also primary targets for demolition under the inner city renewal programs.

A policy that focuses primarily on home ownership is neither fiscally possible nor economically desirable. By being more mobile,

renters contribute to the efficiency of the labor market. Research has shown that economies with small rental sectors tend to face higher migration costs and labor rigidity. Given China's fast rate of urbanization and economic development, it requires a more flexible and adaptable labor force. Renting provides tenants with the flexibility to adjust to employment and income changes and requires little or no savings.

A top-down approach to social housing policy exacerbates distortions in the housing market and results in a mismatch of supply and demand. A key challenge for local governments in China is that targets and objectives for social housing are determined by the central government. These policies outline the range and level of coverage and even stipulate planning, design, size, quality, and safety requirements, thereby creating a system of unfunded mandates for local governments. Moreover, the social housing that municipal governments provide in response to central government targets is not necessarily what is needed or demanded by households. In many large cities, this results in relatively high vacancy rates in suburban locations and lack of sufficient housing in more central areas.

Although the central government should provide incentives for local governments and developers, planning for housing should be done by local governments through careful analysis of local conditions. To better align housing supply and demand, market studies should be carried out to find alternatives to building by some formula. A "housing observatory" is needed to collect systematic information on housing markets and demographic and socioeconomic data to capture trends in housing affordability and finance. This information will enable local governments to define the nature and scope of policy interventions required to effectively align housing demand and supply. Without such ongoing monitoring, policy interventions may be misguided.

The development of a privately led rental market that serves different market segments (including low-income households) will enable the government to focus direct assistance on those who need it most. A well-developed and competitive rental market

will promote affordability for all income segments, whether local or nonlocal hukou holders. This market could be accomplished through the formalization of housing developments in urban villages, which could trigger higher investments and introduce better standards in housing for migrants.<sup>42</sup> Urban villages offer affordable housing to migrants when urban governments fail to provide such housing, and they offer rural collectives new and significant income sources that often offset the negative impacts of the government's previous land requisition. Urban villages thus provide support to the two most vulnerable groups in China's urbanization: the migrant population and dispossessed farmers.

To address the housing needs of the lowest-income households, demand-side subsidies based on a means-tested targeting approach should be considered. Although national policies for housing often mention low-income housing, the reality is that only a small percentage of the allocation for new social housing is for low-rent housing. This low-income housing program is intended to serve households that do not qualify for a mortgage. A means-tested targeting system, which most likely would piggyback on the existing targeting process for dibao, would determine the level of support that will allow a household to rent through a private market. Rental vouchers could be used to implement the demand-side subsidies and will also help stimulate development of the rental market. The annual cost of this option is between 0.02 and 0.11 percent of 2012 GDP, depending on the assumptions regarding coverage and the amount of the subsidy.

International experience has shown that maintaining decent housing over the long term is almost impossible without such demand-side subsidies for a specific segment of the population. Although such incentives involve significant fiscal costs, they are much more efficient than supply-side incentives. Most countries with advanced housing and housing finance systems rely heavily on demand-side subsidies such as housing allowances, vouchers, or cash assistance to maintain affordability. It is extremely rare for a middle- or upper-income country to not provide housing payment assistance. For

example, the United States Department of Housing and Urban Development provides housing assistance to renters through a program commonly known as Section 8, which provides housing vouchers or direct payments to private landlords. Under the Section 8 program, tenants pay about 30 percent of their gross income for rent, with the remainder of the market-rate rent subsidized by the program.

*Framework for cost sharing and incentives for municipal government to integrate migrants into urban areas*

The annual cost of extending access to compulsory education, basic public health care services, social security (medical and old-age pensions), social assistance, and welfare housing to current migrants is estimated to be about 1.22 percent of 2012 GDP (table 3.10). The cost increases to 2.51 percent of 2012 GDP under the assumption that all left-behind children move with their parents to the cities, and it increases to 3.14 percent of 2012 GDP if, in addition to the cash flow cost of extending the urban old-age security to migrants, the discounted accrued liability costs are accounted for. Accounting for both of these costs and changing the assumptions

**TABLE 3.10 Cost of extending urban social services to cover rural migrants**

*Percentage of 2012 GDP*

	2015	2020
<b>Education</b>		
Migrant children currently in the cities	0.98	0.95
All left-behind children	2.27	1.97
<b>Health services</b>		
7 percent annual cost increase	0.15	0.37
9 percent cost increase	0.16	0.46
<b>Old-age security</b>		
Cash flow cost	0.03	0.06
Accrued liability cost	1.95	2.19
Social assistance	0.04	0.05
<b>Housing</b>		
2 percent coverage	0.02	0.02
10 percent coverage	0.11	0.11
<b>Total</b>		
Lower bound	1.22	1.45
Upper bound	4.53	4.78

Source: Wang, Wang, and Glinskaya 2014.

about the increase in medical cost and social housing coverage, the total cost could increase to 4.53 percent of 2012 GDP in 2015 and to 4.78 percent of 2012 GDP in 2020.<sup>43</sup>

Although a transitional subsidy would help cities expand social service coverage for migrants, fiscal system reforms will be needed in the medium term to finance the national minimum basic package of social services. In the short term, a transitional subsidy to entice cities to deliver social services would help accelerate the integration of migrants. The overall cost is high but manageable, and some cities with large concentrations of migrants will have high expenditure needs. In the medium term, fiscal system reforms of both revenues and expenditures will be needed to finance the national minimum basic package of social services, which should be phased in and carefully calibrated to fit fiscal capacity.

To increase the willingness of local governments to provide social services to migrants, fiscal resources should follow people. The fiscal system should be closely linked to the new modern residence system—once people have moved to a new location, registration would increase the population count used for fiscal allocations. In addition to a gain in the tax base, local governments would receive larger transfers from the central government for delivery of the basic package. Such a link would help make receiving cities less resistant to providing services for new arrivals.

## Social policy reforms and rural-urban integration

Beyond expanding access to services in urban areas, China faces the broader challenge of delivering services equitably across the entire country. In addition to the reforms discussed previously, wider sectoral and cross-cutting accountability reforms will be critical to improving equity and distributional outcomes. Such reforms would also promote greater efficiency and cost-effectiveness as well as quality improvements in services. Unlike in the previous section, which focused more narrowly on the modalities and costs of extending services in urban areas (and for

migrants, in particular), this section looks more broadly at issues of rural-urban integration in service delivery and overall sector reforms. Following a brief overview of the context and need for such reforms, it discusses specific reforms in the areas of education, health, pensions, and social assistance. The section then addresses the cross-cutting issue of strengthening accountability to improve social service delivery.

## Context and challenges

The social policy vision for urbanizing China should have the goal of equalizing access to basic public services across provinces and across urban and rural areas. Such an approach is truly consistent with the goals of efficient urban development and rural-urban integration and supports the notion of equality of opportunity. The 2009 *World Development Report* introduced the idea of spatially blind institutions as the bedrock of an effective integration policy. Spatially blind policies—available to everyone regardless of location, but based on their attributes—should also be universal in coverage, particularly for regulations affecting labor and social services. Spatially blind social services are critical to rural-urban integration in ensuring that people are pulled to cities by agglomeration economies and not pushed out of rural areas by a lack of schools, health care services, and social security (World Bank 2009).

Although China has made remarkable progress in basic service provision in recent years, further improvements are needed in both the quantity and quality of services. China has achieved widespread access to a range of basic services: basic health insurance, compulsory education, postbasic education, and a rapidly expanding pension system. In both urban and rural areas, people increasingly expect not only quantity but also quality of service provision. The quantity challenge is not yet met (for instance, for early childhood development and migrant pension coverage), but the biggest challenges for now relate to ensuring quality and improved outcomes.

The foundation for rural-urban integration is a basic minimum package of social

services and social insurance that would promote equality of opportunity with basic security for all. Building on the “12th Five-Year Plan (2011–15): The National Basic Public Social Services System” (box 3.5), this package could include the following elements:

- An expanded cycle of quality general education that is accessible for all. Preprimary education would be available affordably to all, with subsidies for the neediest, and senior secondary schooling would be free of fees.
- Pension and health insurance systems that have full coverage and provide deeper and more uniform financial protection, integrating rural, urban, and migrant residents.
- A social safety net that is available for the poorest and most vulnerable and has greater coherence with different parts of the social protection system and across China.

Financing this type of basic minimum package across China will require a large amount of additional resources. In many localities—especially rural areas—the quality of services needs to be raised substantially.

Resources will also be needed in urban areas across the country to deliver services to the large number of new qualified users, while maintaining quality for all.

To make efficient use of these resources and to promote equality of opportunity, sectoral reforms and cross-cutting accountability reforms need to be deep and aim to affect the behavior of users and providers. In the case of users, reforms should target the incentives to co-finance. In many cases, the current institutional rules of service provision do not provide sufficient incentives for users to co-finance services (as in the case of old-age insurance, given the lack of portability) or to consume the appropriate level of services (as in the case of health care, with insurance payments favoring costly inpatient care). With regard to providers, reforms should not incentivize providers to induce demand (as is currently the case in health care) but should instead promote delivery of outcomes.

An important point to make is that providing services on an equitable basis does not require that services be equal for all citizens. Needs, resources, goals, and social values differ widely across China. Although all residents

### **BOX 3.5 12th Five-Year Plan (2011–15): The National Basic Public Social Services System: The basic package and beyond**

The 12th Five-Year Plan identifies the lack of integration between systems of basic services in rural and urban areas as a major challenge, and it makes rural-urban integration and equalization guiding principles for future actions. Integration and equalization will be achieved by developing standards, implementing an integrated urban-rural basic public service facility, encouraging local areas to conduct pilot reforms, supporting rural basic public services (through greater investment in fixed assets and improvements in the professional capabilities of rural grassroots public service workers), and developing basic public service programs for the mobile population (particularly rural migrant workers).

The Plan also outlines sector-specific initiatives to promote rural-urban integration in education, health,

social assistance, and security. In education, for example, it talks about establishing mechanisms for co-development and sharing of compulsory education resources among urban and rural schools and one-on-one exchange and assistance systems. In health, it mentions expanding one-on-one urban-rural hospital assistance efforts. The Plan outlines tasks such as national coordination of pension insurance and integration of the basic health insurance system in urban and rural areas, as well as enhancement of the connection between urban and rural minimum security and unemployment insurance. In addition, the Plan stresses the need for greater sharing and integration of information resources and encourages the use of information technology to facilitate rural-urban integration in all public services.

*Source:* World Bank staff compilation based on the 12th Five-Year Plan (2011–15).

of a city should be given access to equal services, residents of different cities and urban and rural areas may be given different services.<sup>44</sup> The central government may wish to establish a basic minimum package of services that would be offered to all citizens, with nationally assured funding as needed for every jurisdiction to meet this standard. Beyond this basic package, provinces, cities, or towns may raise the standard for their jurisdiction but would be responsible for providing additional funding. They could raise the standard because they are more affluent, because their residents demand different or better services and are willing to pay higher taxes, or because they wish to attract new residents.

## Education

### *Current status and challenges*

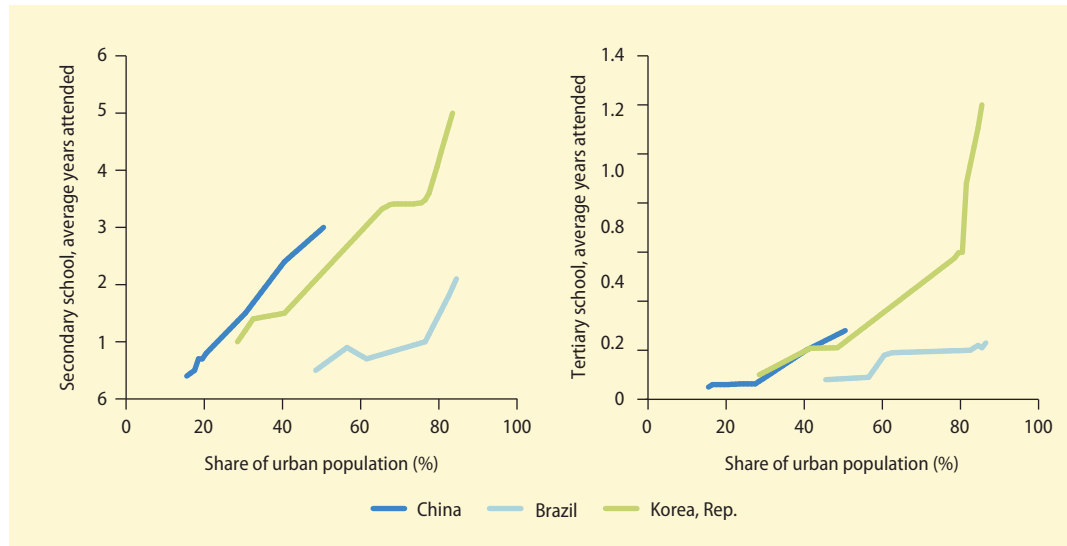
Although China has greatly improved its human resource endowment, challenges remain in improving educational outcomes across the country. Thanks to a positive policy environment and a high level of societal demand for education, China has universalized access to nine years of basic education, nearly universalized enrollment in junior secondary education, and increased enrollment in senior secondary education to almost 80 percent. Almost one-quarter of high school graduates are now going to university. Nonetheless, China's gross enrollment rates of 65 percent for preprimary education and 24 percent for tertiary education are well below the OECD averages of 90 percent and 68 percent, respectively.<sup>45</sup> Moreover, these national-level outcomes mask wide disparities across social strata, rural and urban areas, coastal and inland provinces, and migrant and local residents. At one end of the spectrum, Shanghai's star performance in the 2009 and 2012 international PISA tests captivated the world, as 15-year-olds in Shanghai ranked first in math, reading, and science relative to peers from 65 countries.<sup>46</sup> At the other end of the spectrum are school-age children in rural areas of Yunnan, Fujian, Hunan, and other poor parts of the country whose neglected diseases such as anemia, intestinal worms,

and nearsightedness have profound negative effects on their educational performance.<sup>47</sup>

Middle-income countries that have transitioned to high-income status have invested heavily in education and human capital. When Japan and Korea were at China's current level of development, they had achieved universal high school education. In contrast, countries that have not escaped the "middle income trap," such as Argentina, Brazil, Mexico, Arab Republic of Egypt, and Iraq, have low human capital for their income (World Bank 2013). China has performed more like Korea than Brazil (figure 3.9), but further improvements will be difficult unless the population has access to higher-quality, free education.

Urbanization offers unprecedented opportunities to further this agenda but can lead to fierce competition for urban services if not managed properly. As mentioned in the first section, with greater urbanization comes denser cities and more people to service in concentrated masses, giving rise to economies of scale in service provision. However, denser cities will also place additional stress on existing education systems, as more migrants and their children become eligible for and demand equal access to quality education at all levels.<sup>48</sup> With the demand for services exceeding the supply, rationing will result when services are free, or prices (for instance, placement fees, informal payments to schools) will be introduced for what are nominally free services. In addition, the greater diversity in the types of people coexisting in cities today means that educational systems face a diversity of learners. All these are potentially at odds with the interests of long-term urban residents and can lead to conflicts if not managed properly.

Some educational challenges are becoming more prominent and demand more immediate policy attention as a result of urbanization. These challenges include defining a level and standards for providing minimum public education for all and developing financing and accountability measures to ensure provision to both rural and urban children. Integration will also require removing structural rigidities and abolishing the hukou

**FIGURE 3.9** Share of urban population with secondary and tertiary education in China, Brazil, and Korea

Source: Barro and Lee 2001; World Bank staff calculations.

requirement for entrance into senior secondary education and higher education.

Since 2000, the public financing of universal compulsory education has undergone major changes. Under policies calling for improved public services, budget expenditures in education have increased rapidly, with an 8.6-fold increase in nominal terms and a 7.0-fold increase in real terms.<sup>49</sup> The composition of funding for universal compulsory education has also changed significantly:

budget appropriations constituted just over 50 percent of total funding in 1997, and by 2010, they made up more than 90 percent of total revenues (table 3.11). The acceleration of public spending became especially marked after 2006, when the new Compulsory Education Law (2006) stipulated that compulsory education would be “implemented free of tuition and fees.” The law also laid out a framework for financing to cover “the whole of universal compulsory education,” with

**TABLE 3.11** Composition of funding in universal compulsory education, 1997 and 2010

Share of total	1997				2010			
	Junior middle school	Rural junior middle school	Primary school	Rural primary school	Junior middle school	Rural junior middle school	Primary school	Rural primary school
Budgetary appropriations	54.3	53.1	56.3	55.1	89.8	92.7	92.0	94.4
Earmarked taxes and surcharges	16.6	17.8	16.0	17.3	5.8	4.6	4.7	3.4
incl. urban education surcharge	4.7	1.1	2.7	0.7	4.3	3.1	3.5	2.4
incl. rural education surcharge	11.1	16.3	12.8	16.4	1.3	1.2	0.9	0.8
Other fiscal resources	0.6	0.4	0.4	0.3	0.3	0.3	0.2	0.2
Profits of school-run enterprises and services	3.5	2.9	3.3	2.7	0.1	0.1	0	0
Social contributions	10.3	12.7	10.0	11.4	0.9	0.7	0.8	0.6
Fees collected by schools	9.9	10.0	9.8	10.2	0	0	0	0
Other educational incomes	4.7	3.1	4.1	3.0	3.4	1.9	2.4	1.5

Source: MOE 1998, 2011.



funding to be shared by governments at all levels while responsibility for coordinating its implementation was assigned to the provinces.

Although the central government has greatly expanded intergovernmental transfers and introduced many funding programs, wide disparities remain both across and within provinces. Although central transfers have helped stem the trend of growing regional disparities, these disparities remain significant. In 2011, Beijing spent more than eight times as much per student in junior middle schools as Henan—nearly RMB 38,000 compared to RMB 4,600. Wide disparities can also be found across counties and districts within provinces. In Guangdong, for example, the 2012 provincial average was RMB 5,600 per student in primary schools, whereas the average for districts in Shenzhen municipality was RMB 16,000, and the province's poorest counties spent barely RMB 2,000.<sup>50</sup>

Equality of quality in basic education across different areas, social categories, and income groups remains the key challenge. The equality of quality agenda is relevant to rural and urban areas in distinct ways:

- *Rural areas—and especially remote areas—face significant challenges* in the recruitment, compensation, and retention of quality teachers as well as gaps in the quality of educational infrastructure and learning inputs. Poor households also face the challenge of shouldering the nonfee costs of education, especially in the face of rising opportunity costs as real wages have risen.
- *In urban areas, disparities are evident among local children, migrants, and children from poor households and without social connections.* This can be seen in the differential enrollment rates of local, migrant, and poorer children in higher-quality “key schools” and regular schools and in indicators such as average class size and transition rates. The increased importance of family connections and placement fees to get children into elite urban public schools risks reinforcing existing social disparities. In megacities such as Beijing and Shanghai, key elementary and junior

high schools generally use exams to select their students. For example, a key primary school in Shanghai accepted 60 out of 3,000 six-year-old applicants through an intense one-hour exam consisting of 200 questions,<sup>51</sup> despite the national policy set out in the Compulsory Education Law that entitles a child to attend a neighborhood school near home.

In urban areas, most of the privately operated migrant schools charge fees and lack proper accreditation from the government, qualified teachers, or adequate facilities. As of 2007, almost 80 percent of private migrant schools in Beijing were unlicensed (Tian and Wu 2010). Even among government-approved migrant schools, education quality is still not on par with that of public schools, as discussed previously. As the migrant population in urban centers continues to grow, unequal access to public education between migrant children and urban students will continue to be an acute issue.

In rural areas, a school merger policy is being implemented, with boarding schools becoming important providers of education services. Responding to demographic trends and out-migration, the Ministry of Education launched a School Merger Policy in 1999. Under the policy, education officials closed down small, remote schools and focused their attention on improving teaching and facilities for larger, centralized schools. The merger policy has improved the quality of education, at least in terms of the policy goals of hiring more qualified teachers and improving school infrastructure. One of the most notable problems with the merger policy was the dramatic increase in the distance between students' homes and schools. The government responded with a program to build dormitory facilities, and by the mid-2000s, most students who needed a place to board had access to dormitory rooms. Recent evidence shows that ensuring the provision of dietary quality in these establishments remains a challenge.

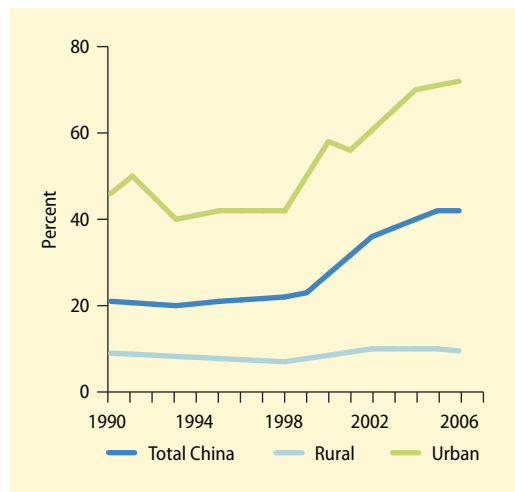
Beyond the compulsory education system, access to other levels of schooling remains problematic in rural areas, as in the following:

- *Senior high school.* Official data on the rate of graduation of rural children into the academic stream of the senior high school show that this rate remained almost unchanged between 1990 and 2006, increasing from 7 percent to only 9 percent. The newest estimates (taking into account rural children who go to school in urban areas) indicate that about 20–30 percent of rural children progress to senior academic schools, compared to 40–70 percent of urban children (figure 3.10). Drivers of low rural progression into the academic stream include the entrance exam, the high costs of secondary education, the perceived low quality relative to cost, and the opportunity costs for students and their families. In addition, the government policy direction to achieve a 50:50 ratio between academic and vocational enrollment might be pushing a higher proportion of rural graduates into the vocational track.
- *Preschool.* Only 30 percent of rural children attend preschools, compared to 80 percent of urban children. Among those who attend early childhood development and education (ECDE) in rural areas, half are in one-year-only programs. Furthermore, rural ECDE programs have higher pupils-to-teacher ratios and a lower percentage of

qualified teachers. Disadvantages accumulating at various stages of childhood development for rural children tend to manifest themselves in lower school readiness scores, as documented by a recent study comparing school readiness among rural and urban children. Stunting, which has negative impacts on cognitive development, affected over 20 percent of children under age five in poor rural counties, almost six times the national urban rate.

Migrant students also face difficulties in accessing public high schools. In urban areas, junior high school students must take a city-wide senior high school entrance examination as a prerequisite for entering any senior high school-level public institution (including regular senior high schools and vocational high schools). However, for migrant students, the local government in Beijing grants the opportunity to take the exam only for vocational high schools, and even then, they must meet numerous criteria. In 2012, the government of Shanghai also introduced a set of requirements that migrant parents would have to fulfill in order for their children to qualify for the exam for regular senior high schools. As a result of such policies, migrant students' access to high school education—especially regular high school education—is very limited in urban centers.

**FIGURE 3.10** Official promotion rates from junior high school to academic high school, urban and rural, 1990–2006



Source: Rozelle 2011.

Note: Rural promotion rate includes promotions only in rural areas.

### Proposed policy responses

The most critical area for reform is education financing. Financing reform should be implemented in a way that (a) facilitates the setting of minimum standards for every level of education and revises the revenue and expenditure assignments to ensure financing to meet those standards, especially for poor rural localities and disadvantaged children; (b) better defines fiscal and spending responsibilities among various levels of government; (c) experiments more with demand-side financing mechanisms to stimulate competition and choice that encourage higher levels of efficiency in public spending; and (d) explores higher levels of private provision and financing, in particular for upper secondary education.

Given the mounting evidence on glaring disparities in education quality, it is also imperative that the national government start defining clear quality standards for basic education. At a minimum, these standards should specify pupil-teacher ratios, per student public expenditure, and percentage of qualified teachers in each school. In the future, a desirable goal will be to introduce more advanced quality indicators, such as graduation rates and employment rates or even national and international test scores.

Improving quality will require focusing on teachers—teacher recruitment and career advancement, as well as allocation, compensation, and incentive policies. A combination of measures will be needed, including rotation mechanisms to promote programs in which quality teachers spend time in disadvantaged schools, twinning arrangements between stronger and weaker schools, stronger inservice training, incentives for hardship postings, and a more fundamental examination of teacher compensation.

For China to continue deepening its human capital base, senior secondary school completion rates must increase in the coming decades. China has already set a senior secondary enrollment target of 90 percent (with half in the academic stream and half in the vocational stream) by 2020, which is comparable to Korea's senior high enrollment rate in 2000. A case could be made for extending public free education provisions beyond basic education as conditions allow.

China will also need to improve the coverage of ECDE programs (particularly for the rural poor), for example, by increasing the level of public financing and using diverse delivery mechanisms. Preprimary education is the most underfunded education sector in China, accounting for 9 percent of the total number of students in the system but receiving only 1.3 percent of the budget. Internationally, preprimary education commonly claims 6 to 8 percent of the total education budget. Localities in China can use diverse mechanisms—including public-private partnerships, home-based care, or a combination—to deliver ECDE. In particular, public-private partnerships are worth exploring to diversify sources of funding and models of delivery and to create markets with new ECDE providers.

Some localities (particularly those with better economic conditions) are experimenting with free preschool or senior high school education. In more than 25 geographic areas across China, students now receive free preschool education, free senior high school education, or both (table 3.12). Most of these services are available only for children with local hukou. Certainly, each locality needs to develop a strategy for financing such an extension. For evidence-based policy making, more rigorous and continuous studies need to be conducted to determine the demand-side constraints to enrolling in preprimary and senior secondary education for rural children.

The government will benefit from setting clear expectations on the role of public

**TABLE 3.12** Examples of extended free basic education in China, various years

Type of extended free basic education	Extension duration (year)	Length of free basic education (year)	Areas of implementation
Preschool	1	10	Xiamen (Fujian), Yan'an Zhidan (Shaanxi)
	3	12	Dongying Hekou (Shandong)
Senior high school	3	12	Zhuhai (Guandong), Wuqing (Tianjing), Ningbo Yinzhou (Zhejiang), Shanshan (Xinjiang), Haixi (Qinghai), Fuzhou Mawei (Fujian), Ankang Zhenping (Shaanxi), Xiangxi (Hunan), Yuxi Hongta (Yunnan), Zoucheng (Shandong), Nilka (Xinjiang), Inner Mongolia, Nansha (Guangzhou), Menghai (Yunnan), Linfen Gu (Shaanxi), Linfen Pu (Shaanxi), Linfen Ning (Shaanxi), Shuozhou Pinglu (Shaanxi)
Preschool + senior high school	3 + 3	15	Ankang Ningshan (Shaanxi), Wuqi (Shaanxi), Shenmu (Shaanxi), Fugu (Shaanxi), Yanzhou (Shandong), Changzhi (Shaanxi), Tibet

Source: World Bank staff compilations from various sources.

Note: The name of the province is indicated in parentheses.

financing in education. If current trends in China continue, demand for education will continue to rise. The Chinese society values education highly, and parents' demand for education for their children seems insatiable. Families should not face any barriers in seeking education beyond what the government provides for free. Demand is already high for private English language education, tutoring for college entrance exams, additional extracurricular activities, and tutoring for entrance into overseas universities. Over time, migrant families will have similar demands. The government will need to place greater emphasis on regulations and quality assurance to strengthen consumer protection in these areas and to ensure that all public and private money is spent efficiently.

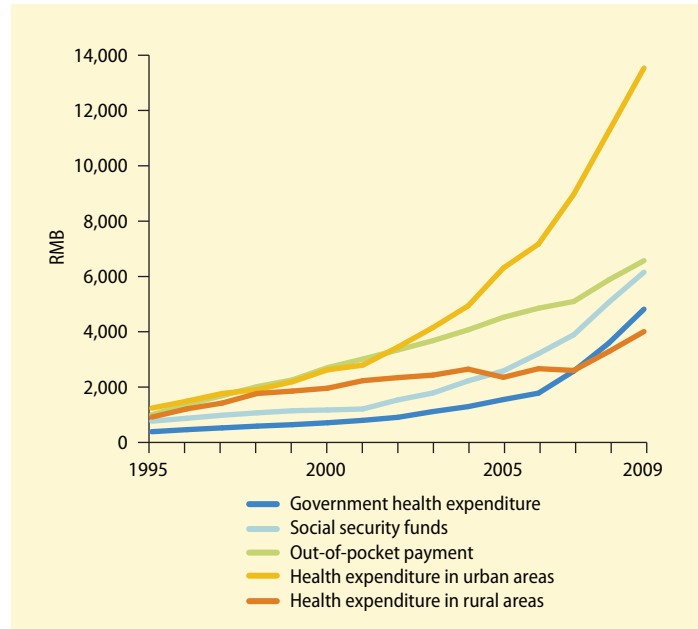
### Making health services more equal and responsive to needs

#### *Current status and challenges*

Reforms in the past decade have greatly improved coverage and reduced out-of-pocket medical expenditures, but the current escalation in health spending raises questions about the long-term sustainability of China's health financing arrangements. As discussed earlier, China has launched two waves of reform in the past decade to improve access to health care. At the same time, between 2007 and 2010, real annual growth in health spending averaged about 15 percent, compared to annual GDP growth of approximately 8 percent. As shown in figure 3.11, the lion's share of spending occurs in urban areas, a trend that will probably continue for the foreseeable future as China urbanizes.

Urbanization and other demographic trends will continue to place greater pressure on the health care system. Rising incomes, an aging population, and an increasing burden of chronic diseases together will likely raise demand for health care in urban areas. The share of people age 60 years and over will increase rapidly in the coming decades, from around 12 percent in 2010 to almost 25 percent by 2030 and more than 33 percent by 2050. Another demographic challenge is the growing epidemic of noncommunicable

**FIGURE 3.11** Health spending by source and location, 1995–2009



Source: MOH 2011.

diseases (NCDs), which account for more than 80 percent of the 10.3 million deaths annually and contribute to 82 percent of the total disease burden. A recent report shows that migrants and those with lower education levels tend to have a higher NCD burden, another indicator of urban dualism (World Bank 2011). Urbanization itself also leads to behavior change and exposure to risks that can increase demand for health care.

In terms of the health care delivery system, despite a massive expansion in grass-roots facilities and beds in both urban and rural areas, hospitals continue to gain an increasing share of both outpatient visits and inpatient admissions. Chinese health spending shows a strong hospital bias relative to OECD countries, with nearly half of total public health spending in China going to hospitals in 2010. This bias appears to be intensifying, and the system is becoming increasingly top heavy, which will escalate costs and contribute little to improved health outcomes. Between 2007 and 2011, the number of inpatients increased by 56 percent, compared to 33 percent for outpatients (MOH 2011). Moreover, it is estimated that nearly 30 percent of hospital admissions are unnecessary,

which can inflate spending because the average cost of an inpatient stay is nearly 37 times higher than an outpatient visit (MOH 2008, 2011). Another factor that increases costs is the average length of a hospital stay, which is double the OECD average.

The perceived poor quality of primary care providers and higher insurance reimbursement levels for inpatient care drive patients to upper-level health care facilities such as hospitals. Patient surveys found that only one-third of patients considered urban community health centers (CHCs) to provide adequate quality of care (Bhattacharyya and others 2011). Despite government training programs to upgrade these physicians and general practitioners and despite outreach technical support from hospitals, most residents prefer to travel longer distances and queue for specialty care in hospitals. One major challenge is that the primary care system in China is institutionally fragmented, with highly fragmented financing arrangements. The primary care system consists of many often-uncoordinated actors, including family planning agencies, maternal and child health programs, township health centers for primary and secondary care, village doctors, and public health agencies. Funding sources for primary care are also varied and include earmarked vertical program budgets, health insurance, central and local budgets, and user fees, all of which make financing highly fragmented and unequal across space and social groups. Yet another barrier to primary care is the low level of reimbursement for outpatient care. The insured have an incentive to seek inpatient admissions because insurance reimbursement levels for inpatient care are higher than for outpatient care.<sup>52</sup>

Other factors also contribute to the hospital-centered health care delivery system, such as the following:

- *China has yet to systematically adopt coordinated care approaches to service delivery, which increasingly dominate the service delivery landscape in many OECD countries.* Coordinated care consists of a mix of measures that links professionals and organizations at all levels of the health system, emphasizes patient-centered care integration,

manages patient referral through the delivery system, and promotes follow-up care as well as the continuity of long-term service provision. The concept is often based on the strong role of primary care facilities in coordination functions. In China, however, very limited cross-referral takes place across the three tiers of health care facilities to ensure that health conditions are managed at the most appropriate and cost-effective level. Patients tend to go directly to hospitals even for outpatient care (about 53 percent of patients have their first contact with the system at a hospital), with little gatekeeping by lower levels.

- *The capital investment model for public hospitals is not conducive to rational hospital planning and may lead to excessive hospital capacity.* The model involves a strong reliance on bank lending and project cooperation, whereby third-party capital investors effectively take a role in management and even ownership. This has reinforced incentives for maximizing profits in public hospitals, led to unclear ownership and control of public facilities at times, and contributed to irregular practices. More broadly, capital planning in China may contribute to an oversupply of beds and facilities. International experience shows that excess beds are associated with overutilization of hospitals (Delamater and others 2013).

Providers have strong incentives to induce demand, leading to overservicing, which threatens the sustainability of the insurance and delivery systems. For all levels of care, the dominance of provider payment systems based on fee for service, emphasis on self-financing of facilities (for example, sales or business income represented over 90 percent of hospital revenue in 2010), and the link between hospital business revenue and physician income have encouraged unnecessary care and inefficiency in service production.<sup>53</sup> Distorted pricing for treatments has given health care providers strong incentives to generate demand for profitable high-technology services and drugs in place of unprofitable basic alternatives. Considerable evidence reflects cost-enhancing (and quality-impairing) provider behaviors in response to



these incentives, including extended lengths of stay and prolonged treatment, unnecessary admissions and complementary services (for instance, intravenous fluids), overuse of high-tech diagnostics, misuse of antibiotics, and overprescribing of drugs. In 2009, 43 percent of health spending in China was for pharmaceuticals, compared with 17 percent in OECD countries (Yip and others 2012).

In terms of China's health insurance system, the fragmentation of risk pooling poses a threat to long-term sustainability. Because insurance funds are pooled at the level of urban cities and rural counties, nearly 3,500 separate risk pools have been created for the various schemes. Compared to those in other countries, these risk pools are relatively small, limiting the ability of insurers to spread risk among the healthy and the ill and to provide adequate financial protection. Research also shows that NCRMS and URBMI face the problem of adverse selection (Chen and Yan 2012; Liu and Tsegai 2011), which, when combined with low levels of risk pooling and government subsidization, may compromise the institutions' long-term financial viability.

Lack of portability in the health insurance system is another concern. In general, benefits from URBMI and NCRMS are not portable when workers change jobs or switch residences between rural and urban areas. This lack of portability may impair labor mobility, access to health services, and continuity of care, especially for workers with chronic conditions. One possible barrier to portability is the lack of uniformity in benefits and reimbursements across schemes (for instance, higher out-of-pocket spending resulting from higher premium levels and copayments or lower reimbursement ratios), making enrollment in a new scheme unattractive.

The health insurance system also suffers from low capacity. Agencies responsible for operating insurance schemes generally lack sufficient staff, information technology, and managerial know-how to effectively manage and monitor the schemes, oversee providers, and navigate the increasingly complex array of norms and regulations (Yan and others 2011). The lack of integrated databases and management information systems impedes insurers' ability to monitor provider

behaviors and quality, coordinate care across different types of providers, and process claims reimbursements across provinces for migrants. Another capacity issue relates to the role health insurers could play in altering the behaviors of health care providers through effective purchasing strategies. Despite major increases in health insurance financing by the governments, health insurance agencies remain largely passive payers of claims.

The quality of the delivery system remains nearly forgotten. Many of the essential and systematic elements of quality improvement programs are still in their infancy in China, including continuous quality improvement programs, performance measurement, monitoring and benchmarking, provider accreditation, medical and nursing school accreditation, professional credentialing (and recredentialing), and disciplinary actions for malpractice. As in many countries, a lack of reliable data on quality of care, systematic measurement, and institutional infrastructure for quality monitoring and evaluation frustrates attempts to assess quality at any facility or level of care.

### *Proposed policy responses*

China faces both new and unfinished reform agendas in addressing the health consequences of urbanization. As discussed in greater detail next, the new reform agenda involves the expansion of insurance to migrants, integration of insurance schemes, and promotion of healthy urban living. The unfinished reform agenda entails dealing with cost-inducing perverse financial and provider incentives, an unbalanced and uncoordinated delivery system, and quality of care.

### *New agenda*

To increase equality and labor mobility, segmentation among the three health insurance schemes—URBMI, UEBMI, and NCRMS—must be reduced to create an integrated and seamless system. Notwithstanding expansion of insurance coverage to migrants as described earlier, continued efforts are needed to minimize differences in benefits, reimbursement rates, copayments, and deductibles among the three insurance schemes.



The schemes should also be integrated into a common institutional platform while raising the pooling level of the health insurance system to at least the provincial level. Although no blueprint is available for integrating insurance schemes, the most appropriate approach for the Chinese context may be the consolidation of multiple funds into a limited number of pools. Variants of this model can be found in Canada, the United Kingdom, Sweden, Korea, Colombia, Chile, and Norway.

In the medium term, China can build on the experiences of several of its own provinces in merging URBMI and NCRMS. Integration can start with merging organizational arrangements, including physical location; managerial, monitoring, and supervisory functions; and information systems. Chongqing, Guangdong, Ningxia, and Tianjin have vertically integrated these schemes, although the breadth and depth of integration varies. The next step would be to merge benefits, reimbursement rates, and provider payment systems. It will also be important to move away from the current model of individualized coverage in insurance schemes to household-based coverage, to promote administrative efficiency, and to facilitate portability of entitlements. Pending issues include selection of the government agency responsible for the new organization and establishment of the accountability arrangements for performance oversight.

In addition, reforms should recognize that healthy urban environments depend on having healthy urban design at the core of urban planning. International evidence shows that healthy urban environments promote healthy living by incorporating design elements such as pedestrian walkways, bicycle networks and infrastructure, parks, play areas and plazas, weekend pedestrian and cycling streets, pedestrian overpasses and traffic islands, and walking trails.<sup>54</sup> These strategies are typically supported by promotional or soft activities such as fitness events, childhood overweight and obesity programs, senior group exercise events, promotion of exercise facilities and use of stairs in the workplace, antismoking regulations and campaigns, access to mental health services, and community health fairs.

### *Unfinished agenda*

Service delivery needs to be reoriented based on primary and coordinated care. An alternative care delivery model should be considered, one that would anticipate and shape patterns of care according to the projected health and medical needs of the population while boosting the role and quality of primary care. The model should involve significant strengthening of community-focused care, vertical and horizontal integration of facilities to provide comprehensive services along a continuum or chain of care, and use of primary care as the point of entry into the system. Recent OECD experience suggests using a coordinated care delivery model that emphasizes primary care as a gatekeeper and case manager, defined links among providers, and specialized outpatient and day surgical treatment, which reduces the need for inpatient beds. The international trend is toward transferring services currently provided by hospitals to community-based ambulatory centers or telemedicine clinics.

Pilot reforms to strengthen the role of primary care in China are already under way. Emerging experiences in Shanghai and Beijing demonstrate that CHCs are able to fulfill primary care provision and case management tasks when they are equipped with a new set of competencies and provided with professional support. For the past several years, Shanghai and Ningbo have also provided promising examples of a functional model using a family doctor. Beijing, Wuhan, and Shanghai are testing medical consortium models, which link CHCs, secondary hospitals, and tertiary hospitals in a two-referral system in which CHCs serve as entry points or gatekeepers. Specialists are also decentralized to CHCs.

To improve quality of care, China can implement several short- and medium-term measures that are already being undertaken in a number of cities, counties, and facilities. The first measure involves conducting an inventory of quality improvement initiatives in ambulatory units and hospitals, including any results of these initiatives. The second measure is to require all hospitals to report a set of quality indicators on high-volume

tracer conditions. Third, hospital eligibility for insurance financing should be linked to threshold requirements such as accreditation or certification that the hospital meets specified standards. A fourth measure entails providing financial incentives to improve quality, known as quality-based purchasing, which has become widely accepted in OECD countries. Under this approach, insurance schemes can use their purchasing power to stimulate quality improvement, data reporting on quality, and patient satisfaction.

China can learn from the lessons and emerging innovations of OECD and other middle-income countries that have an oversupply (or underutilization) of beds. OECD countries are adopting alternative planning approaches in the face of aging populations. They are applying coordinated, community-based medical models to address NCDs; rapidly advancing communication and telemedicine technologies; emerging noninvasive or minimally invasive therapies; pharmaceutical advances; miniaturization of sophisticated equipment; and increased use of ambulatory surgery, urgent care centers, and other forms of “day hospitals.” In doing so, these countries have redefined the role of hospitals and reduced bed-to-population ratios, lengths of stay, and ultimately the number of hospitals—almost all of which are steps that need to be taken in China.

In terms of health insurance reform, controlling utilization and provider cost escalation are essential to the financial sustainability of any insurance scheme. International experience shows that no single approach to cost containment can effectively slow the increase in costs over the long run. Used in combination, the following three approaches could contribute to effective cost containment in China:

- *Design and implementation of robust provider payment mechanisms.* These mechanisms are already in practice in China. Payment reform is essential to achieving the other components of the reform agenda, avoiding uncontrollable cost escalation, and restoring public trust in the health system. Some pilots with alternative provider pay-

ment systems are under way, and although the number of facilities involved in these experiments is small, preliminary assessments indicate progress in cost containment. For example, Hainan province introduced prospective global budgets in six hospitals, resulting in slower rates of cost inflation, lower copayments, and slower increases in expensive services compared with hospitals paid on a fee-for-service basis (Yip and Eggleston 2004). Expanding pilots to experiment with alternative payment methods will provide important information on which models work best in the Chinese context.

- *Adoption of managerial cost control measures.* Such measures will help control utilization or frequency of claims, lower spending for services provided, and detect and control fraud. Measures typically used by health insurers and purchasers include (a) inpatient management to reduce length of stay and avoid unnecessary admissions (for example, preadmission review, concurrent review, second opinion before surgery, discharge planning); (b) programs and incentives to encourage the substitution of outpatient care for higher-cost inpatient care and the identification of new and less costly treatments for high-cost conditions; (c) provider profiling to enable the analysis and characterization of providers according to utilization, costs, quality, and other performance-related features to help identify high-cost providers and providers with patterns of high utilization; (d) standard treatment guidelines and provider education programs to encourage cost-effective practice patterns; and (e) programs and incentives to promote the use of generic drugs and low-cost technologies.
- *Expansion of the institutional separation between revenues and expenditures.* Institutional separation is an operational feature of the current health reform, although uptake has been slow. Part of the objective is to delink incomes of facility staff from revenue generation. Chengdu, Hangzhou, and Beijing have applied this reform to urban CHCs. All revenues are placed into a special government account, then returned to the facility in the form of a negotiated

budget. The measure has reduced overtesting and overprescribing, thus breaking the link between sales of health care services and physician income. The cities are experimenting with contracts that specify and rationalize the mix of services provided.

As mentioned above, sound institutional purchasing can provide incentives to deliver more efficient, more appropriate, and higher-quality care. For health insurance agencies, moving from simply paying the bill to actively purchasing will help promote a system that puts patient care and cost-effectiveness above providers' focus on maximizing revenue. International experience shows that purchasers can do a great deal to incentivize providers to improve quality processes and results while contributing to cost containment. Explicit contracts linking payment to performance have been shown to be effective instruments for improving patient satisfaction, quality, and efficiency (Preker and Langenbrunner 2005). For example, in the Brazilian state of São Paulo, the state government crafted contracts with public and private hospitals that specified production targets for a large array of services, along with cost-based budgetary caps. The contract also mandated quality improvement measures and data reporting requirements. A portion of financing was tied to successful compliance with these mandates.

## Deepening pension system reform

### *Current status and challenges*

Deeper pension system reform is needed to achieve the goal of a "full coverage, basic protection, multilayered and sustainable" pension system outlined by the 18th National Congress of the Communist Party of China. As discussed previously, although much progress has been made in the past decade, China still has a large unfinished agenda, in part because of the rapid pace of reform to date. Given the major demographic changes discussed earlier, the pension system also faces the challenge of remaining fiscally sustainable while dealing with the dual challenges of handling a rapidly aging population and meeting the needs of an increasingly diverse

and mobile labor force. Addressing the historically low coverage of rural, migrant, and urban informal sector workers remains a challenge.

Structural issues in the current pension system must also be addressed to support rural-urban integration. These issues include the following:

- *Fragmented pension systems*, which result in low levels of pooling and limit portability. The urban worker pension scheme pools its contributions and payout responsibility at the municipal level, with only a partial adjustment fund established at the provincial level. Rural and urban resident pension schemes are pooled mainly at the county and city levels. The policy measure to allow for transfer of entitlements across pension schemes was announced in 2014, but the implementation modality still needs to be determined. The geographic fragmentation and multiplicity of urban pension schemes for workers, PSU employees, civil servants, and in some areas residents and migrants, as well as differences in parameters, create disparities in benefits and barriers to worker mobility across space and sectors.
- *The "legacy costs" of earlier, more generous urban worker pension provisions*, which are largely financed through current pension contributions, thus keeping contribution rates high and creating incentives for underreporting of wages and nonparticipation. These legacy costs are not affordable for many local governments.
- *Design weaknesses* in the pension system, such as a low retirement age and outdated annuity factors can affect incentives and fiscal sustainability.
- *Low returns on individual accounts*, such that pension replacement rates that have been significantly lower than anticipated when the system was developed in the 1990s.
- *Weak management and service delivery capacities*, particularly in the face of rapid pension system expansion.

### *Proposed policy responses*

The proposed policy response is a design vision that aims to provide an integrated

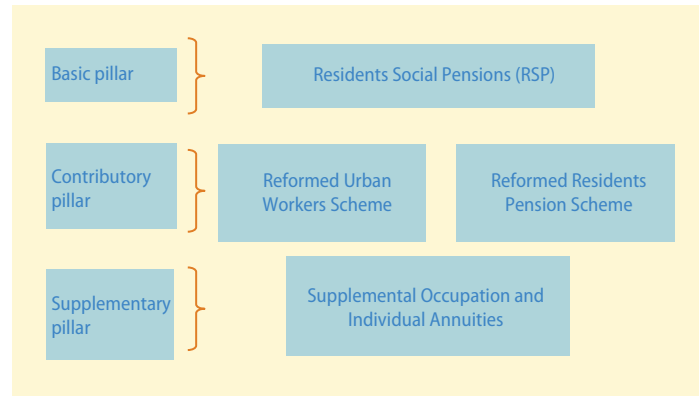
framework for pension policies, financing, and institutional development (Dorfman and others 2013). The policy framework supports a greater diversity of instruments for old-age income protection to better address coverage gaps, support an increasingly mobile and diverse labor force, and ensure fiscal sustainability. The proposed financing options would diversify the sources of financing, rebalance the level of risk sharing between the citizen and the state, upgrade financial and risk pooling at the central level to relieve local budgets of some spending obligations, and ensure that pension promises can be honored for China's growing population reaching retirement age. Achieving an integrated national pension system will also require substantial institutional reforms, including the development of a national information and communication system and changes in incentives and accountability for information sharing.

**Moving to an integrated design for the pension system.** An integrated pension system design would better address the needs of all workers and retirees while allowing for diverse circumstances. Such a design would no longer differentiate along urban and rural locational or hukou lines. It would ensure that pension provisions take into account the employment circumstances of workers, distinguishing among those who are formally employed and those who are self-employed and informal, and the capacity of individuals to make contributions.

The proposed reform provides an integrated framework of instruments supported by three pillars (figure 3.12). It uses a notional defined contribution (NDC) approach to anchor the design and the financing of contributory pensions. The three pillars are as follows:

- A *basic pillar*, which provides minimum elderly poverty protection through non-contributory resident social pension (RSP) benefits.
- A *contributory pillar*, with a mandatory NDC scheme for workers with wage incomes and with labor contracts (a modified current urban workers scheme [UWS])

**FIGURE 3.12** Proposed overall design of the pension system



Source: Wang and Dorfman 2014.

and a voluntary defined-contribution pension savings scheme for the urban and rural populations with nonwage incomes (a modification of the current rural and urban resident pension schemes [RPS]).

- A *supplementary pillar*, which provides voluntary occupational and individual pension savings options that may supplement other pension benefits, building on the existing enterprise annuity scheme.

The three-pillar approach builds on features of the existing pension system while providing a common basis for addressing fragmentation, portability, pooling, and sustainability. For workers with wage incomes, the NDC design proposed for the UWS would provide stronger incentives for participation and will strengthen portability and financial sustainability.<sup>55</sup> For workers with nonwage income, the proposed RPS is similar to the current rural and urban resident pension schemes in its voluntary and defined-contribution design, while also sharing features of the reformed UWS, such as qualifying conditions and the benefit formula. These parameters could support the transfer of pension rights and benefits across the two schemes. The combination of the RPS and RSP mimics the design of the existing resident pension schemes but broadens the scope of benefits for all retirees and introduces a benefit adjustment factor to reduce the fiscal burden on a sustainable basis. The introduction of the RSP would help achieve the policy goal of full coverage.

**Upgrading the pooling level.** Although the initial aim should be to achieve provincial-level financial pooling, the long-term objective should be national-level pooling. As a starting point, financial pooling is needed at the provincial level, including consolidation of all contributions and (unified) benefits. Cross-subsidies between regions with net surpluses and those with net deficits are expected, as well as between regions with lower system dependency rates and those with higher ones.

Financial pooling of contributions and reserves helps smooth disparities and diversifies risks to members, but the level of pooling remains low across most of the country. Two types of financial pooling approaches are currently used in China: (a) full pooling of all contributions, accumulations, and disbursements and (b) partial pooling through the use of provincial adjustment funds aimed at redistributing a portion of contribution revenues. Among 31 provinces, Beijing, Tianjin, Shanghai, Chongqing, Shaanxi, Qinghai, and Tibet have realized full financial pooling at the provincial level, while the other provinces have partial pooling or no pooling. Transfers to provincial adjustment funds are levied based on total municipal or county wage payrolls, pension account balances, or budgetary contribution revenues. Table 3.13 indicates the proportion required to be transferred. Some provinces such as Guangdong have fully realized the financial pooling of pension contributions, accumulations, and disbursements at the prefecture city level, while a number of provinces have full financial pooling only at the county or city level.

Unification of parameters and pooling of data and management are essential for

financial pooling. A national pension system needs to be grounded in standardized policies for contributions, qualifying conditions, and benefits. Without unification of parameters, those communities with the lowest benefits can end up transferring resources to those with more generous benefits. Local consumption and poverty parameters should be used in determining the social pensions benefit level. Support for accounting, financial control, and accountability systems can help ensure the integrity of the financial pooling process. Unique identification, validation systems, data standards, and other policies are essential for recordkeeping and to enhance information flows across space.

A vertical management approach that builds on local capacity could help ensure provincial-level accountability. Under this approach, individuals in local social security and finance departments would be accountable to provincial (not municipal) authorities. However, even with vertical management, legal, regulatory, and supervisory mechanisms will be needed to ensure that national standards are applied at the local level (Wang and Dorfman 2014).

**Achieving financial sustainability.** Financing sources should be diversified from the current largely contribution-based financing to a greater mix of sources, with a rebalancing of the level of risk sharing between the citizen and the state (table 3.14). Social pensions and legacy costs would be financed from current government revenues, whereas the other schemes would be contributory, with either a pay-as-you-go or fully funded approach. A separate financing strategy is proposed to partially prefund future pension costs. Automatic benefit indexation using publicly disseminated indexes and GDP-linked rates of return shields workers and retirees from risk. Similarly, annuitization protects retirees from having to bear or pay for coverage of longevity risks.

Three policy measures would help achieve long-term financial sustainability and improve the incentives to participate:

- *Parametric changes*, to reduce long-term costs, including gradually increasing the minimum retirement age to 65, automati-

**TABLE 3.13 Proportion of pension contributions transferred to provincial adjustment funds**

Province	Proportion (%)	Province	Proportion (%)
Shanxi	3	Hubei	5
Inner Mongolia	2	Hunan	0.5
Liaoning	10	Guangdong	9
Jilin	5	Guangxi	1
Jiangsu	1.5	Hainan	1
Zhejiang	2	Sichuan	5
Jiangxi	3	Xinjiang	1

Source: World Bank staff compilation based on the latest provincial policy documents.



**TABLE 3.14** Proposed financing arrangements for the pension system

Scheme	Financing approach	Sources of financing
Resident social pension	Noncontributory and unfunded	Government budgetary allocations
Urban workers scheme	<ul style="list-style-type: none"> <li>• Contributory pay-as-you-go</li> <li>• Unfunded legacy costs</li> <li>• Separate external prefunding to address long-term demographic changes</li> </ul>	<ul style="list-style-type: none"> <li>• Employer and employee contributions</li> <li>• Government budgetary allocations</li> <li>• Government external prefunding</li> </ul>
Resident pension scheme	Contributory pay-as-you-go	<ul style="list-style-type: none"> <li>• Workers</li> <li>• Matching contribution subsidies from government at different levels</li> </ul>
Occupational and personal annuities	Contributory and fully funded	<ul style="list-style-type: none"> <li>• Employers</li> <li>• Employees and self-employed</li> </ul>

Source: Wang and Dorfman 2014.

cally adjusting the annuity factor to reflect the life expectancy at retirement age, and automatically providing hybrid indexation based on wages and per capita GDP growth.

- *A separate partial-funding strategy*, to address the future funding requirements that will arise as old-age dependency ratios increase and contribution revenues prove insufficient for benefits. Such a funding strategy would lead to the establishment and financing of buffer reserve funds on a provincial basis, based on projected cash flow needs.
- *Financing of legacy costs from general revenues*, rather than from pension contributions. Financing legacy costs from outside the pension system would reduce contribution rates, thereby substantially improving the affordability of contributions to the reformed UWS.<sup>56</sup>

**Sequencing of reform measures.** To realize the policy goals of full coverage, equity, portability, and financial sustainability, the sequencing of pension reforms will be critical. Possible short-, medium-, and long-term measures are proposed below.

In the short term,

- *Initiating an increase in the UWS minimum age for receipt of benefits.* Given the need to do this gradually, initiating an increase in the pensionable age sooner rather than later seems advisable.
- *Implementing other parametric reforms of the UWS.* This measure would include eliminating the minimum wage subject to contributions, dramatically reducing the

vesting period, and initiating a process to reduce contribution rates (linked to financing of legacy costs from general revenues).

- *Increasing the matching contributions provided under the RPS while initiating measures to delink a basic monthly benefit social pension from a vesting period of contributions.* This reform can further improve coverage, particularly for younger workers and workers who may find it difficult to satisfy the current 15-year vesting requirement.
- *Taking preparatory design steps to integrate the PSU, civil servant, and urban workers pension frameworks.* Ultimately, the aim should be to fully integrate the PSU and civil servant schemes with the UWS. The key design question is how to integrate these workers into the UWS while avoiding a dramatic downward adjustment in replacement rates. This would in turn require integrating policy development of PSU and civil service pension reform with broader compensation reforms.

In the medium term,

- *Promoting greater harmonization across schemes and making progress on integration of schemes for different groups.* This includes (a) completing integration of PSU and civil servant workers into the reformed UWS and (b) integrating the rural and urban resident schemes and their management under one policy and institutional umbrella.<sup>57</sup>
- *Putting in place the information systems to facilitate portability of pension rights and*



*pooling*. Common data standards and data sharing protocols under the leadership of MOHRSS are needed, along with development of a data management system strategy for phased convergence. Social insurance information systems within provinces also need to be integrated to prepare the way for eventual sharing of beneficiary data and financial information across provinces.

- *Separating legacy cost financing using a clearly defined financing strategy.* A framework for legacy cost estimation and identification needs to be developed and implemented. The legacy costs could be financed by the different levels of government.
- *Meeting prefunding targets under the overall financing strategy.* This measure would require effective supervision and oversight, including supervision of investment management.
- *Completing provincial pooling of pension funds.* This would require putting in place the incentive framework to implement provincial pooling of financial flows and provincial financial management.

In the long term,

- *Transitioning from provincial pooling and management to national-level pooling and management.* The nationally pooled and integrated system would need to be underpinned by an integrated national data management system.
- *Moving to a pension system that continues to distinguish between those with wage employment and those without it, such as self-employed and informal workers.* However, this could be undertaken as different programs come under a unified institutional framework.
- *Introducing funded defined-contribution pension instruments.* This funding would be done to the degree that the financial markets are liberalized, well regulated, well supervised, and well governed.

## Social assistance

### *Current status and challenges*

The social safety net in China consists of dibao and traditional social assistance pro-

grams and special/temporary social assistance programs. Traditional social assistance programs such as *wubao* in rural areas and the “three-no’s” program in urban areas were established to provide income support for those who do not have dependents, have lost their ability to work, and have no income sources. In 2012, *wubao* beneficiaries numbered 5.5 million in rural areas, and urban three-no’s beneficiaries numbered 99,000. China also has special/temporary social assistance programs such as medical financial assistance, education assistance, and housing and heating subsidies, which provide temporary cash and in-kind support for the poor and low-income families. Medical financial assistance is the largest of these programs, providing support for 84.5 million people in urban and rural areas in 2012. Table 3.15 shows the benefits and fiscal inputs for medical financial assistance and dibao, illustrating the relative scale of the programs. Other temporary assistance programs covered 2.6 million urban households and 3.8 million rural households in 2012.

Inclusion of migrants into the urban social safety net is an important policy objective, as discussed earlier; however, in addition, the social assistance system is also facing a second generation of issues that must be addressed to promote greater rural-urban integration. Second-generation challenges faced by the social assistance system include (a) developing a more systematic approach to determining dibao eligibility thresholds and

**TABLE 3.15** Dibao and medical financial assistance in urban and rural China, 2012

	Urban areas	Rural areas
<b>Dibao programs</b>		
Thresholds (RMB/month)	330.1	172.3
Benefits received (RMB/month)	239.1	104.0
Total fiscal inputs (RMB, billion)	67.4	71.8
<b>Medical financial assistance</b>		
Medical cost reimbursement (RMB per capita)	858.6	721.7
Subsidies for medical insurance contributions (RMB per capita)	84.0	57.5
Total fiscal inputs (RMB, billion)	7.1	5.8

Source: Ministry of Civil Affairs 2013, 2012 Statistical Bulletin of Social Services Development, <http://www.mca.gov.cn>.

benefit levels across urban and rural areas and across provinces; (b) focusing on the primary objective of dibao; and (c) promoting greater synergies between social assistance programs and antipoverty interventions in poor counties. The high level of discretion in setting dibao thresholds compromises the goal of policy consistency in the area of social protection. Although the design and objectives of dibao programs are conceptually clear in targeting income poverty, in practice, dibao programs are used to target consumption poverty and even provide support for low-income families. The ambiguity that has arisen has resulted in low targeting efficiency. The protective versus promotional role of dibao will need to be clarified to refine the policy objective.

#### *Proposed policy responses*

Promoting integration of the rural and urban components of social assistance programs requires clearly defined financing roles and responsibilities of government at various levels. The increasing role of the central government provides a channel for standardizing and equalizing dibao programs. The central government could assume a bigger role in the dibao and temporary social assistance programs by ensuring fiscal inputs and income transfers to cover both developed and lagging areas. This approach would ease the fiscal burdens of city governments in coastal areas and provide incentives for them to treat long-term migrant families and urban residents equally.

To facilitate the convergence of approaches and equalization of dibao thresholds and benefits, the central government could upgrade the authority to establish dibao thresholds from the county (city) to the provincial level. Currently both the method of determining dibao thresholds and the levels themselves vary enormously, reflecting the highly decentralized nature of implementation. Developed countries often apply a unified formula for the threshold level for social assistance programs, taking into account regional cost-of-living differences. Similarly, China could gradually move the responsibility for setting thresholds from county (city) to prefecture,

from prefecture to province, and finally from province to the national level. A systematic approach is needed to ensure that the standard reflects the true cost of living and is adjusted accordingly over time. The authorities could also consider adopting a common benefit floor for all localities in China, while allowing local government to establish a higher level as capacities allow (Umapathi, Wang, and O'Keefe 2013). The Ministry of Civil Affairs has made progress in this direction, and its assessment of emerging experience can inform future policy development.

Improved targeting would help dibao and temporary assistance programs better use the limited public resources available. An additional consideration is the role of social assistance programs in addressing the equity issue between the poor and the near poor. Although the dibao program has performed well in excluding the nonpoor, its design raises risks of poverty traps for households just above the dibao eligibility threshold. Eligible households have their incomes topped up to the dibao threshold and also receive noncash benefits, including exemptions or reductions for education fees, subsidized health insurance, and public housing and subsidized utilities. As a result, they may be better off than households just above the dibao threshold that are not entitled to such noncash benefits but have only slightly higher incomes.

In parallel, deeper reform of the social assistance system is needed to help better achieve its poverty alleviation objectives and improve coherence with other programs. Additional resources will be needed to develop the information management system, increase staffing levels according to the population or families served, and develop business processes and performance standards. The reforms should also promote greater synergies and coherence among social assistance programs, social insurance schemes, labor market programs, regional antipoverty programs, and housing programs, as in the following:

- For *social insurance schemes*, with the expansion of basic pension benefits to rural and urban informal sector retirees in the

coming years, the interaction with measurement of household income for dibao needs to be examined closely. Currently, basic pension income is ignored in determining dibao eligibility, but in the longer run it may be necessary to look more closely at the rationale for such an approach as the pension system expands.

- For *labor market programs*, some cities provide job training for family members of dibao beneficiaries, encourage community works participation, and allow a gradual reduction of transfers after they find jobs. Those are good practices that could provide strong incentives for the poor to reenter the urban labor market.
- *Regional antipoverty programs* have been based on a regional development approach parallel to household-based social welfare support. More efforts are needed to facilitate greater convergence of social assistance, social services, and antipoverty programs, that is, building on the recent examples of prioritizing dibao and near-poor households in training under antipoverty programs.
- For *housing programs*, as discussed earlier, the government has placed greater emphasis on affordable housing for lower-income households and public housing for the poor. Although this is a welcome policy direction, it will also require more rigorous valuation of the implicit value of social assistance packages that include free or subsidized public housing and of the subsidies offered to households that are not receiving social assistance.

### Accountability and social services delivery

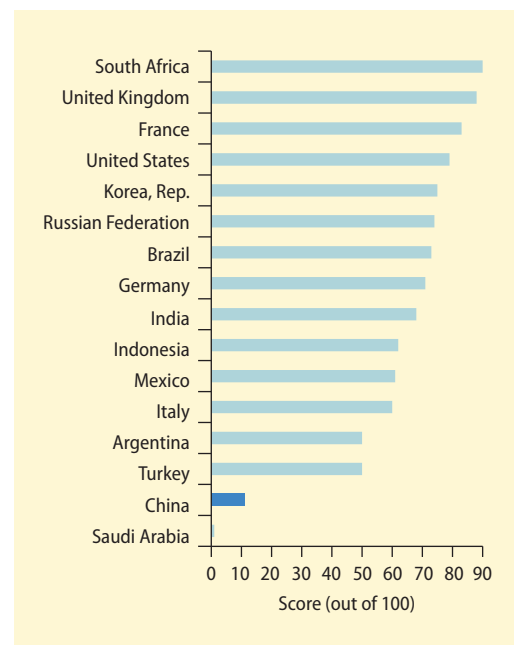
To improve results in service delivery across the social sectors, China faces the challenge of increasing accountability through three broad channels: government systems, citizen based, and choice based. Compared with most countries, China has traditionally placed less emphasis on citizen- and choice-based accountability channels in the social sectors. For citizen-based accountability, that reflects the lack of client voice in service delivery. Choice-based accountability is underemphasized because of the dominance

of public sector service provision, resulting in a lack of client choice and provider competition. The potential of each channel of accountability will vary according to the type of service considered, the nature of the market in which it operates, and the nature of outcomes and performance improvement to be promoted. The following sections discuss each of the three broad channels of accountability in turn.

### *Government systems and accountability to promote better service delivery*

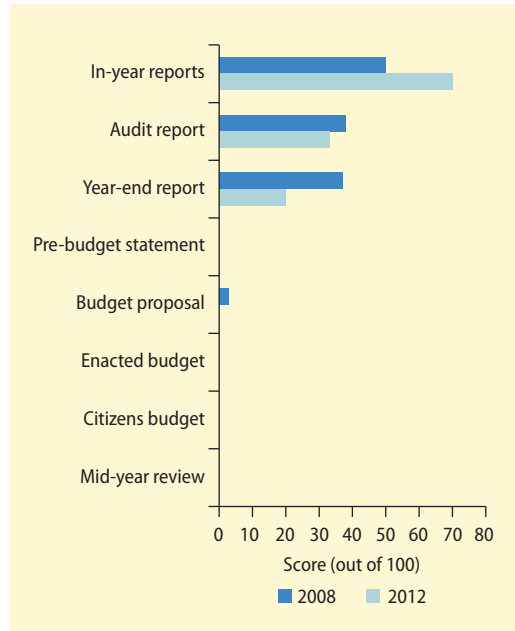
China's overall level of budgetary transparency is low by the standards of Group of Twenty (G20) countries and has fallen in recent years. Figure 3.13 shows China's overall rating on budgetary transparency compared with G20 countries, and figure 3.14 presents the individual elements of the budgetary system ratings for China in 2008 and 2012. Although some indicators such as in-year reporting are relatively high, others related to review and actual budget enactment are very low. Stronger performance on these

**FIGURE 3.13** China and G20 fiscal transparency indicators, 2012



Source: Open Budget Survey 2012. <http://internationalbudget.org/what-we-do/open-budget-survey/>.

**FIGURE 3.14** Elements of fiscal transparency indicators for China, 2008 and 2012



Source: Open Budget Survey 2012. <http://internationalbudget.org/what-we-do/open-budget-survey/>.

indicators will be needed to move from a budget compliance culture to a performance-oriented budgetary approach.

Although China has substantially increased central and provincial transfers to support social services in recent years, the majority of China's provincial and sub-provincial governments have a low level of fiscal transparency (OECD 2005). Information on actual expenditures, off-budget transactions, and government performance is particularly limited in the public sphere. Therefore, it is difficult to assess the differential impacts of central and even provincial spending on the outcomes that matter most or the efficiency in achieving desired outputs. Monitoring of outcomes for poor and vulnerable communities is a particular weakness.

The global trend for middle- and high-income countries has been toward increased emphasis on performance budgeting (Arizti and others 2010). Performance budgeting focuses on the results that are being delivered rather than just on the amount of money being spent, and it aims to strengthen resource allocation, effectiveness, efficiency,

and accountability. Over two-thirds of OECD countries now include nonfinancial performance information in their budget documents, drawing on sources such as strategic spending reviews, performance audits, and scorecards and benchmarking exercises.<sup>58</sup>

Because performance-informed budgeting places new demands on budgetary systems, sectoral agencies, and service providers, the goals for making the budget process more performance oriented must be realistic and gradual. The outputs or outcomes measured should also be reasonably attributable to the service provider. The experience of Korea in introducing performance-related budgeting after the East Asian crisis is useful for understanding some of the risks. It also points to a need to focus initially on the quality of performance information and the capacity and willingness of both budgetary and line agencies to use the information generated in a manner that constructively focuses on sustained improvements in performance and is not overly mechanical in its application.

Just as budget systems aim to increase accountability for performance through various channels, human resource (HR) and compensation systems may do the same. The most obvious example is performance-related pay, and China already has significant elements of it in education and health care services. As of the mid-2000s, two-thirds of OECD countries had performance-related pay for public sector workers or were introducing it (OECD 2005; World Bank 2013). However, the evidence regarding its impacts is mixed. For example, studies in the United States have found no impact on learning outcomes of bonus schemes for teachers in New York City and Nashville schools. In contrast, recent evidence from developing country evaluations of bonus-pay incentive schemes for teachers suggests a more positive picture, although none of the evaluations to date have looked at long-term impacts.

However, performance-related pay has given rise to particular challenges in China's health sector. Although fee-for-service provider payments and a strong emphasis on profitability of individual providers closely link pay with performance, the performance indicators of volume and value of services

are not closely linked to quality and cost-effectiveness. As discussed earlier, overemphasis on volume and value indicators gives providers the incentive to more services than are necessary and sometimes even provide harmful treatment. Future payment systems need to focus much more on quality-related information (for example, infection rates, medical error rates, and adverse events) to assess provider and facility performance, which in turn requires improved facility information systems, improved measures of performance, and revised case-based payment systems that encourage efficiency.

China is gradually trying to strengthen its regulation, accreditation, and licensing capacity in the social sectors and beyond, but realizing the potential of such systems to drive quality improvements remains a challenge. The importance of more sophisticated regulation, accreditation, and licensing systems will increase as private and nonprofit providers become a more common feature of the service delivery landscape in the future. The health sector, in particular, has the potential to benefit substantially. Globally, accreditation systems are playing an increasingly important role in driving quality and efficiency improvements in hospital care. Although China accredits its hospitals, the underlying hospital information systems needed to generate the data for more effective accreditation are usually absent.

#### *Citizen-based channels for enhancing accountability*

In recent years, China has made efforts at the subnational level to improve the public finance information available to the public. Guangzhou was the first city to publish all budgets from 2009, and the practice subsequently spread throughout the province. China also has program-specific transparency initiatives such as the publication of dibao applicants for public scrutiny and new requirements for budgetary management of extrabudgetary funds.

Many countries, including OECD and G20 countries, have found that increasing the transparency of information on public service financing and delivery has created conditions

that are more conducive to improved service delivery performance. One tool, employed by about 26 countries by 2012 (including Brazil, Indonesia, Mexico, and Thailand), is a “citizen’s budget,” which presents basic revenue, expenditure, and fiscal data in a user-friendly format to communicate directly with the public. OECD practice is also promising—for example, Korea’s Web-based D-Brain system (<http://digitalbrain.go.kr>) offers real-time access to fiscal data and citizen participation throughout the budget process. Many OECD countries also have sector-specific report cards generated by government agencies on facility-level performance, particularly in the health sector but also in education.

The citizen scorecard or user satisfaction survey can provide useful quantitative feedback on citizen satisfaction with service delivery. Some hospitals in China undertake their own user satisfaction surveys in an effort to improve the efficiency of their facilities. Such a citizen report card was developed and provided the basis for a large-scale survey conducted in 2006 by the World Bank in partnership with the Government of China in five cities—Chengdu, Dalian, Shanghai-Pudong, Shenzhen, and Xi’an (Brix 2009). Globally, three broad models are used for such surveys: by fully independent third parties such as nongovernmental organizations (NGOs), by the service-providing government agencies themselves (who may contract out the survey but control the dissemination of findings), and by autonomous public agencies.

The social audit is a related tool that may be more integrated into the regular processes of service delivery programs. It allows citizens to review and cross-check information on a public program against user feedback and perceptions. The social audit can be useful where there is a solid authorizing environment (such as a requirement in program implementation regulations) and a clear channel for the findings and recommendations of the audit to feed into formal grievance and redress processes. Depending on the situation, facilitation of the social audit process by a neutral third party such as an NGO may be desirable. Perhaps the most famous example of a social audit is India’s National Rural Employment Guarantee Program.



Institutions have growing experience within China in incorporating citizens directly into management and oversight institutions for services, echoing experiences from other parts of the developing world.<sup>59</sup> The directions for enhanced citizen involvement in social services are also clear in some sectoral policies, such as the National Education Development Plan. Globally, countries have had positive experiences in incorporating client satisfaction information into formal accreditation systems for hospitals.

Chinese practice and global experience also point to the importance of a sound legal and administrative environment for authorizing citizen participation in oversight and management of social services. Unless citizens' roles are required rather than simply tolerated, and unless the redress mechanisms have firm legal backing to ensure that providers and administrators give authorized powers to citizens, such mechanisms will likely be simply cosmetic and will not fundamentally increase the accountability of providers to citizens. Some areas of China have already made efforts to address this issue: for example, Shandong province and Chengdu city have regulations that seek to clarify the scope of authority and the underlying processes of the councils to give them firmer jurisdiction.

#### *Choice-based channels to promote accountability*

To date, China has not fully exploited the potential of using client choice as a means of improving provider performance. Furthermore, the role of the private sector as a source of competition and quality comparison has been limited in China. However, by offering greater potential for agglomeration of service providers, urbanization offers potentially enhanced choice for clients.

A first step to enhance client choice and use it as a driver of performance improvement is greater reliance on demand-side financing of services where appropriate. China invests public resources overwhelmingly on the supply side of social services, with notable exceptions such as health insurance. Where feasible, some financing could be shifted to the demand side through direct payments to citizens who then exercise choice among

providers. A good example is the experiments in parts of China (for instance, Jiangsu, and Meizhou in Guangdong) with vouchers for skills training.

A second area in which much more can be done to leverage improved service delivery outcomes is public purchasing of social services. This channel for promoting accountability has the most obvious potential in the health sector and for any social services for which provision is outsourced. As discussed earlier, the dominant position of local health insurance agencies as purchasers provides an opportunity to improve provider performance. Considerable experience in shifting to more active purchasing can be found within the East Asia and Pacific region, such as Thailand and Cambodia (Langenbrunner and Somanathan 2011). In the education sector, Shanghai's experience in providing compulsory education for migrants as described earlier is also instructive.

A third major area for reform is leveling the playing field between public and private providers of social services in order to deepen choice and competition. There is a range of social services for which private providers could potentially compete for public funding, such as higher-end health care, elder and long-term care, higher education, skills training, and preschool education services. The government is looking to encourage greater entry of private providers, including international health care investors who can bring global best practices in facility management and quality assurance. Global practice offers lessons in contracting out management of public hospitals to nonprofit organizations, as has been done successfully in middle-income countries such as Brazil and a number of high-income countries.

### **Strengthening institutions for an inclusive and productive labor market**

In addition to equitable access to social services, another critical component of inclusive urbanization and rural-urban integration is an inclusive labor market. Matching people to jobs where the private and social returns



on their labor and human capital are maximized is crucial for improving livelihoods and promoting economic growth. As urbanization proceeds, efficient job matching needs to be underpinned by geographic as well as sectoral and occupational mobility. Given the increasing demand for skilled workers, continued improvements are needed in the skills of workers to make them more adaptable to technological changes. This section looks at the remaining challenges in reducing barriers to labor mobility in China, with a particular focus on the areas of skills accumulation and labor market institutions (barriers such as hukou and lack of portability of social security were discussed in earlier sections). In the area of skills accumulation, this section assesses progress and proposes reforms in the technical and vocational education and training (TVET) system and higher education. It then examines the labor market institutions for wage setting, labor taxation, labor law, and labor dispute mediation.

### Context and challenges

China has made encouraging progress in integrating migrants into the urban labor market in recent years. However, China still faces challenges, including the following:

- *Improving worker skills.* As discussed earlier, migrant worker wages have increased very rapidly in recent years, and the end of so-called cheap Chinese labor has already been documented (Li and others 2012).<sup>60</sup> When wage increases outstrip productivity increases, it affects firm profitability, and in fiercely competitive sectors, this condition can lead to failure or relocation to lower-cost countries. Workers must upgrade their skills so they can take up higher-skilled jobs, but rural migrants are considerably less educated than the urban workforce. With available jobs increasingly being generated at the higher end on the value chain, migrants will have difficulty finding and keeping jobs.
- *Strengthening labor market institutions.* Despite progress in enforcing the labor laws and expanding social insurance coverage, rural migrants are overrepresented in the

informal sector. In 2010, over 60 percent of migrant workers were in the informal sector, and their movement to the formal sector was very limited (Park and Cai 2011). Even when employed in formal sector jobs, migrants have weaker attachments to formal sector employment. This divide is likely driven by a combination of factors, such as migrants having shorter contracts and formal sector employment benefits being less attractive to younger migrants (Giles and others 2013).

Beyond the integration of rural migrants, China faces other labor market challenges. Labor force participation is low among local urban workers over age 50, especially women, in part because of low retirement age and limited possibilities for lifelong learning (Giles, Wang, and Cai 2011). At the same time, young college graduates are experiencing persistent unemployment (Bai 2006). Wage setting mechanisms have resulted in substantial wage premiums in the SOE and PSU sectors (World Bank 2013). Although China's urban labor market has a relatively low degree of informality, a high tax wedge threatens to push both migrant and low-skilled urban workers into the informal sector.

Policies must shape a labor market that is inclusive of migrants and efficient for all workers (Wu 2004). As mentioned earlier, an inclusive and productive labor market requires geographic, sectoral, and occupational mobility for workers. At the same time, worker skills need to be continually improved to meet the demands of a rapidly evolving economy. Labor market and related institutions must provide channels for lifelong upgrading of skills, as well as balance wage and productivity growth. These areas of reform are discussed in greater detail below.

### Deepening the skills base

Although the overall quality of China's labor force has improved significantly since the 1980s, China remains a human resource-poor country compared to more developed

countries. Of the 761 million employed workers, only 114 million are considered high-skilled workers. Half the workers have attained only the nine-year compulsory education, and only 20 percent have attained an education at the upper secondary level or above, compared to an average of 74 percent for OECD countries and 47 percent in the United States (OECD 2013). According to the 2010 census, only about 10 percent of China's labor force is college-educated—a rate well below that of Korea, Japan, and the United States, where the college-educated share of the labor force is over 40 percent (OECD 2013). Among technical workers in China, only one-quarter are qualified as high-skilled workers with skills certifications.

Even in the less developed areas of the country, skills shortages and mismatches have begun to emerge. A 2012 survey in Yunnan province showed that as many as 28 percent of the firms identified worker skills and education levels as the most severe constraint to growth, the second most common of all factors.<sup>61</sup> Lack of required skills was cited as the main problem encountered by firms hiring for managerial and professional positions as well as for operative skilled workers. Notably, among China's 253 million rural workers (including 159 million migrant workers), as many as 69 percent have not received any type of training (NBS 2012a).

International experience shows that when economies move up the technology ladder, their need for education and skills at all levels grows, particularly at the tertiary level. By providing high-quality skills relevant to current and future labor market needs, higher education systems can improve human capital formation and enable entrepreneurs, managers, and skilled workers to perform well, thus supporting technological mastery, productivity, and competitiveness. An effective higher education system can also help develop a country's technological capability by undertaking research, supporting technology transfer, and providing workers with skills for innovation. The subsections below discuss two important channels for skills accumulation in China: TVET and the higher education system.

### *Technical and vocational education and training (TVET)*

#### *Current status and challenges*

China has made numerous achievements in strengthening its TVET system. These achievements include (a) dynamic school-industry collaboration at the majority of TVET schools and colleges, including student internships, customized training for enterprises, “factory in school” opportunities, establishment of training bases in industries for students and faculty, and even product research and development (R&D); (b) improved image and branding for TVET; (c) greater labor market relevancy of TVET curricula, along with more student-centered and hands-on pedagogy; (d) graduation of about 6 million students from secondary TVET schools annually, with a 95 percent employment rate since 2005, and about 10 percent continuing to tertiary-level studies; and (e) graduation of about 3 million students from tertiary TVET annually, with an employment rate of about 80 percent over the past few years.

However, a number of challenges still need to be addressed, such as the level of enrollment in TVET. As mentioned earlier in this report, the government set a policy goal for the enrollment ratio of TVET to academic programs to reach 50:50 at both the secondary and tertiary levels. Although the current ratios are very close to 1:1, it will be increasingly difficult to maintain a 1:1 ratio at the secondary level as parents continue to favor general high school over secondary TVET schools. Ultimately, it may not even be desirable to aim for a 50:50 ratio between the academic and vocational tracks. A large majority of TVET students are from rural, migrant, or otherwise disadvantaged or blue collar backgrounds, and the 50:50 target may have unfairly pushed more migrant and rural children into the vocational track. In several EU and middle-income countries,<sup>62</sup> at least 60 percent of upper secondary students are enrolled in general programs, even though prevocational and vocational programs are offered. About 25 percent of total secondary enrollment in Singapore is in the TVET track, and in Korea, approximately 40 percent of

secondary students choose to enroll in TVET institutions (UNESCO-UNEVOC 2010).

Another challenge is the continued fragmentation of TVET governance, management, and provision across public sector agencies and a growing private sector. Both the Ministry of Education (MOE) and the Ministry of Human Resources and Social Security (MOHRSS) and their local departments are involved in TVET. For certain economic sectors such as transportation, health, and agriculture, line ministries share responsibility for delivering sector-specific training. No single government ministry or agency is in charge of TVET affairs in China, although MOE has been charged with a leading role in implementing TVET system reform under the direction of the Medium- and Long-Term Education Development Plan.

Quality assurance also remains a challenge. Reflecting the education and human resources dual-track provision of TVET, two parallel arrangements govern quality assurance for education and training providers in China. Standards developed by both MOE and MOHRSS tend to be input based, requiring a minimum level of school infrastructure, training facilities and equipment, number of majors, and qualifications of the institutional head and teachers. Occupations and the corresponding competencies required have been changing rapidly, and the classification and competency standards need to be updated accordingly with further input from industry. Because schools must rely on their own capacity to develop and modify training programs, the quality tends to be very uneven across schools. The general lack of up-to-date, industry-led, competency-based occupational standards seems to have affected the overall quality of training programs. China does not yet have third-party accreditation of TVET providers.

Allocation of TVET funding also needs to be improved. More than 80 percent of total TVET financing comes from the government. The allocation of public funds for TVET relies predominantly on a formula based on the number of students and a fixed, per student expenditure. Allocation remains primarily supply and input driven, with very few demand-side interventions, apart from

student subsidies and localized examples of vouchers such as in Jiangsu and in Meizhou city in Guangdong. With the current resource allocation, huge disparities exist in secondary TVET across cities and prefectures and between urban and rural areas. Special funds for TVET tend to disproportionately benefit schools that are already stronger.

In terms of adult and labor force training, although the government clearly considers such training to be a priority, the effectiveness and relevance of current government training programs need to be examined further. Training of surplus rural labor is critical for facilitating the movement of rural workers to the secondary and tertiary sectors of the economy and preparing them for migration. Recognizing the importance of such training, the government has invested in a number of national training schemes in recent years. Although evidence suggests that such training improves rural household income (Liang and Chen 2013), monitoring and evaluation of the various government training programs are lacking. Furthermore, the training programs often do not have clear links with employer demand.

Evidence indicates that work-based training is uneven across enterprises. The recent government requirement for enterprises to contribute 1.5 to 2.5 percent of the wage bill to training left implementation to individual enterprises. A recent study in Yunnan province found that whereas 90 percent of enterprises did provide some form of training, most provided training to less than 10 percent of their employees. Small and medium enterprises, in particular, face capacity constraints in forecasting and planning for employee training.

### *Proposed policy responses*

The effectiveness and efficiency of the TVET system could be improved by greater coordination among government, education, and industry. In the short and medium term, the role of existing coordination mechanisms such as Interdepartmental TVET Coordination Committees could be strengthened for policy development, planning, and service delivery at both the provincial and local levels. In the long term, the government could

consider consolidating policy making, planning, financing, and service delivery for TVET into an agency such as a new skills development authority or into one of the existing ministries. This would eliminate the distinction between schools governed by the Department of Education and those governed by the Department of Human Resources and Social Security, as Shanghai has already done for its secondary TVET institutions. Consolidated governance and management will be even more critical for nonformal training, which appears to be even more fragmented and less structured.

Further efforts are needed to increase demand-side interventions and on-the-job training and to balance technical and non-technical skills training, as in the following:

- *Nonformal and rural training.* Public, private, and industry sources of funding for nonformal training could be consolidated into a single fund. A set of transparent criteria for disbursement of funds would be necessary and should be based on outcomes rather than input to ensure the quality of training. Training vouchers would be another option, creating a competitive market for nonformal training while giving participants more choice.
- *On-the-job training.* Employers are currently required to dedicate 1.5 to 2.5 percent of their total wage bill to training, but efforts are needed to ensure the effective implementation of that requirement. Other mechanisms that provide more incentives and quality assurance for work-based training should also be considered. In a few successful East Asian countries such as Korea, Singapore, and Malaysia, centrally pooled training funds have been used to improve the overall efficiency and equity of training.

Public investment in TVET could be improved further. More public resources could be directed toward promoting equity of financing and bridging gaps between rural and urban areas and between schools. Public finance should be targeted at helping TVET schools in disadvantaged localities, poor-performing schools with more resource constraints, and low-income families.

In addition to financial assistance, technical and institutional assistance would help facilitate the provision of work-based training, especially by small and medium enterprises. Technical assistance is particularly needed in the areas of needs assessment, training design and implementation, and monitoring and evaluation. Institutional support might include organizing groups of small and medium enterprises to reduce the cost of training design and delivery. The government can also systematically help firms build partnerships with training providers.

To enhance the relevance and effectiveness of TVET, the link between schools and enterprises need to be strengthened. Industry and employer involvement can play a key role in ensuring that the educational and training system, especially at the TVET level, is responsive to labor market demand. System- and school-level industry involvement should be legalized and institutionalized and its functions expanded to cover a range of policy issues, including setting skills development priorities, developing competency standards for skills certification, allocating resources, and monitoring performance.

The existing qualifications framework needs to be updated with standards and competencies that reflect labor market demand. In the long run, adoption of a common standard for assessing competencies would promote greater integration across the education system and with other countries. A national qualifications framework (NQF) could play an important role in this regard. Country-level frameworks have proved to be valuable in a number of countries, including the Russian Federation, the Netherlands, the United Kingdom, Ireland, and Australia. The EU has also established a voluntary European Qualifications Framework to promote mutual recognition of educational and skills qualifications. The potential benefits of such a system in China, with its diversity of institutional subsystems of education and training, are substantial and could contribute to needed improvements in educational quality and labor market relevance.

The TVET system could benefit enormously from greater private provision. To help encourage greater plurality in TVET

provision, the financing system for TVET would need to allow for public financing of nonstate provision, within a solid regulatory framework that would ensure that nonstate providers meet quality standards.<sup>63</sup> Licensing and accreditation for nonstate providers is very underdeveloped in China and would benefit from the experience of countries with well-developed training markets. For example, in Chile, the Servicio Nacional de Capacitación y Empleo (SENCE), a specialized agency of the Ministry of Labor, maintains no in-house capacity for training provision and procures training services from public and private providers.

Stronger monitoring and evaluation are needed to help ensure implementation of policies and gauge the effectiveness of TVET efforts. The existence of a functioning monitoring system creates an incentive for local authorities and schools to implement required policies and adhere to standards. Evaluation results can be further used to promote good practices within the system and replicate them on a wider scale.

An overarching reform needed across TVET and higher education is to increase articulation between the technical and academic streams. The objective would be to enable students to shift between streams

with due credit for competencies acquired in either system.

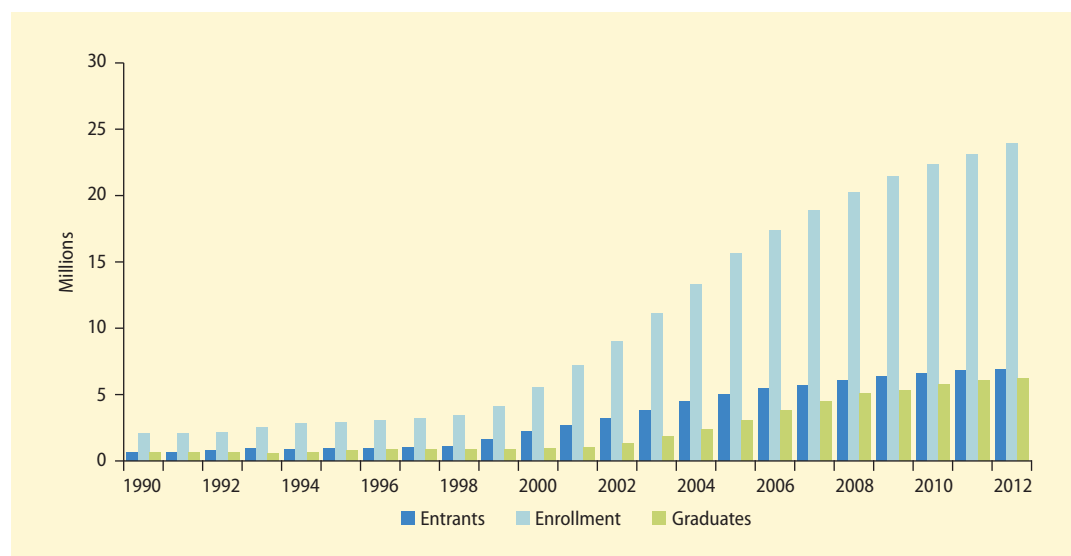
### Higher education

#### *Current status and challenges*

Higher education in China has expanded rapidly since the late 1990s. Historically, it was an elite institution, with a gross enrollment rate of less than 10 percent. In 1998, the Chinese authorities made the decision to expand higher education, starting with a target of increasing the gross enrollment rate from 9.1 percent in 1997 to 11.0 percent in 2000.<sup>64</sup> Rapid expansion took place between 1999 and 2009, with annual growth of more than 20 percent for both college entrants and graduates (figure 3.15). By 2012, the gross enrollment rate reached 30 percent (Yue 2013). China aims to achieve a higher education gross enrollment rate of 36 percent in 2015 and 40 percent in 2020 (MOE 2010).

This rapid expansion of higher education has resulted in lower labor force participation among young people. With greater access to colleges, millions of youths have chosen to study longer and postpone their labor market entry, which is one reason for the emerging labor supply shortage in China. At the same time, college graduates appear to have

**FIGURE 3.15** Expansion of higher education in China, 1990–2012



Source: NBS, China Statistical Yearbook, various years.



difficulty finding jobs—the employment rate measured at six months after graduation declined from 93.7 percent in 1996 to 73.0 percent in 2004 (Lai and Tian 2005). Evidence also indicates that the increased supply of graduates has had a downward effect on their wages (Y. Wu and Zhao 2010). Yet according to other sources,<sup>65</sup> sample surveys show that the employment rate of university graduates six months after graduation rose from 87.6 percent in 2008 to 91.5 percent in 2012, and the average initial monthly wage increased from RMB 2,133 to RMB 3,366 during the same period (table 3.16). Nonetheless, the same source estimates that underemployment (part-time work or working in an unrelated field) among university and college graduates six months after graduating was high at 14 percent in 2011.

Both supply and demand factors likely contribute to the difficulties college graduates face in finding attractive, well-paid jobs. College graduates now account for nearly half of new urban labor market entrants. On the demand side, the urban labor market needs time to generate opportunities for skilled workers and absorb them. Another possible contributing factor to higher unemployment among recent college graduates is that new graduates with high expectations for jobs may be willing and have sufficient resources to take time to find the right job.

Although China is home to world-class universities, the rapid expansion of higher education has led to a decrease in the average quality of graduates. China dominated the 2014 ranking of higher education institutions in BRICS and emerging economies, taking 23 slots among the top 100 universities, with Peking University and Tsinghua University ranked first and second.<sup>66</sup> On average, however, the rapid expansion of higher education has been accompanied by a decline in education quality. Li and others (2012) found a 26.4 percent return to attending an elite university for new graduates before controlling for student ability (proxied by examination scores) and a 10.7 percent return after doing so. Analyzing data from 2002, Zhong (2011) found that the difference in earnings between graduating from a high-quality university and a

**TABLE 3.16 Trends in employment and wages of college graduates, 2008–12**

Year	2008	2009	2010	2011	2012
<b>Employment rate (%)</b>					
University graduates	87.6	88.0	91.2	90.8	91.5
Vocational college graduates	83.5	85.2	88.1	89.6	90.4
Average	85.5	86.6	89.6	90.2	90.9
<b>Monthly wage (RMB)</b>					
University graduates	2,133	2,369	2,815	3,051	3,366
Vocational college graduates	1,647	1,890	2,142	2,482	2,731
Average	1,890	2,130	2,479	2,766	3,048

Source: China College Graduates Employment Report (MyCOS 2010, 2013).

Note: Employment rate is measured at six months after graduation; monthly wage is the average initial wage.

low-quality university was 28 percent, with the gap being larger for those who graduated later. These findings suggest that school quality (or rank) provides some information on graduate quality and subsequent returns, and it is likely that students enrolled in new expansion colleges may be perceived to be of lower quality.

Decentralized financing and allocation of budgetary resources is an important factor in the decline of higher education quality. Although the expansion of higher education enrollments is impressive, the budgetary expenditure per student dropped from RMB 8,529 in 1998 to RMB 5,941 in 2005 (Yue 2013). Most of the enrollment increase has come from universities run at the provincial level, but the allocation of budgetary resources is severely biased toward key universities and coastal provinces.<sup>67</sup> In 2011, although provincial universities accounted for 83.1 percent of total enrollments, the ratio of budgetary expenditures per student in key universities to those in provincial universities was 2:1.

Insufficiently qualified faculty and varying standards have also contributed to a decline in education quality. To meet the ambitious expansion targets, secondary vocational schools were often upgraded to vocational (three-year) colleges, and vocational schools were upgraded to four-year regular colleges without obvious improvements in the quality of instructional staff or facilities. Some colleges also expanded enrollments without matching the increases in student numbers



with comparable increases in teachers and facilities. From 1990 to 2007, the student-to-faculty ratio rose steadily from 5.2 to 17.3.

The mismatch between higher education institutions and the skills employers need is a critical issue for the quality of higher education.<sup>68</sup> The oversupply of college graduates for some majors partly reflects a disconnect with the urban labor market. Better matching of graduates to jobs may be greatly facilitated by reforms to increase the labor market relevance of higher education. In addition to the problem of finding workers with the right job-specific knowledge, a broader criticism is that the Chinese educational system—including its universities—still does not sufficiently equip students with some of the general skills desired by employers, such as leadership, creativity, teamwork, and communication.

The unfinished governance reform has profound implications for the administration of higher education institutions and the quality and relevance of higher education. China has taken a gradual approach to shifting from its traditional state-controlled model to a state-supervised model for universities (World Bank 1997). The autonomy of higher education institutions has increased with respect to curriculum development, faculty recruitment, and international exchanges, and oversight for the majority of higher education institutions has been decentralized from the central ministries to provinces. However, universities are far from autonomous in their administration and management (W. Wu 2011), and the roles of government and universities are not well defined.

Inequality in access to higher education is another significant challenge, in part the result of university enrollment quotas. University enrollment quotas for provinces have been used since the 1950s, with a higher quota for the host province or city. In the late 1990s, some key universities—largely financed by the central government—started receiving support from local governments and started returning the favor by providing even higher quotas to their host provinces or cities. As a result, the chance of getting into any university in Beijing is significantly higher for Beijing residents than for equally qualified nonresidents.

Another gap is evident in the enrollment disparities across different economic and social groups. Although more than 60 percent of the Chinese population resides in rural areas, some surveys of university enrollment in Beijing city in 2007 showed that only 29 percent of non-Beijing enrollment was from rural areas (X. Wang and others 2011; Li 2010). The percentage of parents in China with college and higher degrees is only 5 percent, but the same survey showed that 31 percent of enrollees had parents with college and higher degrees. Ethnic minorities generally have a lower participation rate in higher education than Han Chinese.

### *Proposed policy responses*

Greater efforts are needed to increase the labor market relevance of higher education, for example, by strengthening the links between the higher education system and industry. Governments can improve their stewardship by ensuring that private and public providers of higher education complement each other, especially in meeting the skill needs of employers. They can ensure favorable policies, clear and efficient regulation and information, and better access to student loans for both public and private providers. Governments can also connect firms and providers of skills and research by sharing best practices—from collaborating in curriculum development to setting up university incubators—and by offering incentives to make these university-industry links work.

Increased resources and improved investment efficiency for higher education are needed, which includes tapping the potential of private provision and financing sources. More public financial resources should be considered to improve teaching conditions and facilities, especially in lagging regions. Greater efficiency means being more selective and performance based when allocating public funds across teaching and research institutions and targeting scholarships and loans more effectively. One option is to review the current financing approaches and resources for both recurrent and capital funding so as to reward efficiency. It is also important to encourage the expansion of private universities. Variable fee policies combined with

effective loan schemes are one effective way to mobilize private resources while protecting access for the poor and disadvantaged.

Within the system for managing public higher education institutions, universities should have greater institutional autonomy and accountability. An important aim will be to continue the transformation from a state-control model of higher education governance to a scenario in which the government plays the crucial role of planner, coordinator, and supervisor and is involved nationwide in quality assurance in terms of standards setting, monitoring, and evaluation. Further reforms include providing more institutional autonomy with clear accountability, a quality assurance and accreditation framework, a system of transfers of academic credits, strategic and equitable financing, better coordination in overall planning (including the possibility of setting up an autonomous higher education commission), more exchanges with world-class universities, and improved programs of student loans and scholarships.

The current provincial quota system among higher education institutions should be reviewed. Various proposals have suggested how to revise the current quota system, which tends to favor provinces with the most tertiary institutions. The most favorable proposal is to slowly increase the quota for more populous provinces rather than abolish the quota immediately, as the latter may result in increased inequity if admission is based only on college entrance exam results.

### **Aligning labor market institutions to better serve the needs of the urban labor market**

Regulation of the employment relationship has evolved with the transition to a market economy, with China's legal labor standards becoming more protective over time. Box 3.6 provides an overview of some of the country's main labor laws.

Labor market institutions can have important impacts on labor mobility, income distribution, and social cohesion. These institutions are important for balancing the twin objectives of maximizing productivity and ensuring distributional fairness. This section

focuses on four key labor market institutions that have important implications for the urban labor market: wage setting (including minimum wage and collective bargaining), labor taxation, labor contract law, and labor dispute mediation.

#### *Building a modern wage-setting mechanism*

Real minimum wages have increased rapidly across China since the mid-1990s, as illustrated by figure 3.16. With the exception of 2009 (when in the wake of the global financial crisis no provinces adjusted their minimum wages), the number of provinces making upward adjustments has been increasing steadily (Du and Wang 2008; World Bank 2013). The average minimum wage as a percentage of the average urban wage increased from 22 percent in 2009 to 25 percent in 2012. According to the 12th Five-Year Plan, the policy goal is to increase the minimum wage by 13 percent annually, allowing the ratio of the minimum wage to the local average wage to reach more than 40 percent in most provinces. Looking internationally, the average ratio of minimum wage to national average wage ranges from 20 percent in Mexico to 50 percent in New Zealand, with an average of 37 percent in OECD countries (World Bank and DRC 2013).

Currently the minimum wage is not a wage that most workers face in the urban labor market, and it serves as a reference point in its relationship to the level of average wages and social benefits. Although minimum wages have adjusted sharply upward in recent years, the vast majority of formal and informal workers in urban areas have labor incomes above the official minimum. Empirical results reveal that almost all workers—migrant or local, men or women—receive labor income above the city-level minimum wage (Cai and Du 2011). The current minimum wage policy plays a significant function as a broader social policy tool, a device for signaling the government's concern for low-income workers, and perhaps also as an instrument of local industrial policy in terms of cross-prefecture competition.

The multiple policy objectives of the minimum wage in China may at times dilute its

### BOX 3.6 The main labor laws in China

*National Labor Law (1994)*: This first National Labor Law became a foundational law that set out key principles and institutions to guide the reform of labor relations in China, moving away from the previous system of state administration of employment, lifetime employment, extensive enterprise-provided welfare, and limited labor mobility. This law enshrined features such as a labor contract system that stipulates written contracts to establish a labor relationship; five types of social insurance that rely on employer and employee contributions to socialized pools; a system of labor dispute resolution that resolves labor conflicts via mediation, arbitration, and litigation; and legal standards for working hours and vacation time. In important contrast to the previous system, which institutionalized deep divides between workers based on work-unit and hukou status, the 1994 law also aspired to cover most workers in most types of firms. The law also contained articles on minimum wage regulation, although more detailed guidelines on minimum wage setting did not emerge until 2004 and 2007. The first provisions on collective contracts can also be found in the 1994 National Labor Law, and a series of guidelines and regulations have been issued periodically since then.

*Labor Contract Law (passage in 2007/implementation in 2008)*: The Labor Contract Law was passed to enhance legal protection for China's workers, improve working conditions, increase wages, stabilize employment, and improve participation in social insurance programs. It mandated that companies sign open-ended contracts with employees after completion of two fixed-term contracts. It also provided the legal framework (supplemented by the 2010 regulations for the "Rainbow Plan" of MOHRSS)

for expansion of collective contracting in firms with trade unions. More recently, the National People's Congress has been working to close loopholes in the 2008 law related to labor subcontracting. The 2012 revisions to the Labor Contract Law placed new restrictions on labor subcontracting and introduced stricter regulations on the establishment of labor subcontracting agencies, including stipulating that labor subcontracting can only be used for workers who are "temporary," "auxiliary," or "substitutes" for workers on leave.

*Labor Dispute Mediation and Arbitration Law (2008)*: This law changed some aspects of the resolution system considerably and expanded access to the labor dispute process for employees. It reduced the fees for going to arbitration and litigation, lengthened the statute of limitations for labor violations to one year (from 60 days), and simplified the dispute resolution process for some disputes, including making some disputes final at arbitration (without the opportunity for court hearings). The new law also placed more of the evidentiary burden on employers, even when the employee initiates the dispute. In short, it followed the general spirit of President Hu Jintao's administration in placing more emphasis on mediation as the primary and preferred way to resolve labor disputes.

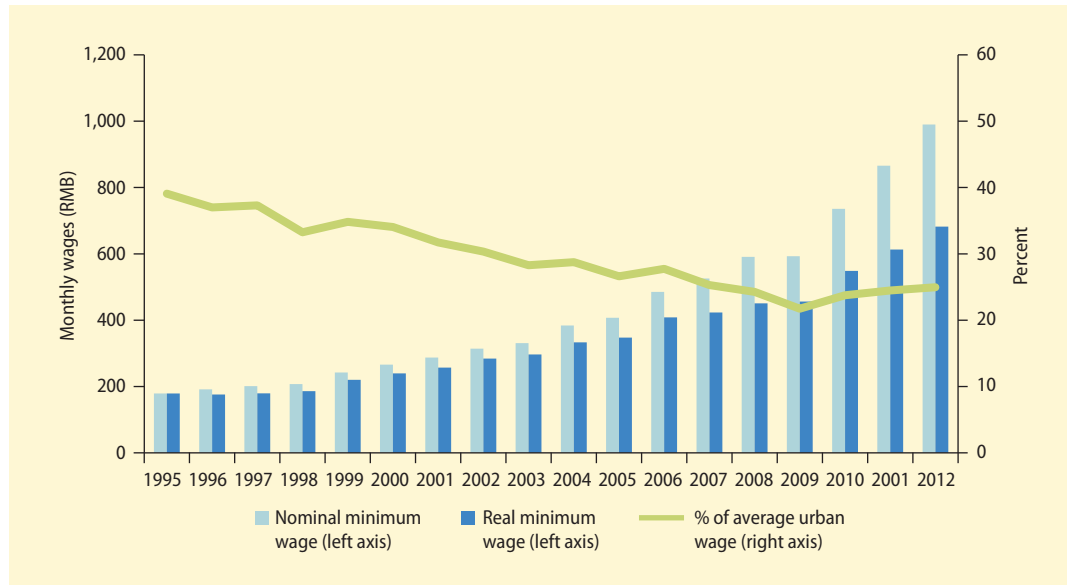
Other noteworthy laws that offer increased employment protection are the Employment Promotion Law (2008) and the Social Insurance Law (2010). The former strengthened restrictions on discrimination, and the latter extended social insurance to more workers and increased the likelihood of portability of insurance across administrative jurisdictions.

Source: World Bank staff compilations from various sources.

pure labor market function. The social policy trade-offs of these multiple objectives have been masked by a wide set of indicators and criteria in China's minimum wage guidelines and practice. To date, these trade-offs have perhaps not mattered because labor productivity has outstripped average wage growth and migrant and low-income workers have had to "catch up" after relative stagnation in their real wages in the 1990s. However, this period will not last forever, and it

may become necessary to adopt a different approach to minimum wage policy.

The basic function of the minimum wage should be reoriented, shifting from the current "living wage" approach to the "wage floor" approach, which is more common in OECD countries. The primary function of the minimum wage is to ensure that workers are not exploited as a result of their limited bargaining power and that they receive a wage that fairly reflects their contribution to

**FIGURE 3.16** Urban minimum wage adjustments, 1995–2012

Source: World Bank staff calculations, based on minimum wage dataset from labor bureau and yearbooks.

productivity growth. The minimum wage is not intended on its own to keep families out of poverty, which is the purpose of other policies, particularly social protection programs. Placing too much emphasis on the poverty function of minimum wages can actually harm low-income workers by increasing unemployment or pushing them into the informal sector.

The major distinction between the living wage and wage floor approaches is that the wage floor approach uses some measures of productivity growth or competitiveness. Like the current approach, the wage floor approach takes numerous factors into consideration in determining the minimum wage, many of which are already reflected in China's minimum wage guidelines. Although price inflation and other factors remain important under the wage floor approach, the key distinction is adjusting minimum wages to reflect productivity growth. China has elements of this approach in its current policy, but the balance between a needs-based approach and a productivity-based approach is toward the former. Moreover, to shift toward a wage floor approach, the system of labor market statistics must be improved so that timely and reliable measures

of productivity are available to the authorities who set minimum wages. Deeper reforms of labor market statistics systems are needed, with regular surveys of representative samples of firms and workers.

More broadly, wage outcomes in the urban labor market indicate that varied mechanisms are driving wage setting. In the competitive and private sectors, positive signs indicate rapid wage convergence between migrant workers and between migrant and local workers, indicating that the labor market fundamentals of demand and supply are overcoming rigidities in wage-setting mechanisms. The convergence can be seen in the falling differential in average hourly wages in the 2000s and in the degree of difference that can be explained by observable individual and job characteristics.<sup>69</sup> In contrast, evidence on wages in monopoly sectors (mainly dominated by SOEs) shows that a high wage gap remained between SOE workers and those in competitive sectors. About half of that difference could not be explained by the human capital characteristics of workers in the monopoly and competitive sectors (Yue and others 2013).

Enforcing wage discipline in the SOE sector will be challenging but could yield

significant benefits for the Chinese economy and a more equitable distribution of wages across society. The current wage premiums of SOEs reflect underlying distortions in the operating environment of SOEs and are difficult to justify on efficiency or equity grounds. A robust and transparent system of benchmarking wages could be established to determine SOE wages by reference to relevant comparators in the wider labor market, rather than simply by the amount of profits available for distribution to workers. In the case of local monopolies, it would also be useful to benchmark their wages across regions to get a broad sense of within-industry comparability and identify outliers. Over the longer run, reforms could move toward having SOEs conduct collective consultation and bargaining in the same way as other firms under current labor legislation.

For the public sector, in which wage setting is determined separately, the main question is how and to what extent wages should be tied to performance and used to promote accountability. A big question for China is the extent to which performance-related pay should be used in setting wages for workers in the education and health sectors. As discussed earlier, pure performance-based pay based on volume and value is not suitable for teachers and health providers because of the perverse incentives that may result, so if it is to be applied, a base compensation with some degree of bonus would be more appropriate. International experience also suggests that a one-size-fits-all approach to performance-based pay should be avoided. The issues in wage setting for PSUs are somewhat distinct, with the additional challenge of promoting accountability of public sector workers while ensuring that they are compensated adequately. Given the unsystematic nature of PSU wage setting, a more desirable approach in the short to medium term would be to develop a national strategy for PSU wage-setting reform, including for social services.

Collective bargaining is still at an early stage of development and needs further reform to transition from wage consultation to true bargaining in the international sense.<sup>70</sup> Evidence shows that such

consultation has reduced labor confrontations in multinational corporations that have such mechanisms, but it is also clear from the rising incidence of labor disputes in China that much remains to be done. A key challenge in developing truly tripartite wage bargaining is the role of the All-China Federation of Trade Unions (ACFTU), which is still evolving toward a role as the representative of workers in wage discussions. Providing an effective voice for both workers and employers in the bargaining process is important for reaching a win-win situation.

### *Reducing labor tax*

China taxes labor at a high rate, with five compulsory social insurance schemes and one urban compulsory housing fund program that require contributions. As shown in table 3.17, employers are required to contribute for all five insurance schemes (pensions, medical insurance, unemployment insurance, work injury insurance, and maternity insurance) and the housing fund program, and employees are required to contribute to three insurance schemes (pensions, medical insurance, and unemployment insurance) and the housing fund program. The rates of social contributions are high by any standard and vary considerably across cities and within provinces. Pensions dominate social insurance contributions, largely because of the high costs of funding legacy pension costs. Contributions for the housing fund, which aims to provide financial support when workers purchase new housing, are also high, and it is not clear that this program has significant benefits for middle- and low-income workers.

Furthermore, social insurance contributions are based on a notion of minimum payment that implies significantly higher contribution rates for low-income workers. The urban social insurance contribution requires a minimum payment for each employee equal to what would be paid in the case of a worker earning 60 percent of the local average wage, with a maximum payment of 300 percent of the average wage. Therefore, if a worker earns less than 60 percent of the local average annual wage, the worker

and the employer must still make the same minimum payment contribution. This non-linearity at low-income levels introduces a significant disincentive for low-wage workers—primarily part-time workers, migrants, and lower-income self-employed workers—to participate in social insurance. Studies show that about one-third of all workers fall below the minimum contribution base threshold (World Bank and DRC 2013).

An international comparison reveals that the tax wedge on workers in China is higher than in many OECD countries as well as other large middle-income countries (such as Brazil, India, Indonesia, Mexico, and South Africa) and East Asian regional comparators. Figure 3.17, which compares the tax wedge for a single worker earning the average wage in urban China, shows that China's tax wedge (including the housing fund contribution) was 42.4 percent in 2012—close to the average for OECD countries.<sup>71</sup> Even when the housing fund contribution is excluded, China's tax wedge is still higher than in most comparator countries. The share of social insurance contributions in the total tax wedge is relatively high in China, because the tax wedge in most countries comprises social contributions and personal income tax. An average worker in China does not pay personal income tax.<sup>72</sup>

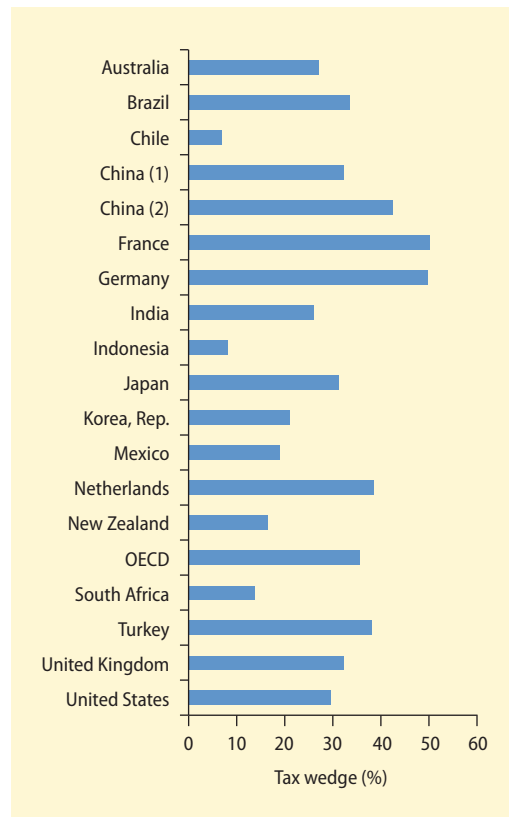
High labor taxation has implications for China's labor market dynamics and long-run competitiveness. It places heavy burdens on both employers and workers and likely encourages informalization of the labor market. Employers game the system in numerous ways, while workers have the incentive to opt out of participating in social insurance schemes. Responding to employer and employee preferences, local city governments may choose to treat social insurance and housing fund programs for local and migrant workers differently to avoid high labor taxation. For example, Shanghai applies only three social insurance schemes (pension insurance, medical insurance, and work injury insurance) to rural migrant workers. Notably, most urban social insurance funds continue to generate significant surpluses, a situation that is often observed in a maturing pension system but not for other forms of insurance.

**TABLE 3.17 Social insurance and housing fund contributions in urban China, 2013**

Type	Employer (%)	Employee (%)
Social insurance		
Pension insurance	Mostly 20 (10–22)	8 (no variation)
Unemployment insurance	Mostly 2 (0.5–2.5)	Mostly 1 (0.2–1.0)
Medical insurance	Mostly 8 (5–12)	Mostly 2
Work injury insurance	0.5–2	No contribution
Maternity insurance	0.5–1	No contribution
Subtotal	31–33	11
Housing fund contributions	Rough average 10 (5–20)	Rough average 10 (5–20)

Source: World Bank staff compilation based on various documents of Ministry of Human Resources and Social Security (MOHRSS) and the Department of Human Resources and Social Security (DHRSS).

**FIGURE 3.17 An international comparison of the tax wedge, 2012**



Source: Gandullia, Iacobone, and Thomas 2012; OECD 2013.

Note: Results for China (1) exclude housing fund contribution; and results for China (2) include a housing fund contribution, as calculated by the World Bank staff. Results for Brazil and India are for 2010; results for Indonesia are for 2009.

As in other countries, high mandated contribution rates provide a strong incentive for employers to avoid compliance by using labor dispatch services and underre-



porting employment and wages (Aterido and Hallward-Driemeier 2011; Gallagher and others 2013; Perry and Olarreaga 2007). This phenomenon is particularly pervasive among private enterprises and smaller businesses, but it occurs even among firms with considerable state or foreign investment. Although estimated evasion rates have fallen from a high of 41 percent in 2000 to 2.4 percent in 2010, this apparent improvement comes with caveats and should be interpreted with caution given the use of administrative data voluntarily provided by firms.

Evidence from the 2010 China Urban Labor Survey suggests that similar evasion may be occurring among workers. As discussed earlier, evidence suggests that employers and rural migrants may collude to avoid paying into social insurance programs in exchange for higher wages (Gallagher and others 2013; Giles and others 2013). This is likely related to a lack of confidence in the portability of these programs among young migrant workers. The limited portability options may lower the expected value of participating for migrants far more than for local hukou workers, given the high mobility of migrants.

As part of China's overall adjustment of the tax structure, the tax burden on labor should be lowered over time. Even within the current system, labor taxation could be reduced without unduly lowering the benefits that workers derive from their contributions. Another issue that could be addressed in such reforms is the high marginal contribution rate for low-paid workers, which would be important to consider as part of a wider strategy to create incentives for formal sector participation. More specific measures are discussed below.

The pension contribution has potential for reduction, although it is a more complex matter if worker benefits are to be protected.

Given the surpluses of those employment funds and the sustained low unemployment rate in China, another option is to reduce the unemployment insurance contribution. The combined employer-employee unemployment insurance contribution is 3 percent (see table 3.17). Currently, the surpluses are nearly RMB 300 billion, and much of the funds are

used for workers' training and related purposes (Chu 2013). Instead of using this source of funding, using general revenue financing for this purpose would improve the efficiency of resource utilization for training that is not currently promoted through the guaranteed revenue of the unemployment insurance contribution. Some cities, including Beijing, Hangzhou, Guanzhou, have already reduced contribution rates and used the surplus funds to provide training for workers.

Reduction of the housing contribution could also be considered. The high share of workers and employers who have already opted out of the housing scheme points to low demand for the program, in large part because of negative real returns, inadequacy of benefits, and inequitable use of funds (World Bank 2013). Although the housing policy for workers needs to be examined, housing funds have proved to be ineffective in providing the desired protection and may have helped inflate property markets by serving as a cheap source of liquidity for local authorities. The primary source of resistance to such a reform would thus likely be local authorities rather than workers or employers.

#### *Implementing the labor contract law*

Provisions of the 2008 Labor Contract Law (LCL) have reversed the trend toward informalization of China's labor market. The 2008 LCL introduced much more severe penalties for failure to sign a written contract in a timely fashion. Firms that do not sign written labor contracts after one month of employment must pay double wages for the time the worker was employed without a contract (article 82, LCL). The firm can also be forced to sign a non-fixed-term contract with an employee who works for one year without a written contract (article 14, LCL).

The LCL and the overall trend toward increased worker protections have benefited migrant workers. Despite weaker enforcement of the LCL after the onset of the global financial crisis in 2008, research shows that the proportion of workers with written labor contracts has increased significantly, particularly among migrant workers. The 2010

CULS found that the proportion of local resident workers with written labor contracts increased from 65 percent in 2005 to 71 percent in 2010, while the proportion of migrant workers with a contract increased from 12 percent to 34 percent. However, enforcement and compliance with the law varies significantly across regions. Social insurance participation has also improved since passage of the LCL, although the rates of participation are still much higher for local residents than for rural migrants (Freeman and Li 2013; Gallagher and others 2013).

The LCL's restrictions on the use of short-term contracts significantly raised costs for employers. Article 14 of the LCL states that a worker who has concluded two fixed-term contracts should be extended a non-fixed-term contract for the third extension of the labor relationship, and workers on these contracts can only be terminated with cause. Showing cause for termination is a lengthy process and usually requires significant documentation and justification. Furthermore, the earlier Labor Law required severance when contracts were terminated early for cause but not for expiration, but the LCL requires severance upon expiration, with one month of wages for every year of employment.

Given the reduced flexibility and added costs associated with open-ended contracts, the LCL created incentives for employers to expand the use of labor subcontracting. According to a report issued by the ACFTU, workers hired under labor subcontracts numbered 37 million, or 13.1 percent of the workforce, in 2011. The ACFTU found extensive use of labor subcontracting in large SOEs, many government and social organizations, as well as some foreign-invested and private enterprises (ACFTU 2012). Subcontracted workers usually earn less than formally employed workers and receive lower social insurance contributions.

Since 2008, the National People's Congress (NPC) has worked to close loopholes in the 2008 law related to labor subcontracting. The 2012 revisions to the LCL placed new restrictions on labor subcontracting and introduced stricter regulations on the establishment of labor subcontracting agencies. While the revisions went into effect

as of July 2013, the MOHRSS has yet to release detailed guidelines on the maximum proportion or number of workers that may be employed through labor subcontracting. After the 2012 revisions to the LCL were passed, companies began looking for other ways to avoid open-ended contracts, such as using outsourcing companies. Authorities in some localities (that is, Jiangsu) have responded by restricting the use of outsourcing companies.

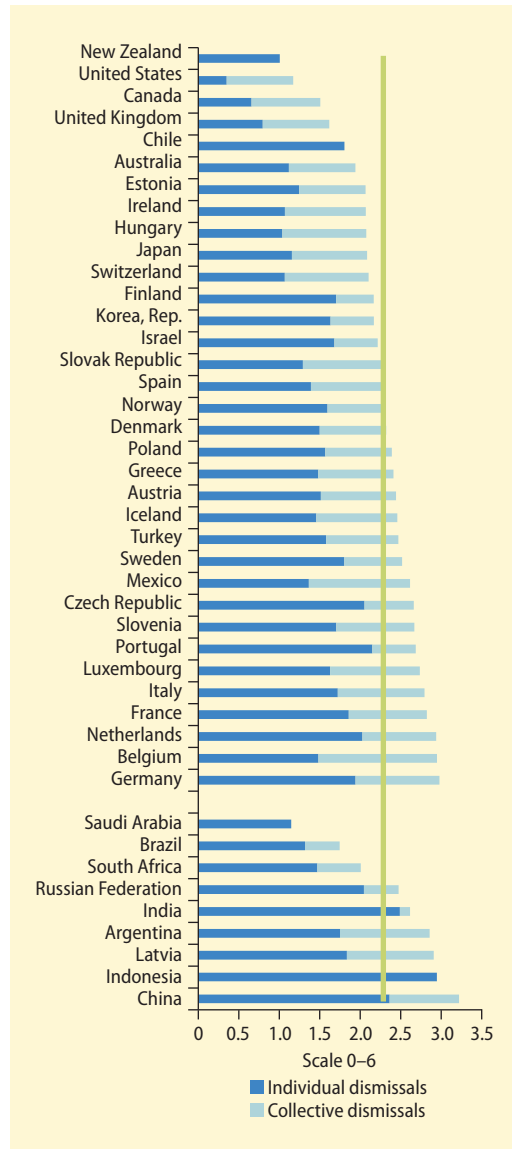
China's labor laws now considerably exceed the OECD average for employment protection (figure 3.18). In areas such as individual dismissal and collective dismissal, China's protections exceed those of many other developing countries and those of all OECD countries. According to the OECD Employment Protection Indicator, in 2008 the average rate of protection for OECD countries was 2.25 (on a scale of 0 to 6). Among the 10 developing economies examined in the report, only Indonesia exceeded China's protection level. Both Indonesia (3.0) and China (2.75) were considerably higher than the OECD average.

The medium and long-term impacts of enforcing the LCL should be carefully monitored so that improvements and amendments can be made as needed. With enforcement of the LCL, raising labor costs would reduce profit margins and might weaken the competitiveness of China's companies. Therefore, monitoring the medium-term impacts of the LCL will support China's competitiveness, job creation, and employment protection. As international experience shows, legitimate interests of both workers and employers should enter the considerations of policy making and legislation so as to balance flexibility and security.

### *Mitigating labor disputes*

The number of labor disputes has exploded since passage of the Labor Dispute Mediation and Arbitration Law in 2008. As described in box 3.1, this law changed some aspects of the resolution system considerably and expanded access to the labor dispute process for employees. As shown in figure 3.19, labor disputes nearly doubled in 2008 and continued to

**FIGURE 3.18 Protection of permanent workers against individual and collective dismissals, 2013**



Source: OECD Employment Protection Database, 2013, update.  
<http://www.oecd.org/employment/protection>.

Note: Data refer to 2013 for OECD countries and Latvia, 2012 for other countries. The figure presents the contribution of EPR against individual dismissal and additional provisions for collective dismissal to the indicator of employment protection for regular workers against individual and collective dismissal. The height of the bar represents the value of the EPRC indicator. EPR = employment protection for regular workers against individual dismissal; EPRC = employment protection for regular workers against collective dismissal.

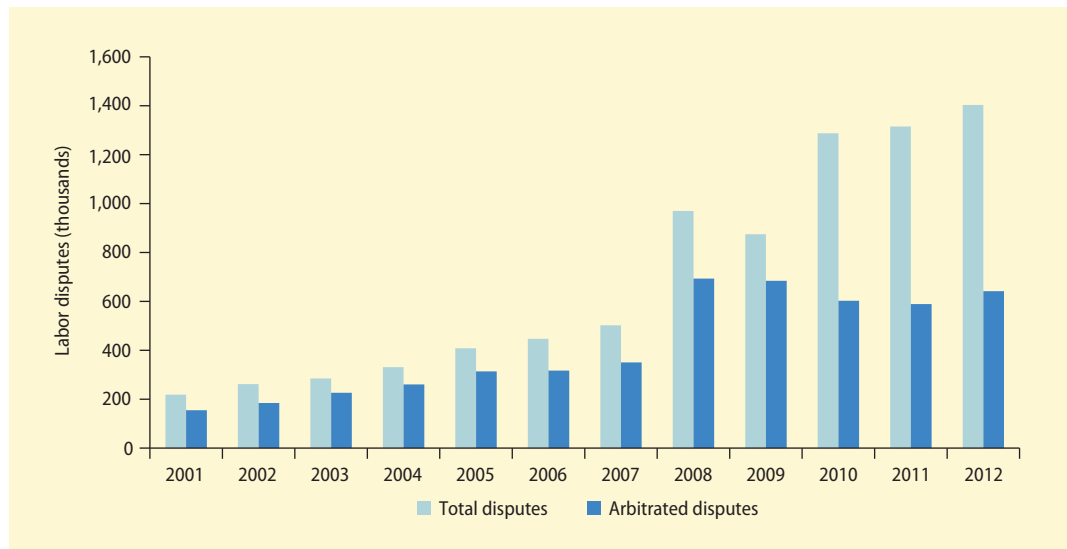
rise. In 2011, 34 percent of all arbitrated disputes were about compensation; 25 percent were about social insurance; and 20 percent were contract termination disputes. About 53 percent of all social insurance disputes were

about work injury insurance. Rural migrant workers are involved in the majority of labor disputes (Gallagher and others 2013).

Labor disputes are becoming more complex, more difficult to resolve in a timely fashion, and more likely to have large impacts on public opinion and social stability (China Labournet 2010). The dispute process can be long and complex, particularly for workers with lower levels of education and little legal assistance. Enforcement of arbitrated and litigated judgments can be difficult, especially when they require action on the part of employers, such as reinstatement and job reassignment. Aggrieved workers, while continuing to make use of the resolution process and the courts, are also becoming more strategic in their use of the media, social media, and public opinion to garner sympathy and put pressure on the government, judicial institutions, and their employers to reach favorable decisions.

A large number of disputes are settled through mediation before reaching arbitration, but the number of cases proceeding to arbitration is still rising as a result of the total increase in disputes. In 2012, there were about 1.4 million labor disputes, with 54 percent resolved by mediating units before reaching arbitration. Despite the push for more mediation, the number of suits going to the courts has increased sharply. Arbitration is compulsory, so all disputes after mediation must go through arbitration. However, arbitration is not necessarily final because either side may appeal and proceed to civil court for a new hearing on the case. In 2005, more than 35 percent of all arbitration judgments in Shanghai were appealed in court (Dong 2008).

Many local governments have lacked the capacity and expertise to handle the large increase in disputes since 2008 efficiently and effectively. China's recent promotion of mediation is unusual in that it relies on non-specialists, local government officials or cadres, and neighborhood volunteers to resolve complicated employment issues. Local courts report very large caseloads, long wait times, and frustrated litigants (Zhao 2008). The wait time for an arbitration hearing has lengthened to several months, and workers

**FIGURE 3.19** Total disputes and disputes settled through arbitration, 2001–12

Source: NBS, *China Labor Statistical Yearbook 2012b*; MOHRSS, *Statistical Bulletin of Human Resources and Social Security Development 2012*.

who appeal rulings to civil courts often face a one- or two-year wait for final resolution (Gallagher and others 2013). To manage large labor conflicts that threaten social stability, local governments have developed cross-unit stability preservation committees.

Although the resolution system may be effective in the short term, it carries the risk of inefficiency and creates incentives for escalation. The current strategies for dispute resolution are very reactive to problems as they occur, and they fail to prevent disputes from arising in the first place. They lead to the loss of economic gains for employers and employees and also rely heavily on government staffing and resources. Furthermore, in the context of large conflicts—sometimes involving thousands of workers—there are strong incentives for extreme action to draw the attention of the public and the media and to put pressure on the government.

China's system of labor dispute resolution is much more centralized than the systems of the United States, Japan, and the United Kingdom. When disputes are numerous, as they have been since 2008, this centralized system places great strain on arbitration committees and local civil courts. China's labor inspection system is much less central to the dispute resolution process, unlike in the

United States and Japan, where administrative agencies play an important role in investigating and handling statutory violations. China's system is also more open-ended than processes in many other countries, which can lead to a very lengthy resolution process.

The current dispute resolution system is organized to settle rights disputes but not interest disputes.<sup>73</sup> As Chinese workers' consciousness of protections has increased, and with tight labor markets putting upward pressure on wages for migrant workers and manufacturing workers in general, an increasing number of disputes in China are interest disputes rather than rights disputes. Some of the recent high-profile collective work actions in China (such as the 2010 Guangzhou Honda strike) involved such interest disputes, but China's system of labor dispute resolution does not include structures to resolve interest disputes. This institutional vacuum may partly explain why collective work actions such as strikes and demonstrations have increased in recent years.

Developing a system to mediate and negotiate interest disputes is a pressing priority. Because enterprise trade unions in China do not serve as strong representatives of the workforce, interest conflicts are often managed reactively, after workers have

spontaneously protested by striking or taking some other kind of industrial action. Reactive settlement leads to loss of production for the company and loss of wages for the workers.

## Notes

1. The *hukou* is a population registration system that defines people's residence status. It classifies the population into rural (agricultural) and urban (nonagricultural) according to their place of birth, and it defines people's access to public services based on this classification. Apart from the system's basic registration function, it provides the framework for managing population flows and defines entitlements for a range of social services, including employment, education, training, health, housing, and social protection programs.
2. Lee and Phillips (1997) show that in the Republic of Korea, migrants to metropolitan areas had earnings 32 percent higher than rural nonmigrants. Although migrants to Seoul had a 5 to 11 percent earnings disadvantage on arrival compared with Seoul natives, after 15 years migrant earnings converged completely. Although in 1970 more than 60 percent of urban household heads were rural migrants, by 1994 those migrants had become full-scale urbanites with equal wages.
3. The rate of increase in rural migrant real wages was lower than that of urban formal employees from 2001 to 2007. Since then, it has been higher in every year except 2009, when 20 million migrants lost their jobs after the onset of the global financial crisis.
4. See Giles and Park (2014). These results are based on the Oaxaca-decomposition equation, using data from the 2001 and 2010 China Urban Labor Survey. The wage penalty for rural migrants increased from 24.1 percent in 2001 to 42.2 percent in 2005, but then it declined to 13.1 percent in 2010. These findings contrast with studies of earlier periods that found strong evidence of differential treatment of migrants within occupations and sectors (Zhang and Meng 2007).
5. According to the Dynamic Monitoring Survey of Floating Population in Urban China conducted by the National Population and Family Planning Commission in 2011 (128,000 migrant households, 31 provinces), 78 percent of rural migrants were married, and 74 percent had at least one child. Of those with children, 72 percent had at least one child living in the city (Démurger, Li, and Xu 2013).
6. Glaeser and Kerr (2009) found that industries employing the same types of workers tend to co-agglomerate. This behavior is advantageous to workers and firms: people can move among employers without retooling, and businesses have access to a deep pool of labor with the skills they need.
7. See 12th Five-Year Plan for National Basic Public Social Services System.
8. For more details, see Wang, Wang, and Glinskaya (2014).
9. See "A Notice on Actively and Stably Pushing Forward the Hukou System Reform," announced by the State Council in March 2011 (the full text was released in March 2012). As this Urban China report is being prepared, the Ministry of Public Security is formulating a roadmap for hukou reform, aiming for implementation by 2020. The December 2013 Urbanization Work Conference of the central government also called for an "orderly conversion" of rural migrants and proposed a numerical target of 100 million long-term rural migrants to be converted to urban hukou holders. These measures are to be supported by investments to renovate shantytowns and urban villages in central and western regions. See the media interview with Vice Minister Min Huang, "Establishing a New Type of *Hukou* System by 2020," December 17, 2013, <http://www.newhuanet.com>.
10. A typical notion of "residence" defines the jurisdiction under which laws and regulations a person has rights and responsibilities with respect to taxation and qualification for benefits and social services. Rights to vote and hold office are often also linked to legal residence. A first residence is acquired when people are born and are registered with the population registration system. A residence system is defined by (a) a framework and standards for eligibility for a residence permit and (b) the extent of access privileges offered once a residence permit is obtained, as well as the sequencing of such privileges.
11. Completing hukou reform can have a dramatic equalization effect between rural and urban incomes. See Zhai, Hertel, and Wang (2003) and Whalley and Zhang (2004), which used computable general equilibrium (CGE) models to explore the impacts of removing all migration restrictions, as well as Zhu and Luo (2010) for a study of Hubei province on the positive distributional effects of labor mobility. In addition, Zhang and Zhao (2013) show that hukou restricts people from moving to the places they would be most productive.



12. See supporting report 6, "Financing Urbanization," for a more extensive discussion of inter-governmental fiscal relations.
13. Numerous sociological studies find that urban residents are concerned about migrant workers compromising the quality of services (Watson 2009; Liu 2008; and L. Wang 2010).
14. According to the European Parliament and Council Directive (2004/38/EC), every EU citizen has the right to move and reside freely within the territory of another member state for up to three months without any conditions or formalities, other than the requirement to hold a valid identity card or passport. The objective of residence or status (for example, employed, self-employed, tourist, student, retiree) has no bearing on this right during this time period. Jobseekers benefit from the right to reside without any conditions and formalities for a period of six months, and even longer, if they continue to seek employment in the host EU country and have a genuine chance of getting work.
15. The general rule is that EU citizens have sufficient resources if the level of their resources is higher than the threshold under which a minimum subsistence benefit is granted in the host EU country.
16. Overall, residency is determined differently for different purposes, and the criteria often vary by state. Also if a person has conducted a substantial amount of business in a state, some states will recognize that person as an actual resident and grant them certain advantages of residency. <http://legal-dictionary.thefreedictionary.com/residency>.
17. Lall, Timmins, and Yu (2009) evaluated the relative importance of wage differences and public services in migrants' decisions to move in Brazil. Their findings showed a distinction in preferences according to income level: for relatively well-off people, basic public services were not important in the decision to move, but for the poor, differences in access to basic public services did matter.
18. See World Bank (2013), based on World Values Survey (2005–08).
19. This is discussed in supporting report 3, "China's Urbanization and Land: A Framework for Reform," including recent indications from the Third Plenum meeting about willingness to undertake rural land reform.
20. Although seemingly generous, it falls quite short not just when compared with the OECD benchmark but also when compared to the BRICS countries, with only India having lower social sector spending than China. The latest available estimates from OECD (2011) indicate that public social sector spending (as a proportion of GDP) in 2007 was 16.3, 12.0, 8.1, 6.5, and 4.6 in Brazil, Russia, South Africa, China, and India, respectively. According to World Bank (2011), Brazil and Russia allocate more than 60 and 50 percent of their total government spending to the social sectors, respectively.
21. See supporting report 6, "Financing Urbanization," for further details.
22. See NBS (2011), *China Statistical Yearbook 2011*, China Statistics Press.
23. See NBS (2011).
24. In some coastal cities, exemptions began in 2006 with local funding from the municipal governments (Hu 2009).
25. Detailed cost calculations are presented in Wang, Wang, and Glinskaya (2014).
26. *Minban* are private schools which charge fees and typically operate at much lower standards than public schools.
27. The third category comprises schools that cater to migrant workers' families and charge low fees. They are often substandard and have not been approved by the local education bureaus.
28. Planning urban schools based on the hukou population and limited resources, such as land, contribute to the capacity constraints of urban schools.
29. Nanfang Dushi Bao 2010. In Zhuhai (Guangdong), for example, it was reported that public schools charged migrant children a school selection fee of RMB 5,000–10,000 as of 2011. In Hubei, the Provincial Education Department sets the school selection fees, currently at RMB 7,200 in primary schools (field visit, March 19, 2013). In Chengdu, school selection fees are RMB 2,000–5,000 (field visit, May 31, 2013). Once the children are in public school, numerous costs associated with extra-curricular activities and tutoring lessons add to the financial burden.
30. Among the main transfers, the wage adjustment transfer (WAT) and rural fee and tax reform transfer are devoted wholly to salaries. The compulsory education transfer (CET) goes not only to funding the New Mechanism but also to performance pay for teachers (Li, Chen, and Jiang 2011). Under the assumption that performance pay made up just one-third of the CET in 2011, support for salary payments was nearly two-thirds of central transfers for universal compulsory education.
31. This wholesale revision approach also would mitigate the considerable resistance that would



- arise if the government were to withdraw current central transfers from lower-income provinces such as Henan, Guizhou, Gansu, and Sichuan in the central and western regions and give them to richer provinces like Guangdong, Beijing, and Shanghai.
32. The government conducted a full audit of the more than 270 existing migrant schools and chose more than 100 of them for the municipally supported private school program. Another 60 were selected for upgrading under a three-year plan, during which they received funding, personnel, and other support from the government. By 2010, 162 private schools had been approved for enrolling migrant children under government supervision, and these schools receive financial support based on enrollment.
  33. Once selected into the program for private schools, each school receives a capital grant of around RMB 500,000 from the municipality and is eligible to apply to the district government for supplemental funds. Thereafter, the schools receive grants for operating costs of up to RMB 5,000 for every migrant student enrolled. With this support, the schools are able to stop collecting tuition and many other fees, pay teachers a decent salary and provide them with social security, and improve facilities.
  34. Unlike URBMI, UEBMI also contains a medical savings account, which beneficiaries use to pay for copayments and uncovered services.
  35. NBS (2012b) reports that population coverage of UEBMI increased from 34 percent in 2003 to 70 percent in 2011, and population coverage of URBMI reached 82 percent by the end of 2011.
  36. Yip and others 2012, and team field visits in May 2013.
  37. Financial inequalities are partly reflected in per capita health spending data. In 2010, total health expenditure per capita was RMB 666 for rural residents compared to RMB 2,315 for urban residents (China National Health Development Research Center 2012).
  38. "Programs and facilities" refer to funding requirements for operating costs (for instance, salaries), specific public health programs (including the essential package), and construction and equipment. The main sources of financing for these items are direct budgetary allocations and fees.
  39. The schemes for PSU employees and civil servants are defined benefit schemes, with a generous replacement rate financed from government revenues. A reform program with a framework similar to the urban employee pension scheme was introduced for PSU employees in 2009 but is yet to be fully implemented, pending a separate reform to reclassify PSUs.
  40. For Beijing: [http://news.xinhuanet.com/2011-03/16/c\\_121196129.htm](http://news.xinhuanet.com/2011-03/16/c_121196129.htm); for Shanghai, <http://news.ehomeday.com/2012-11/201211183205.htm>.
  41. See <http://www.labour-daily.cn/web/NewLabourElectronic/newpdf/PdfNews.aspx?Calendar=2011-9-24>.
  42. Supporting report 2, "Planning and Connecting Cities for Greater Diversity and Livability," provides further insights into the development of the urban rental market in China.
  43. Supporting calculations are presented in a background paper, "Costing Out the Residence-Based Access to Urban Social Services in China."
  44. Similarly, the "Basic Public Service Equalization Five-Year Plan (2011–15)" refers to the concept that every citizen should have equal opportunity of access to basic public services, not necessarily that all services should be the same.
  45. World Bank Data <http://data.worldbank.org/indicator/SE.TER.ENRR/countries/DE--XS-OE-US?display=graph>.
  46. For 2009 PISA results, see Shanghai government website, <http://www.shanghai.gov.cn/shanghai/node27118/node27818/u22ai74238.html>; for 2012 results, see OECD, <http://www.oecd.org/pisa/keyfindings/pisa-2012-results-overview.pdf>.
  47. Large-scale national survey conducted by the Chinese Ministry of Health from 2001 to 2004. For Yunnan, see Steinmann and others (2008).
  48. According to the 2010 census, there are more than 20 million school-age (6–14 years of age) children of nonlocal hukou migrants in urban areas. This does not include a significant reservoir of left-behind migrant children who stay behind with relatives in rural areas as their parents migrate for work but who could potentially move if hukou restrictions are lifted.
  49. In particular, budget expenditures in education increased from RMB 96.5 billion in 2000 to RMB 828.8 billion in 2010 (see *Education Finance Statistical Yearbook*, 1997 and 2010).
  50. See MOE 2012, *China Education Finance Statistical Yearbook*, and 2013 *Guangdong Statistical Yearbook*.
  51. See *China Youth Daily*, July 11, 2012, [http://zqb.cyol.com/html/2012-07/11/nw.D110000zgqnb\\_20120711\\_3-09.htm](http://zqb.cyol.com/html/2012-07/11/nw.D110000zgqnb_20120711_3-09.htm).

52. Reimbursement rates are directly related to a hospital's level of classification, providing an incentive for hospitals to upgrade to achieve a superior classification and thus gain higher reimbursement while building their reputation to attract more patients.
53. Tam (2008) reports that hospitals or hospital departments often set up off-the-book accounts, known as "little treasuries," in which sales revenues are placed for distribution to physicians. Hospital authorities set revenue targets for clinical departments, although the clinical departments may also be held accountable for unpaid bills of the patients they treat.
54. See supporting report 2, "Planning and Connecting Cities for Greater Diversity and Livability," for more details.
55. Combining the UWS with an occupational annuity scheme can provide options for integrating civil servants and PSU employees into the reformed UWS.
56. Simulations suggest that an average contribution rate of 28 percent could be reduced to 16 percent with the same approximate replacement rate for a full-term worker, provided that the retirement age was increased to age 65 (see Dorfman and others 2013).
57. To date, 12 provinces have integrated rural and urban resident pension schemes.
58. See OECD, International Budget Practices and Procedures Database, <http://www.oecd.org/gov/budget/database>; Arizti and others 2010.
59. See Gong and Yu (2011) on election of school principals by parents, students, teachers, and experts (Kunming); school councils (Nanjing and Shandong); and medical disputes councils with citizen representation (Nanjing).
60. For more on whether China has entered the Lewis turning point, see Cai (2010); Wang (2009); Yao and Zhang (2010); and Zhang, Yang, and Wang (2009). At present, the consensus in the literature is that rural surplus labor in China is depleted.
61. The results also revealed that in professional and managerial occupations, 34 percent of the firms consider leadership skills to be most important, followed by job-specific technical skills and communication skills. For front-line operational occupations, communication skills, job-specific technical skills, and numeracy skills were most commonly cited as the most important job-related skills. See Liang and Chen 2013.
62. Brazil, Canada, Chile, Estonia, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Japan, Korea, Mexico, New Zealand, Portugal, and the United Kingdom.
63. On the supply side, this could be achieved by allowing public financing of accredited non-state training institutions. On the demand side, public funds could be used to provide vouchers to students who could freely choose among public and nonstate institutions. Local-level experiments with training vouchers in China (for instance, Meizhou in Guangdong, Jiangsu province) can provide lessons for potential demand-side interventions.
64. See Ministry of Education (1998).
65. See MyCos (2012).
66. The World University Rankings, published by *Times Higher Education*. <http://www.timeshighereducation.co.uk/world-university-rankings/>.
67. Ministry of Education (2011), *China Education Statistical Yearbook*, People's Education Press, and Ministry of Education (2012), *China Education Finance Statistical Yearbook*.
68. Differences in employment outcomes could also reflect differences in the ability of students studying different majors or the quality of colleges from which they graduated. Wage regressions conducted by scholars at Tsinghua University based on surveys of college graduates from 19 colleges in 2010 found that recent college graduates with majors in engineering had the highest starting salary. The other types of majors and their wage penalty relative to engineers were other social sciences (not including economics) and liberal arts (3.4 percent), law (3.5 percent), natural sciences (8.1 percent), management (9.2 percent), education (12.9 percent), economics (17.1 percent), and agricultural sciences (26.7 percent).
69. See Giles and Park (2014).
70. See Shen and Benson (2008) for a useful comparison of Chinese wage consultations and typical International Labour Organization (ILO) standard wage bargaining. Bai (2011) discusses the role of ACFTU and interactions with the interests of capital and labor.
71. The tax wedge is a percentage calculated as  $(\text{total labor cost} - \text{net take-home pay}) / \text{total labor cost}$ . Consider an example for China: assume payroll = RMB 100, then total labor cost  $(100 + 42) = 142$ ; net take-home pay  $(100 - 22) = 78$ ; and tax wedge  $= (142 - 78) / 142 = 45.1$  percent. For many countries, one would also calculate the personal income tax levied after deduction of social insurance contribution; OECD also allows for transfers from the state (for instance, income tax cred-

- its). In China, neither of these is included in the calculation for the average urban worker who falls below the personal income tax threshold. See OECD for data across countries. <http://www.oecd.org/tax/tax-policy/taxing-wages.htm>.
72. China raised the monthly deduction for personal income tax relief from the minimum level of RMB 2,000 (2008–10) to RMB 3,500 in 2011. When applying the new standard, and given that the average taxable earnings were lower for all provinces in 2012, personal income tax does not need to be paid.
  73. Rights disputes are disputes that involve statutory or contractual claims, and interest disputes are disputes over interests (for example, wages, work conditions, and work organization) that do not involve allegations of violations of minimum legal standards or contractual obligations.
- ## References
- ACFTU (All-China Federation of Trade Unions). 2012. "Current Situation of Labor Subcontracting in China." *China Labor* 5: 23–25.
- Arizti, Pedro, Jim Brumby, Nick Manning, Roby Senderowitsch, and Theo Thomas. 2010. *Results, Performance Budgeting and Trust in Government*. Washington, DC: World Bank.
- Aterido, R., and M. Hallward-Driemeier. 2011. "Does Expanding Health Insurance beyond Formal-Sector Workers Encourage Informality? Measuring the Impact of Mexico's Seguro Popular." Policy Research Working Paper 5785, World Bank, Washington, DC.
- Bai, L. 2006. "Graduate Unemployment: Dilemmas and Challenges in China's Move to Mass Higher Education." *China Quarterly* 185: 128–44.
- Bai, R. 2011. "The Role of the All-China Federation of Trade Unions: Implications for Chinese Workers Today." *WorkingUSA* 14 (1): 19–39.
- Barro, R. J., and J. W. Lee. 2001. "International Data on Educational Attainment: Updates and Implications." *Oxford Economic Papers* 53 (3): 541–63.
- Beijing Foundation for the Research of Long-Term Economic Strategy. 2013. "Public Financial Support for the Equitable Education of Migrant Children (draft)." No. 79. Beijing Foundation, Beijing.
- Bhattacharyya, O., Y. Delu, S. T. Wong, and C. Bowen. 2011. "Evolution of Primary Care in China 1997–2009." *Health Policy* 100 (2): 174–80.
- Brenner, N., and N. Theodore. 2012. "Cities and the Geographies of 'Actually Existing Neoliberalism.'" In *The Urban Sociology Reader*, edited by Jan Lin and Christopher Mele, 138–47. Florence, KY: Routledge.
- Brix, Hana. 2009. "China: Urban Services and Governance." Policy Research Working Paper 5030, World Bank, Washington, DC. [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1471128](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1471128).
- Cai, Fang. 2010. Demographic Transition, Demographic Dividend, and Lewis Turning Point in China, *China Economic Journal* 3 (2): 107–19.
- Cai, Fang, and Y. Du. 2011. "Wage Growth, Wage Convergency and Lewis Turning Point in China." *China Economic Review* 22 (4): 601–10.
- Cai, Fang, and Meiyang Wang. 2010. "Urbanisation with Chinese Characteristics." In *China: The Next Twenty Years of Reform and Development*, edited by Ross Garnaut, Jane Golley, and Ligang Song, 319–40. Canberra and Beijing: Australian National University E Press, Brookings Institution Press, Social Sciences Academic Press.
- CCHDS (China Center for Health Development Studies). 2011. "Management of the Demand for Medical Services Is the Critical Path to Solve the 'Difficult and Expensive To Get Medical Service.'" *Health Development Outlook* <http://www.cchds.pku.edu.cn/attachments/article/105/Health%20Development%20Outlook-2.pdf>.
- Chen, G., and X. Yan. 2012. "Demand for Voluntary Basic Medical Insurance in Urban China: Panel Evidence from the Urban Resident Basic Medical Insurance Scheme." *Health Policy and Planning* 27 (8): 658–68.
- Chen, Yuanyuan, and Shuaizhang Feng. 2013. "Access to Public Schools and the Education of Migrant Children in China." *China Economic Review* 26: 75–88.
- Chen, Zhili. 2005. "Step-by-Step Elimination of Fees and Increasing Funding (abstract)." Speech at a Meeting on the Reform of the Funding Mechanism for Rural Compulsory Education." *People's Daily*, December 27. <http://edu.people.com.cn/GB/3976821.html>. Accessed February 24, 2011.
- China Labournet. 2010. "2010 Statistical Analysis of the National Labor Dispute Resolution Situation" [2010 nian quanguo laodongrenshizhengyi chuliqingkuang tongjifenxi]. <http://www.labournet.com.cn/ldzy/ckzl/t21.htm>.
- China National Health Development Research Center. 2012. "Abstract of *China Total Health*

- Expenditure.*" Ministry of Health, People's Republic of China.
- Chu, Funing. 2013. *2012 China Social Security Development Index Report*. Beijing: Economic Science Publishing Press.
- Delamater, Paul L., Joseph P. Messina, Sue C. Grady, Vince WinklerPrins, and Ashton M. Shortridge. 2013. "Do More Hospital Beds Lead to Higher Hospitalization Rates? A Spatial Examination of Roemer's Law." *PloS One* 8 (2): e54900.
- Démurger, S., S. Li, and H. Xu. 2013. "Internal Migration, Family Living Arrangements and Happiness in China." Paper presented at *IAS Program on 'Human Resources and Economic Development' Seminar*, Hong Kong University of Science and Technology, Hong Kong SAR, China, July 17.
- Dong, Baohua, ed. 2008. *Research on Labor Dispute Settlement System*. Beijing: China Labor and Social Security Publishing House.
- Dorfman, Mark, Robert Holzmann, Philip O'Keefe, Dewen Wang, Richard Hinz, and Yvonne Sin. 2013. *China's Pension System: A Vision*. Directions in Development series. Washington, DC: World Bank.
- Du, Yang, and Meiyan Wang. 2008. "The Implementation of the Minimum Wage System and Its Impact in China." *Journal of Graduate School of Chinese Academy of Social Science* 6: 56–62.
- Dustmann, Christian, Tommaso Frattini, and Caroline Halls. 2010. "Assessing the Fiscal Costs and Benefits of A8 Migration to the UK." *Fiscal Studies* 31 (1): 1–41. <http://www.ucl.ac.uk/~uctpb21/Cpapers/DustmannFrattiniHalls2010.pdf>.
- Freeman, R. B., and X. Li. 2013. "How Does China's New Labor Contract Law Affect Floating Workers?" NBER Working Paper 19254. National Bureau of Economic Research, Cambridge, MA.
- Gallagher, Mary, John Giles, Albert Park, and Meiyang Wang. 2013. "China's 2008 Labor Contract Law: Implementation and Implications for China's Workers." Policy Research Working Paper 6542, World Bank, Washington, DC. <https://openknowledge.worldbank.org/handle/10986/15902>.
- Gandullia, Luca, Nicola Iacobone, and Alastair Thomas. 2012. *Modelling the Tax Burden on Labour Income in Brazil, China, India, Indonesia and South Africa*. Tax Policy Working Paper No. 14. Paris: OECD Publishing.
- Giles, John, and Albert Park. 2014. "Labor Mobility in China and Implications for an Inclusive Labor Market." Background paper for Urban China report, Beijing.
- Giles, J., D. Wang, and W. Cai. 2011. "The Labor Supply and Retirement Behavior of China's Older Workers and Elderly in Comparative Perspective." Policy Research Working Paper 5851, World Bank, Washington, DC.
- Giles, John, Dewen Wang, and Albert Park (2013). "Expanding Social Insurance Coverage in Urban China." *Research in Labor Economics* 37: 123–79.
- Glaeser, E. L., and W. R. Kerr. 2009. Local Industrial Conditions and Entrepreneurship: How Much of the Spatial Distribution Can We Explain? *Journal of Economics and Management Strategy* 18 (3): 623–63.
- Gong, Sen, and Dong Yu. 2011. "Cases of Public Participation for People's Well-being (in Chinese)." Development Research Center, Beijing.
- Harris, D., and J. Q. Wang. 2012. "Political Economy Realities in the Chinese Health Sector: Health Financing Reforms for a Mobile Society." *Public Management Review* 14 (2): 217–37.
- Hu, Yaozong. 2009. "Analysis of the Free Urban Compulsory Education Policy." *Issues in Education Development* 5: 22–30.
- Huang, Y., and L. Jiang. 2009. "Housing Inequality in Transitional Beijing." *International Journal of Urban and Regional Research* 33 (4): 936–56.
- Lai, Desheng, and Yongpo Tian. 2005. "An Explanation for 'Educated Unemployment' in China." *Journal of Economic Research* 11: 111–19.
- Lall, Somik V., C. Timmins, and S. Yu. 2009. "Connecting Lagging and Leading Regions: The Role of Labor Mobility." *Brookings-Wharton Papers on Urban Affairs* 151–74.
- Langenbrunner, John, and Aparnaa Somanathan. 2011. *Financing Health Care in East Asia and the Pacific: Best Practices and Remaining Challenges*. Washington, DC: World Bank.
- Lee, Song B., and Phillips, J. M. 1997. "The Earnings Experience of Rural-Urban Migrants in Korea." *International Economic Journal* 11 (4): 85–101.
- Li, Chunling. 2010. "Higher Education Expansion and Unequal Access to Education—College Expansion Equalizing Effect Test." *Sociological Study* 3: 82–113.
- Li, Hongbin, Lei Li, Binzhen Wu, and Yanyan Xiong. 2012. "The End of Cheap Chinese Labor." *Journal of Economic Perspectives* 26 (4): 57–74.
- Li, L., Q. Chen, and Y. Jiang. 2011. "The Changing Patterns of China's Public Services." In *Pop-*



- ulation Aging and the Generational Economy: A Global Perspective, edited by Ronald Demos Lee and Andrew Mason, 408–19. Cheltenham, U.K.: Edward Elgar.
- Li, Si-Ming. 2012. “Housing Inequalities under Market Deepening: The Case of Guangzhou, China.” *Environment and Planning A* 44: 2852–66.
- Liang, Xiaoyan, and Shuang Chen. 2013. *Developing Skills for Economic Transformation and Social Harmony in China: A Study of Yunnan Province*. Washington, DC: World Bank. <https://openknowledge.worldbank.org/handle/10986/16197>
- Liu, D., and D. Tsegai. 2011. “The New Cooperative Medical Scheme (NCMS) and Its Implications for Access to Health Care and Medical Expenditure: Evidence from Rural China.” ZEF Discussion Papers on Development Policy No. 155, Bonn, Center for Development Research.
- Liu, Linping. 2008. “Interaction and Attitude: Migrant Peasant Workers in the Eyes of Urban Citizens: A Survey of the Guangzhou Citizens.” *Journal of SunYatsen University Social Science Edition* 48 (2): 183–92.
- Logan, J. R., Y. Fang, and Z. Zhang. 2010. “The Winners in China’s Urban Housing Reform.” *Housing Studies* 25 (1): 101–17.
- Man, Joyce Yanyun, Siqi Zheng, and Rongrong Ren. 2011. “Housing Policy and Housing Markets: Trends, Patterns and Affordability.” In *China’s Housing Reform and Outcomes*, edited by Joyce Y. Man, 318. Cambridge, MA: Lincoln Institute of Land Policy.
- Meng, Qun, Xu Ling, Zhang Yaoguang, Qian Juncheng, Cai Min, Xin Ying, Gao Jun, Xu Ke, J. Ties Boerma, and Sarah L. Barber. 2012. “Trends in Access to Health Services and Financial Protection in China between 2003 and 2011: A Cross-Sectional Study.” *Lancet* 379: 805–14.
- Ministry of Civil Affairs. 2013. *2012 Statistical Bulletin of Social Services Development*. <http://www.mca.gov.cn>.
- MOE (Ministry of Education). 1998. “China’s Education Revitalization Action Plan toward 21st Century.” [http://www.moe.gov.cn/public\\_files/business/htmlfiles/moe/moe\\_177/200407/2487.html](http://www.moe.gov.cn/public_files/business/htmlfiles/moe/moe_177/200407/2487.html).
- . 2010. “China’s Medium and Long-Term Education Reform and Development Plan 2010–2020.” [http://www.china.com.cn/policy/txt/2010-03/01/content\\_19492625\\_3.htm](http://www.china.com.cn/policy/txt/2010-03/01/content_19492625_3.htm).
- . 2011. *Chinese Education Statistical Yearbook*. Beijing: China Statistics Press.
- . 2012. *Chinese Education Finance Statistical Yearbook*. Beijing: China Statistics Press.
- Ministry of Finance, Ministry of Labor and Social Security, Ministry of Public Security, Ministry of Education, and Family Planning Commission. 2003. “Joint Notification on Incorporating the Costs of Managing Migrant Workers and Associated Expenditures into the Budget,” December. <http://www.moh.gov.cn/ldrks/s7846/201306/742e8c2d0ea944908077049871a624f7.shtml>.
- MOH (Ministry of Health). 2008. *Report on National Health Service Survey in China, 2008*, Beijing: Ministry of Health.
- . 2011. *2011 China Health Statistical Yearbook*. Beijing: Peking Union Medical College Press.
- MOHRSS (Ministry of Human Resources and Social Security) 2012. *Statistical Bulletin of Human Resources and Social Security Development*. <http://www.mohrss.gov.cn/SYrlzyhshbzb/zwgk/szrs/ndtjsj/tjgb/>.
- Montgomery, Jessica. 2012. “The Inheritance of Inequality: Hukou and Related Barriers to Compulsory Education for China’s Migrant Children.” *Pacific Rim Law and Policy Journal Association* 21 (3): 591–22.
- MyCOS (My China Occupational Skills). 2010. *2010 China College Graduates Employment Report*. Beijing: Social Science Literature Press.
- . 2013. *2013 China College Graduates Employment Report*. Beijing: Social Science Literature Press.
- Nanfang Dushi Bao. 2010. “Migrant Children Need to Pay Extra to Public Schools.” <http://gz.aoshu.com/201005/4bf09fe7b82ee.shtml>.
- NBS (National Bureau of Statistics). 2009. “National Monitoring Survey Report for Rural Migrant Workers 2009.” <http://wenku.baidu.com/view/065bc38a6529647d27285255.html>.
- . 2012a. “National Monitoring Survey Report for Rural Migrant Workers 2012.” [http://www.stats.gov.cn/tjsj/zxfb/201305/t20130527\\_12978.html](http://www.stats.gov.cn/tjsj/zxfb/201305/t20130527_12978.html)
- . 2012b. *China Labor Statistical Yearbook 2012*. Beijing: China Statistics Press.
- . (Various years). *China Statistical Yearbook*. Beijing: China Statistics Press.
- . 2012c. *Finance Yearbook of China 2012*. China Financial and Economic Publishing House.
- OECD (Organisation for Economic Co-operation and Development). 2005. *Governance in China*. Paris: OECD. <http://www.oecd.org/gov/governanceinchina.htm>.
- . 2011. *Society at a Glance 2011*. Paris: OECD. <http://www.oecd-ilibrary.org/social->

- issues-migration-health/society-at-a-glance-2011\_soc\_glance-2011-en.
- . 2013. *Education at a Glance 2013—United States*. <http://www.oecd.org/edu/United%20States%20EAG2013%20Country%20Note.pdf>.
- Park, Albert, and Fang Cai. 2011. “The Informalization of the Chinese Labor Market.” In *From Iron Rice Bowl to Informalization: Markets, State and Workers in a Changing China*, edited by Sarosh Kuruvilla, Ching Kwan Lee, and Mary E. Gallagher, 17–35. Ithaca, NY: Cornell University Press.
- Park, Albert, and Dewen Wang. 2010. Migration and Urban Poverty and Inequality in China. *China Economic Journal* 3 (1): 49–67.
- Perry, G., and M. Olarreaga. 2007. “Trade Liberalization, Inequality, and Poverty Reduction in Latin America.” In *Annual Bank Conference on Development Economics*, 103–51. Washington, DC: World Bank.
- Petersen, Gene B., and Laure Sharpe. 1969. “Southern Migrants to Cleveland. Work and Social Adjustment of Recent In-migrants Living in Low-Income Neighborhoods.” Bureau of Social Science Research, Washington, DC.
- Preker, A. S., and J. Langenbrunner, eds. 2005. *Spending Wisely: Buying Health Services for the Poor*. Washington, DC: World Bank.
- Ravallion, M. 2002. “On the Urbanization of Poverty.” *Journal of Development Economics* 68 (2): 435–42.
- Ravallion, M., S. Chen, and P. Sangraula. 2007. “New Evidence on the Urbanization of Global Poverty.” *Population and Development Review* 33 (4): 667–701.
- Rice, J. 2008. “The Urbanization of Poverty and Urban Slum Prevalence: The Impact of the Built Environment on Population-Level Patterns of Social Well-Being in the Less Developed Countries.” *Research in the Sociology of Health Care* 26: 205–34.
- Rozelle, Scott. 2011. “China’s Human Capital Challenge and Investment in Education, Nutrition and Health.” Background paper for *China 2030*, Beijing.
- Sen, S. 2014. “International Comparison of Residence Rules and Eligibility for Social Benefits and Services.” Background paper for the Urban China report, Beijing.
- Shen, Jie, and John Benson. 2008. “Tripartite Consultation in China: A First Step Towards Collective Bargaining?” *International Labour Review* 147 (2–3): 231–48.
- State Council. 2008. *Notice on Implementing Well the Exemption of Tuition and Fees in Urban Compulsory Education*, August. [http://www.gov.cn/zwggk/2008-08/15/content\\_1072915.htm](http://www.gov.cn/zwggk/2008-08/15/content_1072915.htm)
- Steinmann, P., Z. W. Du, L. B. Wang, X. Z. Wang, J. Y. Jiang, L. H. Li, H. Marti, and J. Utzinger. 2008. “Extensive Multiparasitism in a Village of Yunnan Province, People’s Republic of China, Revealed by a Suite of Diagnostic Methods.” *American Journal of Tropical Medicine and Hygiene* 78 (5): 760–69.
- Tam, Wei-Keung. 2008. “Failing to Treat: Why Public Hospitals in China Do Not Work.” *China Review* 8 (2): 103–30.
- Tian, H. S., and N. Wu. 2010. *A Research on Migrant Children’s Education: Based on Investigations of the Situations, Problems and Countermeasure Analysis of 12 Cities*. Beijing: Educational Science Publishing House.
- Umapathi, Nithin, Dewen Wang, and Philip O’Keefe. 2013. “Eligibility Thresholds for Minimum Living Guarantee Programs: International Practices and Implications for China.” Discussion Paper No.1307, Social Protection and Labor, World Bank, Washington, DC.
- UNESCO-UNEVOC (United Nations Educational, Scientific, and Cultural Organization and the International Centre for Technical and Vocational Education and Training) 2010. TVETipedia. “Information on TVET in the Republic of Korea.” [http://www.unevoc.unesco.org/tvetipedia.0.html?&tx\\_drwiki\\_pi1%5Bkeyword%5D=Republic%20of%20Korea](http://www.unevoc.unesco.org/tvetipedia.0.html?&tx_drwiki_pi1%5Bkeyword%5D=Republic%20of%20Korea).
- Wang, Dewen. 2009. “China’s Lewisian Turning Point: Characteristics and Implications.” *Population Studies* 2: 54–58.
- Wang, Dewen, and Mark Dorfman. 2014. *China: Deepening the Pension System Reform through an Integrated Design*. World Bank, Washington, DC.
- Wang, Dewen, Philip O’Keefe, and Jin Song. 2013. “Understanding the Hukou System through Quantifying Hukou Thresholds.” Background Paper for 2013 *World Development Report*, World Bank, Washington, DC.
- Wang, Dewen, Changyou Zhu, Rongtang Ma. 2008. “Social Security of Rural Migrant Workers: Current Coverage, Institutional Designing and Policy Suggestions.” Working Paper, International Labour Organization (ILO), Geneva.
- Wang, Hong. 2013. “Investigation of the Status and Finances of Migrant Children Education in Guangzhou.” In *Issues of Providing Compulsory Education for Migrant Children and Public Finance*, edited by Yuan and others, Beijing: Beijing Normal University Press.



- Wang, Liejun. 2010. "Experiences of Hukou Reform and Overall Strategy for Next Step Reform." *Social Sciences of Jiangsu*, No. 2.
- Wang, Mark Yaolin. 2002. "Small City, Big Solution? China's Hukou System Reform and Its Potential Impacts." *Planning Review* 38 (151): 23–29.
- Wang, Xiaoxia, Chengfang Liu, Linxiu Zhang, Renfu Luo, Thomas Glauben, Yaojiang Shi, Scott Rozelle, and Brian Sharbono. 2011. "What Is Keeping the Poor Out of College? Enrollment Rates, Educational Barriers and College Matriculation China." *China Agricultural Economic Review* 3 (2): 131–49.
- Wang, Xiaoxia, Dwen Wang, and Elena Glinskaya. 2014. "Costing out China's Residence-Permit Reform." A background paper for Urban China report, Beijing.
- Wang, Y. P., and A. Murie. 1996. "The Process of Commercialisation of Urban Housing in China." *Urban Studies* 33 (6): 971–89.
- Watson, Andrew. 2009. "Social Security for China's Migrant Workers: Providing for Old Age." *Journal of Current Chinese Affairs* 38 (4): 85–115.
- Wertheimer, R. F. 1970. "The Monetary Rewards of Migration within the US." Urban Institute, Washington, DC.
- Whalley, John, and Shunming Zhang. 2004. "Inequality Change in China and (Hukou) Labour Mobility Restrictions." NBER Working Paper 10683, National Bureau of Economic Research, Cambridge, MA.
- World Bank. 1997. *China: Higher Education Reform*. World Bank: Washington, DC.
- . 2009. *From Poor Areas to Poor People: China's Evolving Poverty Reduction Agenda—An Assessment of Poverty and Inequality*. Washington, DC: World Bank.
- . 2011. *Global Development Horizons 2011*. Washington, DC: World Bank.
- . 2013. *Inclusion Matters: The Foundation for Shared Prosperity*. Washington, DC: World Bank.
- World Bank and Development Research Center (DRC) of the State Council, the People's Republic of China. 2013. *China 2030: Building a Modern, Harmonious, and Creative Society*. Washington, DC: World Bank.
- Wu, F. 2004. "Urban Poverty and Marginalization under Market Transition: The Case of Chinese Cities." *International Journal of Urban and Regional Research* 28 (2): 401–23.
- Wu, Fulong, Fangzhu Zhang, and Chris Webster. 2013. "Informality and the Development and Demolition of Urban Villages in the Chinese Peri-urban Area." *Urban Studies* 50 (10): 1919–34.
- Wu, Weiping. 2011. "Skills and Innovation in Globalizing Cities: The Role of Higher Education." Paper prepared for Global Cities Research Seminar, East China Normal University, Shanghai, June 10.
- Wu, Yaowu, and Quan Zhao. 2010. "Higher Education Expansion and Employment of University Graduates." *Journal of Economic Research* 9: 93–108.
- Xinhuanet. 2009. "Migrant Children Needs 10 Documents for Accessing Urban Education, Including No Crime Records of Their Parents." June 18. [http://news.xinhuanet.com/edu/2009-06/18/content\\_11558353.htm](http://news.xinhuanet.com/edu/2009-06/18/content_11558353.htm).
- Yan, F., J. Raven, W. Wang, R. Tolhurst, K. Zhu, B. Yu, and C. Collins. 2011. "Management Capacity and Health Insurance: The Case of the New Cooperative Medical Scheme in Six Counties in Rural China." *International Journal of Health Planning and Management* 26 (4): 357–78.
- Yang, Zili. 2011. "A Comparison of Some Models for Solving the Problem of Educating Migrant Children." *China Human Rights Biweekly*, September 14. [http://www.zhuanxing.cn/html/yfr\\_student/715.html](http://www.zhuanxing.cn/html/yfr_student/715.html).
- Yao, Yang, and Ke Zhang. 2010. "Has China Passed the Lewis Turning Point? A Structural Estimation Based on Provincial Data" *China Economic Journal* 3 (2): 155–62.
- Yip, Winnie C., and K. Eggleston. 2004. "Addressing Government and Market Failures with Payment Incentives: Hospital Reimbursement Reform in Hainan." *China Social Science & Medicine* 58: 267–77.
- Yip, Winnie C., William C. Hsiao, Wen Chen, Shanlian Hu, Jin Ma, and Alan Maynard. 2012. "Early Appraisal of China's Huge and Complex Health-Care Reforms." *Lancet* 379 (9818): 833–42.
- Yuan, Liansheng. 2013. "The Development and Reform of Policies in Financing Compulsory Education for Migrant Children." In *Issues of Providing Compulsory Education for Migrant Children and Public Finance*, edited by Yuan and others, 87. Beijing: Beijing Normal University Press.
- Yuan, Liansheng, Hong Wang, and Yanqing Ding. 2013. *Issues of Providing Compulsory Education for Migrant Children and Public Finance*. Beijing: Beijing Normal University Press.
- Yue, Changjun. 2013. "Looking at the Equity of Opportunities of Higher Education from the Perspective of Financial Inputs." *Guangming Daily*, July 24, 2013.

- Yue, Ximing, Shi Li, and Terry Sicular. 2010. "A Study on High Earnings in the Monopoly Sector." *China Social Sciences* (43) 77–99.
- Zhai, Fan, Thomas Hertel, and Zhi Wang. 2003. "Labor Market Distortions, Rural-Urban Inequality and the Opening of China's Economy." GTAP Working Paper 27. Lafayette, IN: Purdue University.
- Zhang, Bingzi. 2010. "The Current Status of China's Statistics on Resident Population and Reflections on the Adjustment of the Related Regulations." In *People's Livelihood: Social Policies of Promoting Inclusive Growth*, Sen Gong and Yang Su, eds. Beijing: Social Science Literatures Press.
- Zhang, Dandan, and Xin Meng. 2007. "Assimilation or Disassimilation? The Labour Market Performance of Rural Migrants in Chinese Cities." Paper presented at the 6th Conference on the Chinese Economy, CERDI-IDREC, Clermont-Ferrand, France, October 18–19.
- Zhang, Junfu, and Zhong Zhao. 2013. "Measuring the Income–Distance Tradeoff for Rural-Urban Migrants in China." IZA discussion Paper No. 7160, Bonn, Germany.
- Zhang, Li, and Li Tao. 2012. "Barriers to the Acquisition of Urban Hukou in Chinese Cities." *Environment and Planning A* 44: 2883–2900.
- Zhang, Xiaobo, Jin Yang, and Shenglin Wang. 2009. "China Has Reached the Lewis Turning Point." *China Economic Review* 22 (4): 542–54.
- Zhang, Yina, and Jie Chen. 2013. "The Changing Prevalence of Housing Overcrowding in Post-Reform China: The Case of Shanghai, 2000–2010." Paper prepared for the Inter-University Seminar on Asian Megacities (IUSAM): "Asian Urbanism and Beyond," Hong Kong SAR, China, August 15–17.
- Zhao, Lei. 2008. "China's Busiest Court." *Southern Weekend*, December 4.
- Zheng, Bingwen. 2013. *China Pension Report 2012*. Beijing: Economy and Management.
- Zhong, H. 2011. "Returns to Higher Education in China: What Is the Role of College Quality?" *China Economic Review* 22 (2): 260–75.
- Zhu, Nong, and Xubei Luo. 2010. "The Impact of Migration on Rural Poverty and Inequality: A Case Study in China." *Agricultural Economics* 41 (2): 191–204.



# China's Urbanization and Land: A Framework for Reform

## Introduction

Land is of central importance to China's urbanization, economic growth, and social stability. Since the late 1970s, land has been an essential element in the government's efforts to promote more market orientation. The government gradually developed a regulatory framework that consistently and successively strengthened individual property rights to land and promoted a more market-oriented allocation of land (box 4.1). The formulation of China's urbanization strategy for the next decade now provides an opportunity to further reform and deepen the regulatory and institutional framework for land and to modernize land administration and management to support efficient and inclusive growth and urbanization.

As urbanization accelerated over the past decades, the shortcomings of China's dual-track rural-urban land tenure system became more evident, stimulating many provinces and municipalities to experiment with innovative land tenure arrangements. Land reform can build on these local experiences to establish the regulatory and institutional foundation that can help guarantee the long-

term and efficient supply of land and financing needed for urbanization that is based on transparent and voluntary market transactions and taxation. Reform also should ensure that the benefits from urbanization can be shared more equitably among China's citizens. To achieve that aim, reform has to tackle the dependency of China's growth model on government-led rural land conversion and ensure the equitable treatment of rural and urban land and property holders during urbanization. This reform will require further strengthening and protecting of individual property rights to land, in particular rural land, and clarifying collective ownership arrangements.

Undertaking land reform, the reform of the public finance system (see supporting report 6), and the reform of the *hukou* system requires a carefully coordinated approach.<sup>1</sup> Reform needs to recalibrate the use of land, improve the governance of the land, and reduce the government's dependence on revenue from land conversion and land sales. Reform could also help facilitate the transition from land asset sales to modern taxation that fits the needs of future sustainable urbaniza-

### BOX 4.1 The evolution of China's policy framework of land, 1978–2013

China's land policy and legal framework has evolved continuously and consistently in response to economic and social changes and challenges. The broad policy directions adopted over the past decades illustrate that tenure security, property rights, and market mechanisms are recognized as important prerequisites for China's future development. The history of land policy reform shows a consistent trend of gradually embodying policies into laws to achieve a comprehensive legal and institutional framework for land.

The Household Responsibility System of 1978 introduced a rural property system whereby farmland, though nominally remaining under collective ownership, was contracted to individual households, initially for a 5-year lease period that was later extended to 15 years (1984) and 30 years (1993). By 1983, virtually all arable land had been allocated to rural households. The Household Responsibility System was the most important driving force behind China's agricultural growth and poverty reduction during the first decade of the reform period.

Central Document No. 1 of 1984 (*Notice on Rural Work for the Year 1984*) established the foundation of the present Chinese rural land rights system. The document clarified the separation of collective ownership from individual land use rights and stipulated that collective land be contracted to households for a term of 15 years. It allowed for the voluntary transfer of individual land rights between farmers within the collective. Central Document No. 11 of 1993 (*Several Measures on Current Agricultural and Rural Economic Development*) further strengthened the Household Responsibility System. It required that farmland rights be extended for another term of 30 years upon the expiration of the initial 15-year lease period. It endorsed transfers of farmland rights for value with prior consent from the collective and restricted the periodic readjustment of farmland rights through administrative means of the collective. Central Document No. 16 of 1996 (*Notice on Further Stabilizing and Improving the Rural Land Contracting Relationship*) explicitly prohibited large readjustments and restricted small readjustments by requiring approval by two-thirds of the villager assembly and the township and county governments. The document prohibited all forms of compulsory, nonvoluntary-scale farming implemented through administrative order.

The Land Management Law of 1986/88 adopted the Hong Kong Leasehold System and legalized pri-

ivate use rights to publicly owned land. It also provided the legal basis for transferring such rights between private users and thereby created the conditions for mobilizing capital through land transfers. The revised Land Management Law of 1998 mandated that collectively owned farmland be contracted to rural households for a term of 30 years. The revised law also set forth procedures to govern the requisition of farmland by the state but did not include provisions on prior notification, participation in determining compensation, and appeal during expropriation.

The *Interim Regulations on Allocation and Granting of Urban State-Owned Land Use Rights of 1990* defined urban land rights as (a) unmarketable allocated rights available for public use and (b) marketable granted private use rights for a term of 70 years. It also provided rules that govern these granted private use rights and thus created the conditions for the development of China's urban land markets.

Central Document No. 18 of 2001 (*Notice on Transfers of Rural Households' Use Rights of Contracted Land*) provided further guidance on rural land by prohibiting the compulsory taking-back of land rights by collectives and contracting to nonmembers for value.

The Rural Land Contracting Law of 2002 comprehensively regulates the extent of farmers' land rights. It provides that rural land contracting and operation, rights that are held by farmer households, may be transferred to other village households, leased to nonvillage households, exchanged, assigned, or transacted by other means in accordance with the law. The law also provides legal remedies for any violations.

The Property Law of 2007 is China's first comprehensive civil property code. It articulates that all types of property in China (state, collective, and private) are entitled to the same level of legal protection. The law clarifies that collectively owned land is owned by all members of the community rather than by the collective entity. It characterizes farmers' rural land use rights as property rights, as opposed to contractual rights defined by previous laws, and provides greater protection for small farmers' land rights. It also reaffirms the provisions of the Rural Land Contracting Law but categorizes farmers' 30-year land right as extendable upon expiration. Regardless of the type of land transaction, land rights transfers must adhere

**BOX 4.1** (continued)

to the principles of voluntariness and free negotiation between the transferor and the transferee, compensation, freedom from compulsion, content and formal procedure, specification of contract terms, and a requirement that transferees possess agricultural operational capacity.

The *Decision on Several Important Issues of Rural Reform* of the Third Plenary Session of the 17th Central Committee of the Communist Party of China (CPC), 2008, declared that farmers' land rights will be for "a long term without change," setting forth the direction for upgrading the 30-year land rights into de facto perpetual rights. The decision also distinguished between public interest use and commercial use when converting agricultural land into urban construction land, and required that conversions for commercial use outside the planned urban areas not be made through eminent domain expropriation. The decision called for affirming farmers' land rights through registration and certification.

The Regulation on Expropriation of and Compensation for Buildings on State-Owned Land of 2011 (the Urban Takings Regulation) defines, explicitly and unambiguously, the needs of public interest for which the state may resort to eminent domain power to expropriate urban private property. The regulation includes three unprecedented features: a list of the purposes for which the state may take private property; a requirement that all public purpose projects must be implemented by government and for public use by a public institution, a clause that emphasizes the public interest principle; and the exclusion of local governments' discretion to expand the list for any nonlisted public interest purposes. The scope of expropriation can be expanded only through law, stipulated by the National People's Congress, or through administrative regulation, stipulated by the State Council in accordance with China's Legislation Law of 2000.

Central Documents No. 1 from 2010 to 2013 reiterated the need to affirm farmers' property rights to

land through the registering and certifying of their farmland, forestland, and residential land rights, and the need to establish a rural land registration system. In Central Document No. 1 of 2013, the central authorities also advanced the target of registering and certifying farmers' land rights within five years.<sup>a</sup>

Several central documents issued between 2004 and 2013 set policy guidelines for protecting farmers' land rights in the process of urbanization and industrialization. The State Council's Document No. 28 of 2004 (*Decision on Deepening Reforms and Intensifying Strict Land Management*) requires the state to follow the principle of restoring farmers' original living standards and ensuring their long-term livelihoods when determining compensation for land expropriation. The State Council's Document No. 9 of 2011 (*Notice on Actively and Carefully Pushing Reforms in the Institutions for Residential Registration Management*) explicitly prohibits compulsory taking-back, directly or indirectly, of migrant farmworkers' land rights, including residential land, arable land, forestland, and grassland rights, when they move to cities and obtain urban residential registration. In Central Document No. 1 of 2013, the Central Committee and the State Council jointly require that farmers' living standards be raised and their long-term livelihoods be ensured when their land is taken for urbanization or industrialization.

Land policy and legal reform has progressed and deepened significantly, but ensuring fully secure, marketable, and long-term land rights for all farmers remains challenging. A revision of the Land Management Law is expected to close important legal gaps with regard to (a) clarifying the scope of state expropriations for public purpose, (b) determining compensation approaches for rural land takings and allocating compensation between the collective and individual farmer, and (c) strengthening tenure security and extending legal protection of farmers' rights to all types of land, including residential land and collective construction land.

Source: Li and Wang 2013.

a. Central Document No. 1 of 2010, *Several Opinions on Strengthening Integrated Urban-Rural Development and Further Solidifying the Foundation of Agricultural and Rural Development*; Central Document No. 1 of 2011, *Decision on Speeding Up Reform and Development of Water Conservancy*; Central Document No. 1 of 2012, *Several Opinions on Speeding Up Agricultural Scientific and Technological Innovation and Sustainably Increasing Capacity for Provision of Agricultural Products*; and Central Document No. 1 of 2013, *Several Opinions on Speeding Up Development of Modern Agriculture and Further Strengthening Rural Development Vitality*.



tion, deepens land markets, and clarifies for rural citizens their property rights and land assets at home and their opportunities and entitlements for integration into the cities.

China's dual-track tenure system still separates collectively owned rural land and state-owned urban land, which are governed by separate regulations and institutions. Reform should aim at gradually removing the complexity and contradictions inherent in this dual-track tenure system, in particular, the ambiguities of China's collective rural land ownership. The separation between rural and urban land governance contributes to the persistent disparities between rural and urban residents. Reform, therefore, needs to cut across the rural and urban spaces if disparity is to be reduced. Land reform should gradually reduce the role of government in the land allocation process and allow for market allocation and the integration of the rural and urban land markets.

The overhaul of China's rural land requisition system could help reduce hardship and discontent in rural areas and bring social benefits by improving efficiency in the land allocation process. Reform will involve amending China's land laws and regulations to clarify and define the "public purpose" for which land can be expropriated by the government, restricting current rural land-taking practices, and introducing approaches that increase compensation standards for requisitioned land. Legal reform should protect farmers' property rights to rural land through property rights confirmation and land titling. Building on international experience, the marketability of rural land and property needs strengthening to supply land for urban development more efficiently and support the consolidation of farmland that is needed for agricultural sector development and income growth in rural areas.

The integration of peri-urban collective land and property, along with migrant residents, into China's cities and the urban economy needs to be supported. Reform needs to focus on the integration of rural and urban construction land markets to allow more equitable sharing of the benefits of urbanization between rural and urban

citizens. Reform could provide the foundation for the redevelopment of urban fringe areas in socially acceptable ways, formalize informal housing rights in urban villages, and strengthen market-based mechanisms to promote the provision of low-cost and legally protected housing for China's migrant population. New approaches to govern agricultural and nonagricultural collective assets can be considered.

In addition, China's land administration and management apparatus need to be modernized, including the development of modern institutions, skills, and professional services. This modernization will likely be a longer-term task that will involve developing regulations and institutions for the management and governance of land, such as cadastral systems, land use control mechanisms, land market regulations, land valuation and taxation approaches, and arbitration and appeals mechanisms.

The underlying issues that necessitate further reform of China's land tenure framework and the modernization of its land management system have evolved since the 1990s. As market reforms advanced, government-led industrialization and urbanization policies and programs capitalized on land but in distinctively different ways. Local governments successfully pursued an industrialization model that built on the inflow of foreign direct investment and globalization, an abundant supply of rural labor, and local competition. In promoting growth, local governments could build on a highly conducive land tenure framework that allowed them the exclusive power to acquire, convert, and supply rural land for industrial use.

China successfully industrialized using this process, but it has not become an urbanized society because the integration of China's labor supply into the urban areas and the workers' transformation into urban citizens have remained incomplete. China's many migrant workers are the visible outcome of this incomplete transformation process. The partial urban integration of migrants is apparent, for example, in the informal and mutual arrangements between migrants and rural collectives in peri-urban areas. Migrants

in search of affordable housing have met with rural collectives that supply land and housing at the urban fringe. The informal urbanization of rural peri-urban areas and migrants and the persistent rural-urban disparities are a result of China's land conversion-based industrial and urban development.

Local implementation of economic, land, and fiscal policy and, at times, abuse of local government power have led to unintended consequences that are widely viewed as unsustainable. The global financial crisis of 2008 and the subsequent stimulus policies have had a dramatic impact on China's land-based economic growth model through accelerated land taking and conversion, bringing the inefficiencies of current land tenure arrangements and the need for reform into even clearer focus.

### **Incentives and inefficient land allocation patterns**

China's municipalities are responsible for economic development and employment generation, in addition to more traditional responsibilities of managing municipal services. Gross domestic product (GDP) growth is an important metric by which mayors are held accountable by higher levels of government, which leads to a narrow focus on GDP growth. Because local governments are the owners of all urban land in their jurisdiction, they have strong incentives to supply cheap land for industrial use to generate economic growth. But because many local governments follow the same approach, cheap land is not a comparative advantage. Instead, excessive supply of industrial land has fueled the inefficient growth of urban boundaries and proliferation of industrial development zones. Simultaneously, the tightly controlled supply of land for urban use has contributed to record prices for residential and commercial land, leading to housing price bubbles. Governments not only control land conversion and land supply but also set policies and land use planning regulations, approvals, and implementation, thereby contributing to inefficient urban growth patterns, violations of land-related regulations, and rent seeking.

### **Fiscal dependence on land-based income**

The combination of China's land tenure and public finance system, including cheap access of local governments to land, monopoly power in land supply, and unbalanced revenue and expenditure assignments, provides strong incentives for local governments to generate local revenue from land sales. Many governments have become reliant on rural land expropriation and land concession income. Revenue from land sales provides a significant share of local government revenues. They also have a widespread reliance on mortgage loans backed by future land sales, which are offered through local land banks, that help circumvent restrictions on local government borrowing. Both practices have contributed to the aggressive requisitioning of farmland, which contributes to unsustainable local finance and fiscal risk, unsound urban growth, and waste of land resources.

### **Emergence of landless farmers**

Farmland expropriation and conversion to urban uses reached nearly 5,700 square kilometers in 2011. An estimated 53 million farmers have lost their land and farm-based livelihood in the process of urbanization over the past 20 years (Xu and others 2013). Low compensation for lost land and property, combined with an underdeveloped rural social security system, has made it often difficult for farmers and migrants to maintain their livelihood. Those conditions—the loss of property and livelihood, lack of transparency in the process of land requisition, low compensation paid to affected farmers, and the large difference between such compensation and the price received by the government when the land is auctioned and sold for urban development—have resulted in widespread social unrest and a growing sense of injustice.

### **Incomplete urban integration**

Migration is often temporary. Permanent relocation into cities is hampered by rural

citizens' concerns over losing farmland and residential land rights in home villages when an urban hukou is obtained. Obstacles to integration are mirrored in cities where social services are not available to migrants and local governments are reluctant or unable to provide construction land for affordable housing. Because migrants cannot integrate into the city, informal settlements have emerged in the urban periphery, housing an estimated 80 million to 100 million people. Generally, such settlements are situated on residual rural construction land that has been informally and often illegally developed by rural collectives to meet demand for low-cost housing, resulting in large numbers of unregulated and underserved peri-urban and urban villages. At the same time, slow rural outmigration and underdeveloped farmland markets prevent the much-needed consolidation of agriculture, which would increase labor productivity and help narrow the urban-rural income gap.

### **Farmland protection and land supply for urbanization**

The central government has stated a target of 120 million hectares of farmland to be protected from conversion to ensure long-term food security. The concern over the loss of farmland has led to the institution of strict land-conversion quotas, and the farmland protection policy has sought to rein in uncontrolled land conversion, misallocation, and inefficient urban expansion. Urbanization, however, is likely to continue to demand more land into the future, and many localities have devised innovative approaches to reclaim inefficiently used rural land and make it available for urban development. The challenge that remains includes creating a better balance of demand for agricultural land and urban development through improved utilization, transparency, market-driven allocation, and control mechanisms for the appropriate use of land.

This report focuses on the regulatory, institutional, and policy aspects of China's urban transformation as they pertain to land. The next section discusses how land is currently being used in China's urbanization

process. It describes recent land requisition trends, land allocation patterns and practices, and the development of land concession revenue, as well as how such revenue is used by local governments. It addresses issues related to land collateralization practices and risks. A subsequent section then discusses selected international approaches to the treatment of land development value and value capture, city financing, rural land registration and property markets, and property taxation. The section following the international approaches reviews some selected pilots for reforming local land systems in China and discusses their relevance to the national land reform efforts. These pilots include Shenzhen's model of integrating rural and urban construction land, Chengdu's rural-urban integration experiments, experiences with land-trading centers in Chongqing, Beijing's redevelopment pilots for urban villages, and Guizhou's experiences in maintaining long-term rights to farmland going through demographic change. Finally, the report closes with a land policy reform framework for the next decade, with various options for reforming land tenure arrangements to make them more compatible with China's goals for social stability and efficient, sustainable economic development.

## **Land and urbanization in China**

### **Industrialization and urban development**

The emergence of China's land-dependent growth model in the 1990s and its proliferation are an outcome of the combination of a unique regulatory regime for land, competition for economic growth between localities, and the fiscal centralization policy and tax reform of the mid-1990s. China's dual-track urban-rural land ownership system and its rural land requisition regime and implementation practices have played a pivotal role in promoting this pattern of economic development.

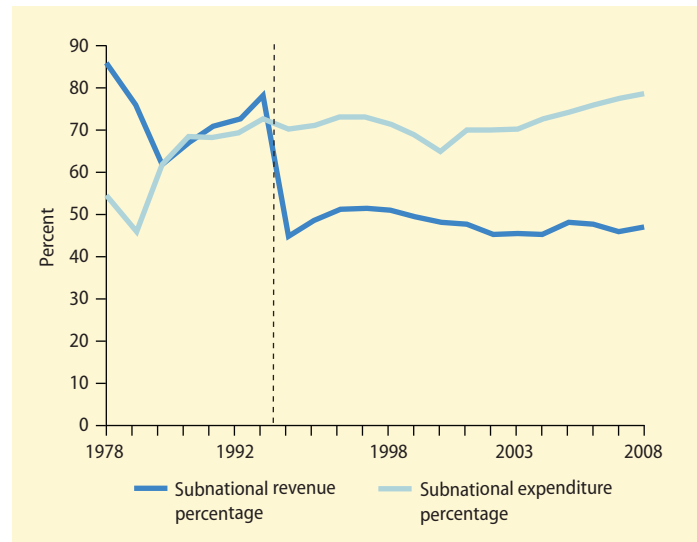
In the 1990s, land emerged as a prominent instrument in China's development, in a much different way than during the previous decade. In the 1980s, decollectiviza-

tion and the introduction of the Household Responsibility System of 1978 marked the beginning of the economic reform period and stimulated extraordinary agricultural and rural growth, including the development of township and village enterprises on collective land. In the 1990, market reforms, the restructuring of and transition to shareholding systems for state enterprises, the decline of township and village enterprises, and integration into the global economy, along with foreign and domestic investments and abundant labor supply, provided the impetus for China's industrial growth and urbanization. Local governments assumed responsibility for economic growth, industrialization, and urban development. Decentralization provided flexibility and incentives to local governments to evolve from the former rigid centralized economic management system. China's growth performance and economic and social achievements over the past 20 years are widely recognized as the outcomes of these successful policies.

Land became a critical resource of industrial development and growth when the fiscal reforms of the 1990s centralized the power to collect budgetary revenue. The reforms deprived local governments of a large share of their revenue while their responsibilities for economic development and public and social service provision remained largely unchanged (Wong 2013).<sup>2</sup> Over the past 20 years, the gap between municipal budgetary revenue and expenditure widened continuously, as the ratio of subnational revenue remained at less than 50 percent of total government budgetary revenue and the ratio of subnational expenditure rose as high as 80 percent of total expenditure (figure 4.1).

With the market reforms and changes in the central and local fiscal relationship, land became the single most important asset under the control of local governments, which began to discriminate very effectively between industrial and urban land use and users. Governments increased the supply of industrial land to develop their local tax base: business taxes accrue exclusively to local governments, whereas value added and corporate income taxes are shared with the central government. They simultaneously restricted the

**FIGURE 4.1** Revenue and expenditure of subnational governments, 1978–2008



Source: World Bank 2012.

supply of land for urban residential and commercial use to capture the increased value of land as demand for such land increased in the course of urban expansion. A distinct pattern of industrial and urban commercial and residential land allocation emerged that continues to shape China's urban growth and has led to continuously decreasing densities in many cities in China.

Local governments seek to attract investors by providing industrial-use land at subsidized prices and infrastructure at little or no cost to the investor. While governments are supplying cheap industrial land they are often incurring financial losses, because they need to pay compensation to dispossessed farmers and finance infrastructure construction. But attracting investors is important not only to meet economic growth targets but also to generate sustainable tax revenue. Enterprises generate value added taxes and corporate income taxes, of which 25 percent and 40 percent stay at the municipality or county levels, respectively. The multiplier effect of the manufacturing sector in the services and business sectors is important to local considerations. Because factories increase workers' financial means, businesses and services such as markets, shops, restaurants, banks, and real estate developers establish themselves

to serve a growing consumer base. These spillover effects influence economic decision making, in particular, because business taxes accrue solely to local governments (Tao 2013).

In urban commercial and residential land use, local governments pursue a different but complementary strategy. By restricting the area to be sold for urban development, local governments are able to raise the price of urban land and maximize revenues from selling that land. With accelerating urbanization boosting land demand and its value, land has become a key source of revenue for local governments. The strategy of discriminating between industrial and urban land also allows local governments to cross-subsidize industrial development through the urban land market and to generate the financing needed for infrastructure.

The proliferation of industrial parks throughout China and the high prices for urban residential and commercial real estate reflect the different allocative strategies for industrial and urban land. Industrial parks emerged in China's coastal areas in the late 1990s and have expanded steadily over the past decade. Inland regions did not join the regional manufacturing competition initially because of relatively poor infrastructure endowment, but as infrastructure began to improve in the 2000s, inland regions began to compete for investments as well. By the end of 2003, China had 3,837 industrial parks and zones. By 2006, the total number of such parks and zones had increased to 6,015, or an average of two industrial parks per county (Zhai and Xiang 2007). The majority of these zones are operated by local governments, with only a small number having received approval from provincial or central governments.

Continuously rising real estate prices across many cities can be attributed to this instrumental use of land, in particular the undersupply of land at times of rising demand. Depressed factor prices over the past decade, including land and labor, and weak enforcement of environmental regulations, resulted in excessive investments and production capacity in manufacturing that could not be absorbed domestically. At the

same time, low compensation levels for requisitioned land and the insufficient coverage of the social insurance system made it difficult for dispossessed farmers and migrants to increase consumption levels. With little flexibility, the central government had to maintain a stable exchange rate and increase the money supply to ensure that the manufactured goods could be exported. Booming exports, increasing labor productivity, and a stable exchange rate regime attracted large amounts of speculative money, thus further increasing China's foreign currency reserves. By 2004, these reserves had grown to US\$609.9 billion and in 2006 to US\$1 trillion. In April 2009, foreign reserves exceeded US\$2 trillion, and in March 2011, reserves exceeded US\$3 trillion. Excess liquidity flooded into the commercial and residential land market and contributed to sharply increased real estate prices (Tao 2013).

Prior to 2004, the growth of China's urban house prices remained below 5 percent, but house prices began to increase from early 2004, growing by nearly 10 percent annually. The central government implemented a number of regulatory policies to stabilize the housing market. However, these land market control policies did not address the underlying problem, and house prices continued to grow at double-digit rates. Neither the more competitive land allocation policies instituted in 2006 nor interest rate increases were able to slow the growth in house prices. Only during the 2008 global financial crisis did house prices decline briefly, dropping by 1.1 percent in the first quarter of 2009. However, real estate prices have since risen steadily in many cities, fueled by demand.

### Rural land requisition

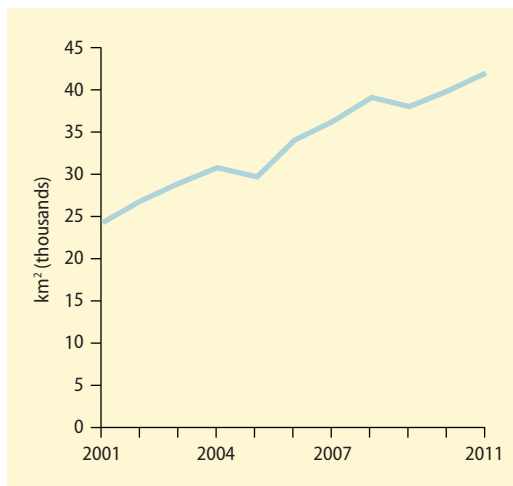
China's urbanization is characterized by the continuous outward shift of urban boundaries and the expansion of territorial jurisdictions of cities, primarily through the expropriation of surrounding rural land and its integration into urban areas. Between 2001 and 2011, urban construction land increased steadily by a total of 17,600 square kilometers, reaching a total area of 41,805 square kilometers in 2011, an increase of 58 percent



over the decade (figure 4.2). Urban construction land expanded by 1,600 square kilometers per year, with about 90 percent of the demand met through the expropriation of rural land; the remainder came from the existing stock of undeveloped urban construction land. From 2005 to 2011, 10,200 square kilometers of rural land were requisitioned and converted to state land for urban construction use. Annual requisition of rural land averaged 1,460 square kilometers, closely matching the trend of increasing urban construction land and urban built-up area during that period.

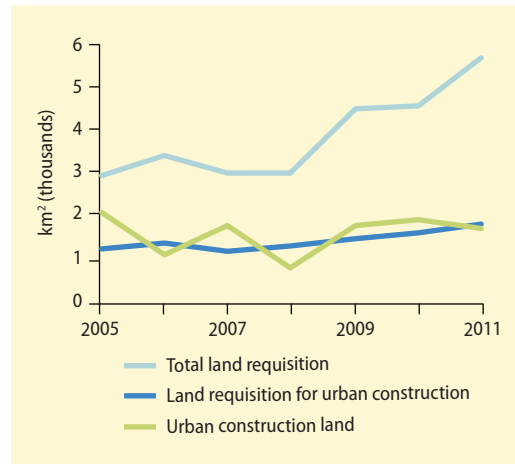
Rural land requisition overall and its conversion into state-owned land was much higher than land conversion for the more narrow urban construction use (figure 4.3). During 2005 to 2011, a total of 27,200 square kilometers of rural land were requisitioned and converted to state ownership. Up to 2008, approximately 3,000 square kilometers were requisitioned annually. Part of the difference between the two land conversion rates is explained by infrastructure construction and expansion of industrial land not yet counted as urban construction land. From 2008 to 2013, however, rural land requisition increased sharply to around 4,460 square kilometers. Part of this sharp increase is associated with the government's 2009–10 stimulus response to slowing growth, includ-

**FIGURE 4.2** Urban construction land



Source: China Urban Construction Statistical Yearbook, 2002–12.

**FIGURE 4.3** Requisition of rural land



Source: China Urban Construction Statistical Yearbook, 2006–12; China Land and Resources Statistical Yearbook, 2006–12.

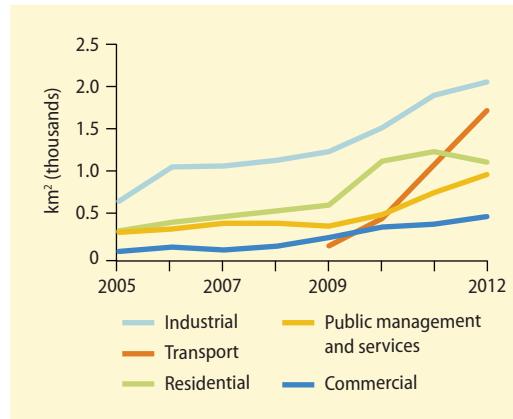
ing increased infrastructure investment; the expansion of industrial, urban residential, and commercial land; and relaxed land use controls.

The sharp acceleration of land requisition may indicate that the requisition and conversion of rural land is, to a certain extent, delinked from the real demand for urban and industrial land or infrastructure needs as local governments have continued to increase their reliance on land-based concession revenue and collateralization of land to meet their fiscal obligations. Rural land requisition rates exceeded the increase in total urban construction land area by nearly 3,800 square kilometers. Notwithstanding infrastructure investments, this difference may indicate the scale of how much land has entered land banks under the control of urban development investment corporations (UDICs; so-called land banks) since 2008 and is used in land-based finance through collateralization.

In terms of the composition of urban construction land, industrial land saw the largest expansion in absolute terms, with an increase of 10,800 square kilometers between 2005 and 2012, followed by residential land (6,081 square kilometers), public utilities and buildings (4,290 square kilometers), and commercial-use land (2,140 square kilometers). Land used for transportation infrastructure, reported only for the period from



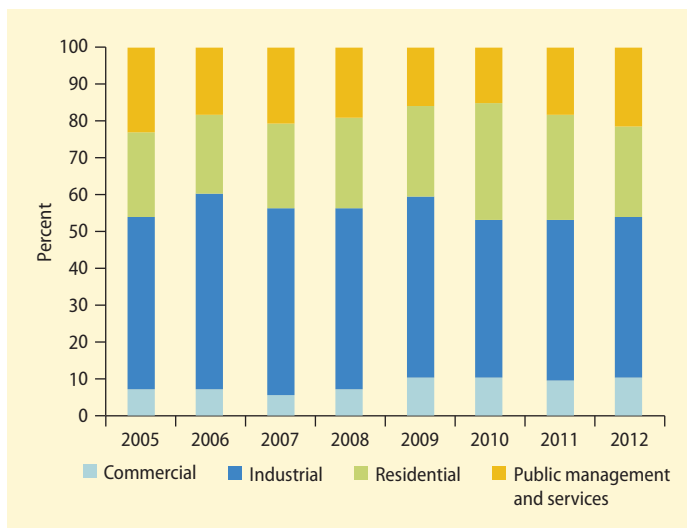
**FIGURE 4.4** Composition of construction land use increase, 2005–12



Source: China Urban Construction Statistical Yearbook, 2006–12.

2009 to 2012, increased by 3,500 square kilometers, or about 15 percent of the total increase in state-owned construction land. Industrial land accounted for nearly half of the increase in construction land area, followed by residential (26 percent), public utilities and buildings (18 percent), and land for commercial use (9 percent) (figures 4.4 and 4.5). The high share of industrial land is noteworthy. Internationally, industrial land usually accounts for less than 10–15 percent of total urban land in major cities. The higher

**FIGURE 4.5** Shares of main urban construction land use categories, 2005–12



Source: China Urban Construction Statistical Yearbook, 2006–12.

share of industrial land in China reflects local governments' land-based economic development model. However, when comparing China's cities with others, one should note that other countries may not include land for industrial use located outside municipal or city boundaries in their urban land statistics.

## Land price development

Prices for commercial- and residential-use land increased steadily over the past decade in response to rising demand, more competitive allocation procedures, and higher land development cost. From 2000 to 2010, the prices for commercial and residential use rose by 310 percent and 530 percent, respectively, according to a Development Research Center of the State Council, China (DRC 2013) survey on urban land prices of 21 Chinese cities. In another survey across 105 selected Chinese cities, between 2006 and 2010 the average price of urban land increased from renminbi (RMB) 1,544 per square meter to RMB 2,881 per square meter, an increase of 46 percent. The average commercial land price went up by 52 percent, from RMB 2,480 to RMB 5,185 per square meter, and the residential land price increased from RMB 1,681 to RMB 4,245 per square meter, or 60 percent (DRC 2013). Figure 4.6 illustrates the development of residential, commercial, and industrial urban land prices averaged across China. Price increases were most pronounced in the eastern region and less pronounced in the western and central regions. The 2008 global financial crisis had only a temporary impact on land prices, which was most pronounced in the eastern region (figure 4.7). In comparison, the price for industrial-use land increased only slightly and has remained significantly below prices for commercial and residential land, even as land became scarcer and land prices were under pressure to move up, a pattern that can be observed across the eastern, central, and western regions (figure 4.8). The average price for industrial land increased from RMB 467 to RMB 705, or 5.5 percent annually, from 2000 to 2011 (table 4.1).

Local governments have various means to manage prices of industrial land to attract investment. Most common is the transfer

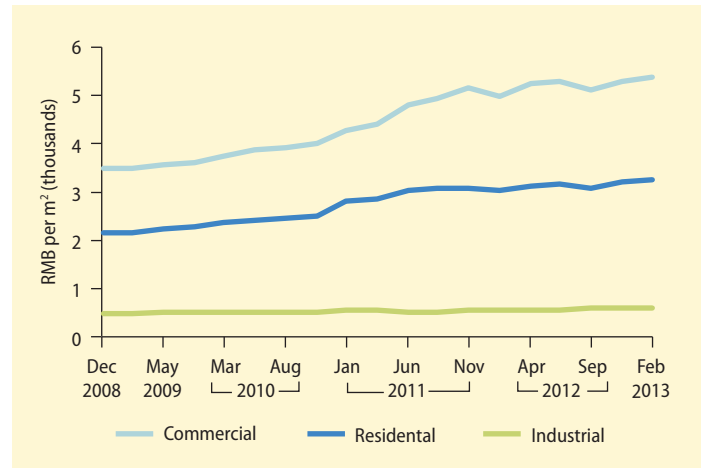
of land use rights through negotiated agreements with an investor rather than through competitive bidding.<sup>3</sup> Other practices include lowering the actual transfer price, giving rebates for fees already collected, or delaying payments on the transfer of land use rights. Governments have also transferred land use rights to developers prior to the completion of the requisition and resettlement process, that is, before buildings have been demolished and compensation has been paid to affected farmers. By implicitly transferring the responsibility of resettlement and compensation payments to the developer, governments have allowed concession fee payments in the form of resettlement compensation and allowance payments to farmers. Price control and preferential policies and practices of local governments that are in the process of industrial land allocation can hinder the shift of the manufacturing sector from the eastern to the central and western regions. These policies may create disincentives for upgrading the industrial sector in the eastern region and for promoting a more intensive and economical use of land.

### Land allocation policies

Land concession income started to emerge prominently in the early 1990s following an amendment to China's constitution in 1988 and the stipulation in the Land Management Law in 1989 that allowed the transfer of land use rights (DRC 2013). In the early 1990s, nearly all land use rights were transferred through direct allocation and contracts between the government and land developers. Gradually, more competitive allocation procedures were introduced to establish the rights transfer process for urban land allocation and use based on market principles. In 1998, Shenzhen was the first municipality to provide land use rights to state land through public tendering, with revenue generated from land auctions contributing about 3 percent of Shenzhen's total land concession revenue in that year.

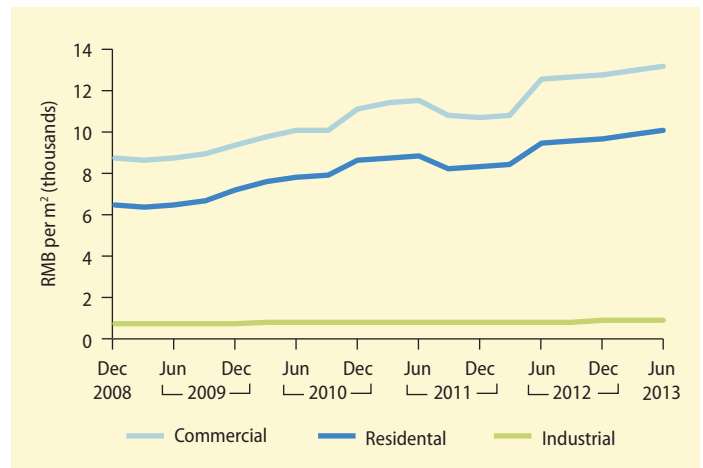
Further reforms toward market-based land use rights transfers and allocation began in 2001 when the State Council<sup>4</sup> called for competitive tendering, auction, or bidding of

**FIGURE 4.6 Urban land prices: National average, 2008–13**



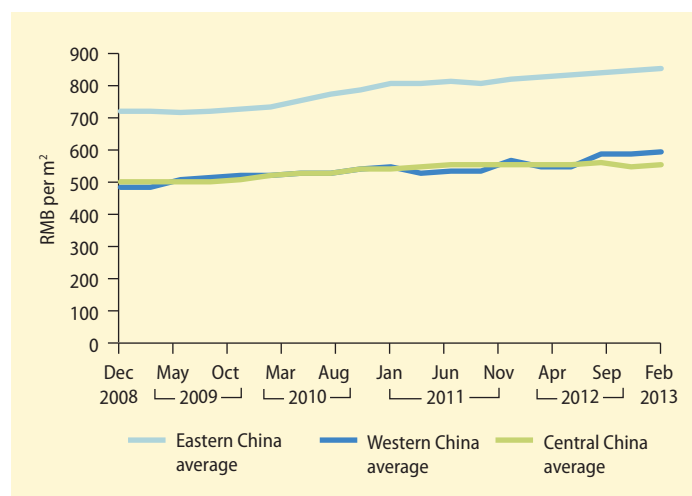
Source: China Urban Construction Statistical Yearbook, 2006–12.

**FIGURE 4.7 Urban land price: Eastern region, 2008–13**



Source: China Urban Construction Statistical Yearbook, 2006–12.

land use rights to state-owned land. In 2002, the Ministry of Land and Resources<sup>5</sup> stipulated that the transfer of land use rights for commercial use, comprising commerce, tourism, entertainment, and real estate development, should be made through competitive tendering, auction, or bidding. In 2004, the government expanded the requirement of competitive bidding to transfers of land for industrial uses. In 2006, the State Council<sup>6</sup> issued a policy that required use rights to industrial land to be transferred through competitive procedures, and transfer prices

**FIGURE 4.8 Industrial land price: Regional averages, 2008–13**

Source: China Urban Construction Statistical Yearbook, 2006–12.

were to be above a minimum price set by the government. The Property Law of 2007 then provided that the use rights to land for commercial and industrial uses, including industry, commerce, tourism, entertainment, and commercial housing, were to be transferred through competitive means.

Land concession income grew overall because local governments increased the supply of construction land to meet increasing demand and because a larger share of land was allocated competitively in response to the shift in central government policy toward market-based principles. The annual supply of land for construction use increased from 1,786 square kilometers in 2001 to 7,113 square kilometers in 2012, with an average of nearly 3,500 square kilometers per year (figure 4.9). The share of the total construction land area allocated through public bidding increased from 59 percent of total supplied

land in 2001 to nearly 80 percent in 2006 and 2007. In parallel, land concession income grew from RMB 542 billion in 2004 to RMB 3.2 trillion in 2012 (table 4.2). From 2008 to 2012, however, the share of land allocated competitively again declined markedly to below 50 percent, and direct allocation of construction land increased correspondingly. While around 3,400 square kilometers of urban construction land were allocated through competitive measures, more than 3,600 square kilometers were allocated through direct negotiation (figure 4.10). The 2009/10 stimulus package called on local governments to deliver infrastructure investments to spur local economic growth and employment. In addition, local governments resorted to allocating and providing a larger share of construction land, particularly construction land for industrial uses, directly and not through public bidding to attract industries more quickly. At the same time, however, governments continued to carefully manage the supply of land for residential and commercial uses through competitive allocation to maintain the income stream from public land sales in the primary urban land market. A secondary land market, in which land use rights are transferred between users of nonstate land, remains relatively underdeveloped (box 4.2). Land concession income from competitive land allocation, in comparison, increased continuously from 57 percent in 2004 to 96 percent in 2012 (figure 4.11; table 3.2).

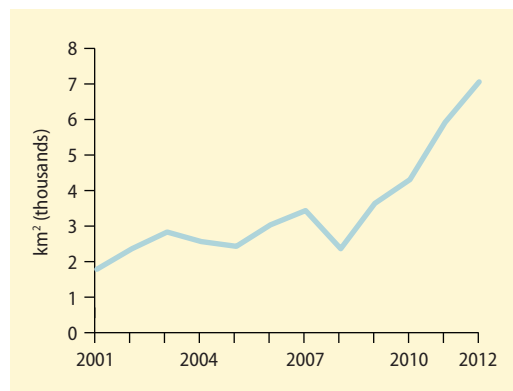
China's local governments have successfully increased industrial land supply to generate growth while restrictively managing commercial land supply to generate income. The average price per square kilometer allocated directly was about RMB 35 million,

**TABLE 4.1 Industrial land price development by region, 2000–11**

Mean price (RMB/square meter)

Area	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
21 surveyed cities	467	475	486	495	508	516	536	640	613	634	672	705
Eastern region	580	588	598	610	627	639	665	831	769	784	837	883
Central region	347	351	364	367	377	382	399	492	508	518	549	566
Western region	391	400	413	421	430	437	448	471	476	511	535	560

Source: DRC 2013.

**FIGURE 4.9** Annual (urban) construction land supply, 2001–12

Source: China Land and Resources Statistical Yearbook, various years.

and the price for competitively allocated land was about RMB 930 million. Total supply of construction land increased sharply from 2008 onward. Much of this land was allocated through negotiated sales, which exacerbated urban sprawl and inefficient land use and did not generate the level of growth expected. Many localities increased the supply of cheap land for industrial uses but could not capitalize on the comparative advantage of that cheap land. Instead, they followed an unsustainable development approach, stimulated discontent among farmers whose land

was taken, and accelerated the wasteful conversion of farmland in rural areas.

### Land concession income, land sales profit, and expenditure patterns

China's land concession income and expenditure policies have evolved over the past two decades. During the early 1990s, about 20 percent of the land concession profits were allocated to infrastructure construction at the local level, and the remaining 80 percent were shared between the central government and the local government. The central government's share of income continuously declined from 40 percent in the 1970s to about 5 percent by 1992. Fiscal reform in 1994 defined land concession profits as local government income. Local governments have full control over income from land sales, which does not need to be shared with the central government.

Land concession income has since grown continuously, from RMB 51 billion in 1999 to an estimated RMB 3.2 trillion in 2012. Gross revenues are estimated to exceed RMB 3.3 trillion in 2013 (figure 4.12). The eastern region's share in total concession revenue has decreased from 70 percent to about 58 percent since 2010, and the shares of the central and western regions have gradually increased.

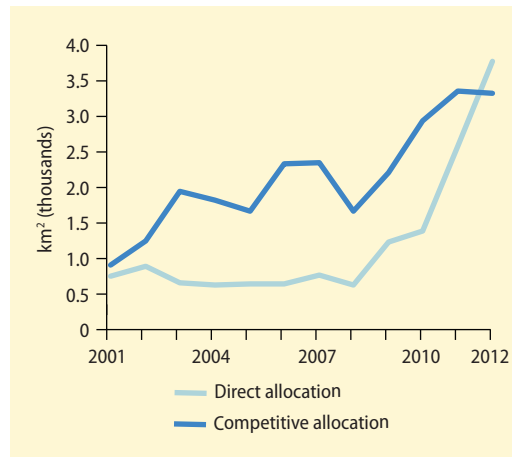
**TABLE 4.2** Supply of construction land and land concession income, 2001–12

Year	Area (km <sup>2</sup> )	Income (RMB, billion)	Directly allocated	Competitively allocated	% total area	Income direct allocation (RMB, billion)	Income competitive-allocation (RMB, billion)	% total revenue
2001	1,787	—	740	1,047	59	—	—	—
2002	2,354	—	881	1,474	63	—	—	—
2003	2,864	—	653	2,212	77	—	—	—
2004	2,579	542	621	1,959	76	235	307	57
2005	2,443	641	646	1,796	74	286	355	55
2006	3,068	588	638	2,430	79	169	420	71
2007	3,420	808	761	2,659	78	228	579	72
2008	2,342	1,222	624	1,718	73	214	1,007	82
2009	3,616	1,026	1,223	2,394	66	73	953	93
2010	4,326	1,718	1,383	2,943	68	88	1,630	95
2011	5,923	2,746	2,572	3,351	57	110	2,636	96
2012	7,113	3,213	3,771	3,324	47	131	3,082	96

Source: China Land and Resources Statistical Yearbook, various years.

Note: — = Not available.

**FIGURE 4.10 Construction supply: Direct versus competitive allocation, 2001–12**



Source: China Land and Resources Statistical Yearbook, various years.

Local governments have become reliant on such income, which has comprised nearly 70 percent of annual local government revenue in 2010 across China but has since then declined to about 45 percent (figure 4.13).

*Land concession income* includes the income local governments receive from leasing the use rights to state-owned land to investors. It also includes the fees paid by land users when the type of land use is changed, a share of the profits made by renting buildings on state land, and fees paid by prospective land users in connection with land expropriation and relocation of previous land use rights holders. *Net concession income* is calculated by subtracting compensation payments for requisitioned rural land and outlays associated with the development of land by the

#### BOX 4.2 China's secondary urban land market: An invisible and unregulated market

China's urban land market is divided into a primary market and a secondary market. In the primary market, the government, as the sole supplier of state-owned land, grants construction land use rights to developers and other land users for a certain period of time. The secondary land market enables the transacting and transferring of land use rights to state land. A secondary land market transaction occurs when entities who have obtained land use rights from the state lease, rent, or mortgage the use rights to other entities for the remaining period of the original land allocation. Whereas transactions in the primary land market are between state and private land users, those in the secondary land market are between private land users, for which the government assumes a regulatory role. Since the establishment of the urban land market, the primary land market has grown significantly in terms of both transaction volume and value. Laws and regulations governing the primary land market have also improved. The secondary land market, however, has lagged behind. The lack of relevant laws and regulations to govern the secondary land market renders this market largely invisible. Quality research and statistics on the secondary land market is very limited and does not allow for further analysis of the working of this market.

In general, land use rights to state-owned land are often leased or subleased. There seems to be a frequent practice of enterprises altering the use of land

from industrial to commercial purposes and entering the secondary market when such land is subleased. The conversion of already allocated land to other purposes is illegal under current law. However, in light of high land prices, entities that have obtained land use rights cheaply often sublease land for other than the original purpose for profit. Others capitalize on opportunities to use land as shares in joint ventures to develop the land. Still others simply sublease the allocated land use rights. One of the most acute problems is the illegal conversion and collateralization of collective land. It arises in the demolition and resettlement process of both rural and urban villages. Some rural communities and individuals, in the name of improving social welfare or raising capital for rural redevelopment, sell land that was originally intended for resettlement, taking a large profit in the process. Other villages transfer collective construction land use rights to developers in exchange for investments. Some villagers rent out not only houses but also land use rights. This practice is especially prevalent in urban villages, where leasing of land and houses pays much more than farming. In general, the types of illegal transactions are getting increasingly varied.

Many such transactions, particularly in second- and third-tier cities, are not reported or registered with the authorities. Regulations are often unclear. Taxes on land and fees are avoided. When land users change the original purpose of the land,

**BOX 4.2** (continued)

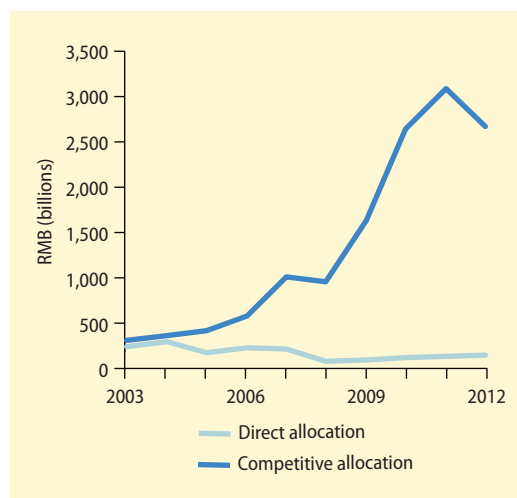
for example from industrial to commercial use, taxes and fees need to be paid to land resources authorities, even if no other party is involved in the transaction and the land user remains the same. The secondary land market has no registries or physical venues for transactions.

Often transactions involve not only land but also property, which creates additional disincentives for land users to register the transaction because different agencies are involved. Regulatory oversight of property falls under the responsibility of the Min-

istry of Housing and Construction, whereas land is under the Ministry of Land and Resources. Separate jurisdictions over transactions create confusion and are inconvenient for land users. Furthermore, the secondary land market involves both state-owned land and collective land, making such transactions difficult to regulate. Courts play a role as well. In legal disputes where land is involved, courts often order the indebted party to repay debt by auctioning off allocated land without the prior approval of the land resources authorities.

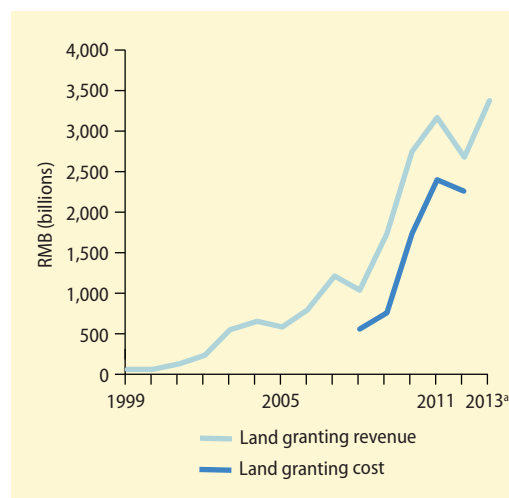
Source: Zhang and others 2012.

**FIGURE 4.11** Local government income from land sales, 2003–12



Source: China Land and Resources Statistical Yearbook, various years.

**FIGURE 4.12** Revenue from land sales and associated cost, 1999–2013



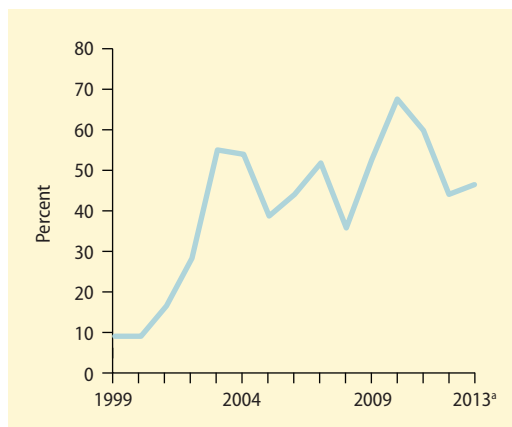
Source: China Land and Resources Statistical Yearbook, 2006–12.  
a. estimate.

government prior to public auctions or direct contracting. *Compensation costs* include the costs for rural land and property requisition, resettlement, social security and subsidies to affected farmers, and allowances to affected workers of state or collective enterprises that are restructured or dissolved as part of the land requisition process. *Development costs* refer to government expenditures to develop and provide basic infrastructure prior to the

land transfer. The net proceeds from land sales are available for local governments to finance infrastructure development and current expenditure.

From 2008 to 2012, social security subsidies to farmers remained at about 3 percent of total land concession cost, and costs for requisition of property and resettlement decreased from 66 percent in 2008 to 60 percent in 2011. Land development costs



**FIGURE 4.13** Revenue from land sales as a share of total local government revenue, 1999–2013

Source: China Statistical Yearbook, various years.  
a. estimate.

increased to about a quarter of the total land concession cost, and land administration–related costs, which include costs associated with land reconnaissance and assessments, land auctions, public notification, and so forth, remained at 1 percent (table 4.3).

Profits from land concessions averaged about 44 percent of total concession income during the period 2008 to 2010 and increased in absolute terms from RMB 436 billion to RMB 1.22 trillion. However, during 2011 to 2012, land concession profits have decreased in absolute terms, from RMB 943 billion to

RMB 627 billion, and as a share of gross income. However, despite the associated costs, land concessions remain highly profitable for local governments—about 44 percent of all land concession revenue during 2008 to 2010 was profit—although the profit share declined to 22 percent in 2012.

Local governments exercise wide discretion in the use of net income from land sales, and rules and regulations concerning profits from land sales remain vague. The Land Management Law stipulates that concession income from transfers of use rights to new construction land should be allocated to arable land development. Other policies require that some share of profits be allocated to construction of subsidized housing. Local governments have been able to use a large share of the land concession profit for urban construction because of the absence of clear definitions of land concession costs and of specific rules on how big a share urban infrastructure construction can take from the total land concession income, and how such expenditure shall be used.

Rural areas remain particularly disadvantaged in benefiting from concession profits. Between 60 percent and 70 percent of land-related profits are spent on urban infrastructure, subsidized housing, and transfers to the state's land profit fund (aimed at financing the acquisition of land reserves). The share of profits directed to agriculture and rural

**TABLE 4.3** Cost structure of land concession, 2008–12

	2008 (RMB, billion)	% of total land concession income	2009 (RMB, billion)	% of total land concession income	2010 (RMB, billion)	% of total land concession income	2011 (RMB, billion)	% of total land concession income	2012 (RMB, billion)	% of total land concession income
Land concession income	994		1,424		2,940		3,348		2,889	
Net income	436	44	658	46	1,222	42	943	28	627	22
Total cost	558	56	766	54	1,718	58	2,405	72	2,262	78
Total cost by item	% of total cost		% of total cost		% of total cost		% of total cost		% of total cost	
Resettlement	366	66	499	65	1,067	62	1,435	60		
Subsidies to farmers	16	3	20	3	45	4	69	3	1,740	77
Subsidies to workers	78	14	107	14	334	19	329	14		
Land administration	7	1	9	1	16	1	22	1		
Land development	90	17	132	17	256	15	551	23	522	23

Source: DRC 2013.

**TABLE 4.4 Expenditure patterns of land sales profits to local government, 2008–12**

Income	2008 (RMB, billion)	% of total expenditure	2009 (RMB, billion)	% of total expenditure	2010 (RMB, billion)	% of total expenditure	2011 (RMB, billion)	% of total expenditure	2012 (RMB, billion)	% of total expenditure
Land concession profit	436		658		1,222					
Urban construction	302	66	334	61	753	67	556	62	320	55
Subsidized housing	15	3	19	3	46	4	66	7	59	10
State-Land Profit Fund	31	7	44	8	101	9	107	12	102	18
Farmland development	13	3	14	3	19	2				
Fees for increased supply of commercial construction land	64	14	92	17	98	8				
Rural infrastructure	34	8	43	8	102	8	99	11	49	8
Irrigation; water conservation	—	—	—	—	—	—	14	2	22	4
Education	—	—	—	—	—	—	50	6	27	5
Total expenditure	458	100	547		1,120		893		580	
Balance	–22		111		102		50		47	

Source: DRC 2013.

Note: — = not available.

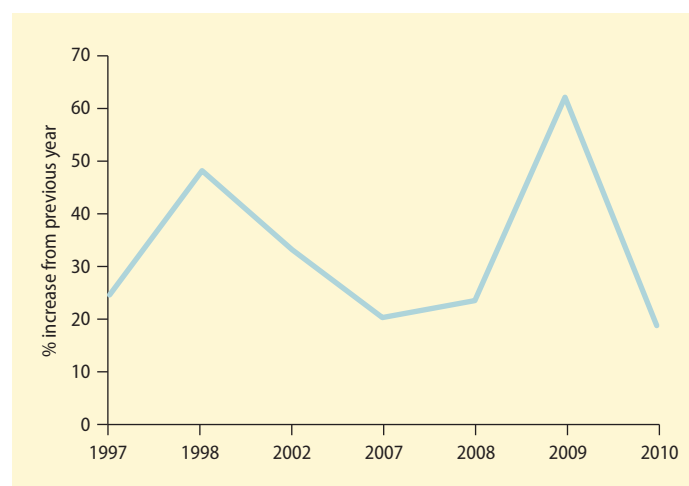
infrastructure development, in comparison, remains about 10 percent. Expenditure associated with the reclamation of arable land and with land redevelopment to increase the supply of commercial construction land currently account for about 18 percent of local profits in 2012 (table 4.4).

### Local government debt and land collateralization

One of the unintended consequences of China's land tenure framework and land policy implementation is the increasing risk associated with the use of land as collateral for local government debt. Governments borrow against future land-use revenue and use the profits from land concessions to repay debt. In addition, land concession profits are diverted from their intended uses to cover public enterprise expenditures, office construction, or even recurrent operational expenses. Leakage of concession profits and illegal withdrawals are widespread. Those weaknesses in expenditure management result in cuts or delays in fund appropriations for agricultural land and irrigation development, subsidized housing construction, transfers to state-owned-land profit funds, and education support (DRC 2013).

Since 1997, local government debt has been growing steadily. In 1998, local government debt increased by nearly 50 percent

over the previous year. In 2009, the debt balance increased by 62 percent over the previous year, coinciding with the sharp increase in land requisition rates, a likely consequence of the stimulus package and attempts by local governments to prevent economic slowdown (figure 4.14). The total outstanding debt of local governments, as published by the National Audit Office, amounted to RMB 10.7 trillion, or about 27 percent of China's gross domestic product (GDP) in 2010. Of that, public sector debt accounted for about

**FIGURE 4.14 Annual change in outstanding local government debt, 1997–2010**

Source: DRC 2012, based on data from the National Audit Office, *Summary of Results of Local Government Liabilities Audit*, June 2011.

20 percent of GDP, and bonds issued by policy-based financial institutions accounted for 6 percent of GDP. Also in 2010, 78 city governments and 99 county governments held debt obligations totaling more than 100 percent of local GDP (DRC 2013).

Land collateralization has become an important source of debt management for local governments, which rely heavily on proceeds of land sales for debt servicing. According to the National Audit Office, at the end of 2010, provincial and city governments, and the overwhelming majority of county governments, had leveraged land and committed to using land concession profits to repay up to RMB 2.55 trillion, or nearly 38 percent of all local government debt obligations (DRC 2013). If land sale proceeds fall in the future (a first indication was given in 2010, although such proceeds have increased again in 2012 and 2013) and no other revenue sources can be mobilized in time, local governments may experience larger shortfalls in land profits, creating risks to their fiscal position.

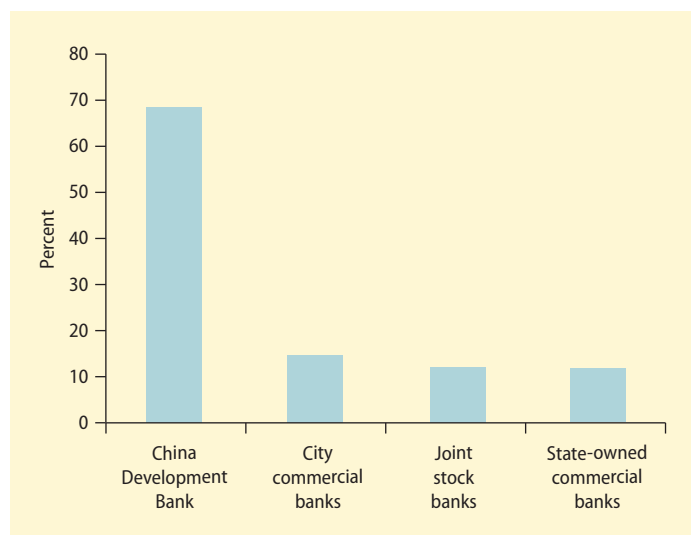
Land concession revenues have grown rapidly for more than a decade. In the future, more fluctuation in land-based revenue, and even downward trends, can be anticipated as the overall economic environment adjusts

and reforms advance. With improvements in China's commercial land supply system, and with more transparent allocation practices and a greater role for the market, the costs of obtaining land use rights, especially obtaining use rights to the existing stock of construction-use land, are likely to increase to match the real market price. In addition, the ratio between the newly increased land supply for construction use and the existing stock of construction-use land is likely to decrease. As a consequence, the price for obtaining land use rights will increase, leaving a smaller land-based profit margin for city governments.

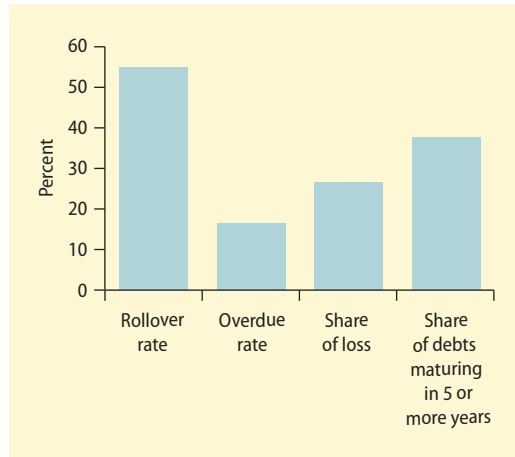
Local governments have been using urban development investment corporations (UDICs) to manage infrastructure construction and also to manage public land holdings (land banks), and those UDICs have borrowed heavily against land. According to the National Audit Office, the outstanding debt held by UDICs at the end of 2010 was RMB 4.97 trillion, or 46 percent of total local government debt (DRC 2013). Local governments have spent an estimated RMB 1.02 trillion through UDICs to acquire and stockpile land. Commercial banks are the biggest credit suppliers to local governments through UDICs. In 2010, total bank lending was RMB 8.47 trillion, accounting for nearly 80 percent of all local government debt. China Development Bank had about 70 percent of its infrastructure construction loans exposed to such corporations (figure 4.15). City-level commercial banks, joint-stock banks, and state-owned commercial banks and local financial institutions had exposure rates of 12 to 14 percent (DRC 2013).

More than 55 percent of the debt held by UDICs is repaid through new loans. At the end of 2010, 358 UDICs borrowed to pay off existing government-backed obligations and related debt of about RMB 106 billion. Rollover rates for government-backed loans for 387 universities and 230 hospitals were above 50 percent (figure 4.16). The debt rollover rate for highway projects across China was 55 percent. In 2011, the China Banking Regulatory Commission banned the rolling over of debt, which increased the risk of short-term debt repayment defaults of

**FIGURE 4.15** Bank lending to urban development investment corporations as share of total infrastructure lending, 2009



Source: DRC 2013, based on data from the National Audit Office, *Summary of Results of Local Government Liabilities Audit*, June 2011.

**FIGURE 4.16** Bank exposure to loans to urban development investment corporations, 2010

Source: DRC 2012.

UDICs. Overdue debt obligations as a share of total debt of UDICs has been rising. At the end of 2010, 148 UDICs (2.3 percent of all UDICs) held RMB 8 billion in overdue debts, with an average share of overdue debt of 16.3 percent. Given the likelihood of a drop in land concession revenue and profits over the next few years, loan repayment through debt rollover is inherently unsustainable, and debt overdue rates of UDICs are likely to rise (DRC 2013).

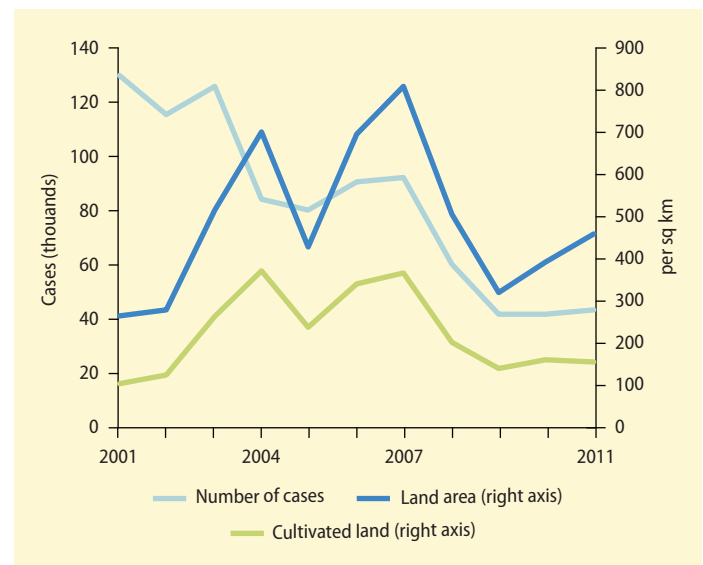
Statistics on land sales in 2011 suggest that growth in the proceeds of land sales slowed, with a decline of 9 percent from the previous year. The decline was most obvious in eastern China. Growth in land sales proceeds slowed by 22 percent in Shanghai, 17 percent in Ningbo, 13 percent in Xiamen, and 6 percent in Zhejiang (excluding Ningbo) (DRC 2013). The slowing growth proceeds increases the risk of default on local government debt backed by land sales proceeds. During the most recent round of local government borrowing, 54 percent of the loans had a maturity of over five years. About 45 percent of local government debt in 2010 will have to be serviced between 2012 and 2015. If land sales proceeds continue to fall over the coming years, local governments will have a bigger shortfall and their solvency will be tested.

About one-quarter of current local government debt was to be repaid in 2011, and

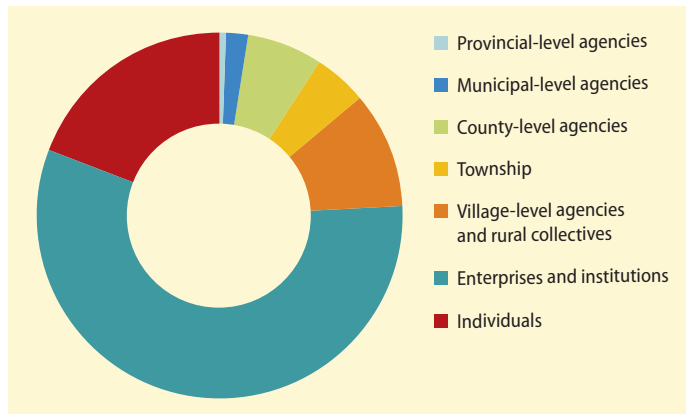
an additional 17 percent was to be repaid in 2012. From 2013 through 2015, 11 percent, 9 percent, and 7 percent would have to be paid off. Debts maturing beyond 2016 account for 30 percent of local government debt. Because UDIC loans are mostly invested in public welfare or quasi-public welfare projects, the investment recovery period is generally long and cash flow generation is weak. By 2010, of the total UDIC loans, 1,734 (26 percent) resulted in losses (DRC 2013).

### Illegal occupation of land and social tensions

Illegal land occupation and use have been widespread across China over the past decade. Illegal land use refers to the illegal purchase, sale, and transfer of land; damage to cultivated land; unapproved land occupancy; unlawful approval of land occupancy; and the granting of land at too low a price. Although the trend of illegal land use has declined since 2007 in terms of the total number of cases reported and in terms of land area, the total illegally occupied land area appears to have increased again since 2009 (figure 4.17). Approximately 10 percent of land requisitioned in 2011 was occupied or

**FIGURE 4.17** Illegal land use: Number of reported cases and area affected, 2001–11

Source: China Land and Resources Statistical Yearbook, various years.

**FIGURE 4.18** Illegal land use by violators in 2011

Source: *China Land and Resources Statistical Yearbook*, 2012.

used illegally. The increase is likely linked to the growing number of large infrastructure projects as well as industrial land expansion since 2008. Most of the violations are by enterprises, individuals, and rural collectives (figure 4.18).

Illegal land occupation by enterprises is linked to the increase in construction activity since 2008, and the large share of violations by individuals and collectives are indicators of uncontrolled expansion of residential and commercial construction on land in rural areas. Anecdotal evidence suggests that rural residential land has continuously expanded into farmland, a trend that may have been exacerbated by remittances of migrants to the countryside and the desire for larger houses and housing plots or even secondary homes. Since 1978, 20 percent of the residential housing built in rural areas each year has occupied arable land. This share increased to more than 23 percent during 1999–2008 (Tao 2013). At the same time, a large portion of existing rural residential property is underutilized or left empty when large numbers of migrants go to cities. “Hollow villages” are often found in rural areas, with vacancy rates as high as 20 to 30 percent. Regardless of the reasons for illegal land occupation and use, they highlight weaknesses in property rights protection under China’s current land tenure arrangements.

The scale and practice of rural land requisition have dramatically increased ten-

sions between local governments and rural residents and have led to a sharp increase in the number of disputes over land. The public image of local governments has suffered as a result of forced evictions, demolition of houses and property in rural areas, violations of due process, and neglect of appeals and consultation in the expropriation process. As farmers have become more aware of their property interests and legal rights, the number of legal disputes over land has increased.

Land-related disputes have become a threat to social stability in rural areas of China. Across the country, the government takes land from approximately 4 million rural people or 1.1 million households every year (Landesa 2012). More than 100,000 mass incidents (with more than 100 people involved) take place every year (Chinese Academy of Social Sciences [CASS] 2013). According to the State Bureau for Letters and Calls, 60 percent of all mass protests every year are land related (DRC 2012a). Undercompensation for land and property requisitioned by the government is generally at the core of land-related disputes in which compensation is perceived as unjust, such as undervaluing of land appreciation during the conversion process and the capture of most of the incremental value by governments. An urbanization model that is based on the conversion of rural land to urban land, which offers no protection of property rights, no broadly accepted benefit-sharing arrangements, no participation, and no procedural safeguards, is likely to contribute to social discontent.

Mass incidents related to land expropriation were concentrated in the economically developed regions such as Guangdong, where they occurred in 137 counties or districts (DRC 2012a). Most of the farmers’ complaints were prompted by land expropriation for commercial purposes. Nearly 60 percent involved expropriation for the construction of commercial residential buildings, industrial parks, or commercial business projects. Complaints were primarily about exclusion from urbanization benefits and unjust compensation. Large-scale infrastructure construction projects were a secondary source of conflict. About 40 percent of the incidents or complaints were related to the construction

of roads, railways, airports, green spaces, and other types. Despite such projects being considered public welfare, farmers appealed or organized protests because of low compensation payments and nontransparent distribution of land sales proceeds. Most of farmers' calls and protests were in response to official misconduct in the expropriation process. More than half of the cases involved insufficient compensation, below the legal requirements, and 42 percent involved the unauthorized expropriation of land. Conflicts also resulted from perceived unfairness in the distribution of the compensation, lack of transparency in whose land was targeted for expropriation, proposed use of expropriated land, and government mishandling of the expropriation process.

### **Informal urbanization, urban villages, and migrants**

Urban villages are a social and spatial phenomenon closely associated with China's rural-to-urban transformation and an outcome of successful industrialization. Urban villages have emerged as cities expanded and surrounding rural areas were incorporated into urban boundaries. As vast areas of farmland were converted to nonfarm uses under state ownership, rural settlements were left intact because compensation payments for rural residential and other rural property were generally higher than those for farmland. Also, agreements between the local government and rural residents often could not be reached because farmers perceived their residential land as privately owned and hence more secure. Consequently, many rural settlements were not included in the requisition and conversion process, and rural residents remained while surrounding farmland was developed for industrial or urban uses. Legally, rural residential land and collectives remained classified as rural, but in reality they became part of the urban economy (Yuan 2013b).

With the loss of farmland, rural collectives and peri-urban farmers developed an alternative livelihood strategy aided by the influx of migrants searching for low-cost housing. Because of limitations imposed by the hukou

system, migrants do not have access to formal public housing, nor are they eligible to participate in the cities' affordable housing programs that target urban residents. Although migrants have the option of purchasing urban commercial housing, they usually cannot afford the high prices. Many migrants also regard their presence in the cities as temporary and, accordingly, tend to minimize their expenditures. In response to the loss of farmland and the influx of migrants, farmers developed housing space on their remaining land, including collectively owned construction and homestead land, or they leased the land directly to migrants or enterprises.

A large gray housing market, operated by rural collectives, has emerged in China's urban fringe areas, where informal land and housing development has thrived. These areas have become residential enclaves for many of China's migrants. About half of China's 200 million migrants are estimated to live in 50,000 urban and suburban villages across the country (DRC 2012b). The governments' monopolization of urban land supply, along with sharply increased residential real estate prices in the formal urban market, means that farmers and collectives continue to have strong incentives to engage in commercial real estate development for profit on collectively owned land.

The informal residential land market in urban fringe areas has led to the fast growth of what is called small-property-rights housing. This term refers to commodity housing units developed either by collectives on rural construction land or by individual farmers on their homesteads that have been leased to migrants. These housing units cannot be transferred legally, and landholders do not have government-issued ownership certificates. Small-property-rights housing has expanded dramatically, despite the lack of legal protection and a number of prohibitive government policies and regulations. By the end of 2007, the total area of small-property-rights housing was estimated to cover 6.4 billion square meters and to account for 17 percent of China's total urban housing stock (Tao 2013).

Urban villages play an important role in the urbanization process by providing affordable



housing for migrants when city governments fail or are unable to provide such housing. At the same time, urban villages offer collectives new and important income sources, often offsetting the negative impacts of the requisition of farmland. Urban villages aid the two most vulnerable groups in the urbanization process: the floating migrant population and the dispossessed farmers. Depending on the success of future reforms, urban villages may be a transitional phenomenon.

Currently, however, challenges to China's urbanization have arisen from urban villages, and many of these challenges are related to land and property issues. The redevelopment of urban village areas and their formal integration into the city space pose challenges to urban developers. Municipal governments and real estate developers have realized the economic potential of redeveloping urban fringe areas. As housing prices continue to increase, there are strong incentives to demolish urban villages and develop these areas for profitable urban housing projects. However, because urban villages provide dispossessed farmers with considerable income through compensation payment, redevelopment and renovation projects that target these urban villages are often strongly opposed. When the compensation payments fail to materialize or do not reflect the opportunity costs of the rental income, social unrest often follows.

Urban villages are generally rural settlements under the jurisdiction of collective authorities and outside the purview of city governments, which therefore cannot generate revenue from informal housing construction and leases. Urban villages are also centers of informal economic activities that circumvent taxation and market regulations. Because urban villages are not incorporated into urban master plans, city administrations have little incentive to extend infrastructure and public services to urban village areas. Housing conditions and building quality are often substandard. Traffic conditions are generally bad as a result of congestion and uncontrolled development. Environmental conditions are usually poor because of the lack of a water supply or proper sewerage and waste disposal systems. Although rural

collectives provide some level of public services, these remain disconnected from the urban services, and many collectives do not have the capacity to serve the community properly. Urban villages are also outside the purview of formal government agencies and face social problems. For example, in Beijing a large number of security threats and criminal cases are reported from urban fringe areas. Social conflicts are frequent, because the migrant population often vastly exceeds the indigenous population.

## International approaches and experiences

### Lessons from international experience

Land is a limited resource, and China's challenge is symptomatic of the global experience: demographic change; rapid growth of urban populations; expansion of cities and take-up of agricultural land in urban peripheries; increasing awareness of market, environmental, and other values of land; the need for food production to keep pace with growing demand; and inadequate legal and administrative frameworks and capacities to keep pace with change and the expectations of various stakeholders.

As discussed earlier, the complex interlinking of rural land expropriation and conversion and local public finance is a feature of China's urbanization approach that has developed incrementally as China selectively adopted market economy principles during its transformation. This approach to urbanization reflects China's historical antecedents in these policy areas and how they could be most easily harnessed to enable and sustain rapid economic growth. In international comparison, they do not represent a sustainable long-term solution. With Central Document No. 1 of 2013<sup>7</sup> giving direction to implement rural land registration nationwide, a new dimension to the issues of urbanization has been added.

A first broad conclusion from international experience is that China's interlinking of local public finance, land development value and value capture, and expropriation

and compensation is not a typical feature of developed market economies. The more typical approach to these policy areas is to separate the features to enable clear decisions and more predictable, sustainable outcomes. For instance, although municipalities in developed market economies may include in their balance sheet revenue generation from the disposal or sale of land and buildings, those transactions are not usually a major source of revenue, or a particularly predictable and sustainable one. Essentially, that approach is the antithesis of what is required to finance local governments in the long term. A sustainable strategy for municipal finance involves the core elements of stability, predictability, a degree of inflation-proofing, and local accountability. In many countries, a local property tax is a significant element of such a strategy.

A second broad conclusion is that addressing these issues as distinct policy areas and building on and adapting solutions tried and tested elsewhere are likely to lead progressively to positive results. The global community recently agreed on and endorsed *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security*,<sup>8</sup> which provides valuable high-level guidance on responsible governance of tenure that can complement the more detailed learning from other specific country experience.

A third broad conclusion is that the rollout of rural land registration is likely to enhance land rights holders' expectations of security and accelerate expectations and understanding of market-based approaches. In turn, this factor may increase pressure to address some of the inherent problems associated with the current approaches to urbanization in China. International experience suggests that the following issues are likely to be significant in China's developing strategy for urbanization:

- **Policy and legal frameworks.** Policy and legal frameworks should recognize the importance of land and property tenure in the urbanization process. Developed market economies have generally moved in the direction of ensuring clear definition of

rights and the security of land tenure and of the whole set of institutions within which this process takes place, including recording of rights, valuation, taxation, regulated spatial planning, and dispute resolution.

- **Effective institutions.** For land markets to work efficiently, they need to be supported by a wide range of institutions and by the data sources and information they generate. Where these institutions are poorly developed, inefficient, or poorly regulated, they lead to market inefficiency, with impacts on the economy and equity. Government institutions provide the policies, regulations, and implementation capacities that govern all aspects of the use of land. Their interaction is often complex, with functions divided between ministerial departments and different levels of government. Modern land administration systems are information technology (IT) based and provide a holistic approach, encompassing land rights registration, property valuation, property taxation, physical planning, and development control.
- **Land markets.** Land markets in developed market economies rely on the availability of capital and credit and the functioning of financial institutions. In well-regulated markets, land with secure title is often a form of collateral, and access to mortgage finance allows owners to invest in properties that they would otherwise be unable to afford. Banks and mortgage lenders are the main source of mortgage finance, with governments retaining oversight and influence over market activity through interest rate setting and financial regulatory frameworks. Insurance companies are critical in supporting market activity by enabling effective control of insurable risks.
- **Professional organizations.** Competent professional institutions provide an essential link between buyers and sellers and government institutions. Their specialist knowledge and skills are an integral part of well-developed land markets. Such service providers include lawyers and conveyancers, brokers or estate agents, value assessors, land surveyors and structural surveyors, and accountants, among others.

## Land development value and value capture

In countries with formal land markets with regulated spatial planning, which restricts the development of land according to zoning principles, land value is determined by a range of factors of which location and land planning designation are the most important. When land in an appropriate location is designated for urban development under planning regulations, its value tends to increase substantially. There is a long history of analysis of impacts of public decisions on land use and infrastructure and who should benefit from them. Development value can be a major windfall gain in developed market economies.<sup>9</sup> The question, however, is who should benefit from the development value of land—the difference in value between the existing agricultural use and the value with permission for development—or from infrastructure investments that improve the value of land by altering its locational qualities. The public sector commonly seeks to capture some or all of the value created by the right to develop or by the public investment.

The question of value capture is always sensitive and reflects contemporary political balances and environments. A range of approaches are used to capture the value that results from development planning decisions

or from public infrastructure development. These approaches are not mutually exclusive but are often used in conjunction with each other (table 4.5).

### *Approaches to capture betterment value*

Government-led compulsory land acquisition involves the compulsory acquisition of land and the payment of compensation. It enables all of the incremental change in value that occurs when land use changes to be fully captured by the government. This approach is the one currently adopted by China. It is resulting in considerable dissatisfaction on the part of those whose land is being acquired, with many thousands of mass protests against expropriation, eviction, and demolition-related actions every year, which suggests that an acceptable political and institutional solution has not yet been found.

An annual land and property taxation system, a typically local tax revenue system, is based on a well-administered land and property tax. The approach is based on the principle that the interest of the individual taxpayer is enhanced by the planning decision or new infrastructure, thereby resulting in an increased tax liability. Regular revaluations of the land will capture a share of the increases in value from development planning decisions or as a result of public infrastruc-

**TABLE 4.5 Mechanisms capable of capturing betterment**

Mechanism	Description
Government purchase and ownership of land, with resale at developed land prices, or granting of development and use rights in the form of long-term leases	Value increments created by rezoning (or the expectation of investment in social infrastructure) can be fully captured. Substantial practical difficulties are associated with such approaches unless acceptable political and institutional precedents exist.
A uniform land tax, paid annually without discrimination	This is an effective and nondistorting approach that would also appropriate increments generated within use classes and not only at the time of upgraded development rights (as is normally proposed with betterment taxes).
A tax on income generated from the sale of land and buildings at appropriate personal and business tax rates, providing tax deductibility for the value of improvements	This tax would act as an effective betterment tax. Such a system could replace capital gains tax (at least as it applies to land and buildings).
Taxes or charges applying to the “unearned increment” of value increases only	The classic application of betterment taxation theory, this mechanism seeks to capture the difference between the unimproved value of the land at its current use and its unimproved value following rezoning.

Source: Medda and Modelewska 2011.

ture development for the community. The annual land and property taxation system is regarded typically as an effective and nondistorting approach that allows for the capture of land value increases over the long term.

An income tax system is based on the income earned from the sale of land and buildings at the relevant tax rates after allowing for the value of improvements. The approach brings the benefits generated into the general tax system and taxes them accordingly. It requires an advanced tax regime and administration capacity to be effectively enforced, and it taxes at the point of disposal. It is therefore different from the annual land and property taxation system approach, which provides long-term community benefit, and from the betterment tax.

A betterment tax (or capital gains tax) seeks to capture some or all of the difference between the value of the land at its current use and its unimproved value following rezoning after development planning decisions or as a result of public infrastructure development.

Table 4.6 illustrates how these different approaches have been used in practice, including how they may be mixed to achieve an appropriate result. They are framed in the context of infrastructure projects, but

generally they are equally applicable to the capture of value in cases where development planning decisions create value. The Danish example shows how a mix of approaches can successfully capture the value generated. The Copenhagen metro development scheme used several of the approaches, including the first (through acquisition and disposal of land) and the second (through real estate taxes). In addition, using direct payments and operating profits from the Metro rail system itself allowed the total debt incurred to be repaid. In the Canadian example, the annual real property tax was the core mechanism for capturing value. In the Italian example, the initial basis for value capture was a special levy, similar to the betterment tax approach above, followed by a real estate transfer tax, which has characteristics in common with the income tax.

#### *Specific issues of relevance to China*

Under China's current framework, municipalities use their monopsony and monopoly powers to capture land value by taking rural land for urban and infrastructure use. Compensation is based on the existing agricultural use value and may include limited elements of the future development value. Most of the

**TABLE 4.6** Transport sector investment projects and land value capture

Project	Description
Copenhagen metro and Orestad scheme, Denmark, 2002–07	The Copenhagen metro and Orestad scheme is a recent metro development costing €1.6 billion. Value was created from the design and construction of the new metro rail line. The increased accessibility to the adjacent land raised demand among developers and investors. By the end of 2006, 52 percent of the whole site was sold or under construction, with overall sales totaling €623 million. Value was captured from direct payments (10 percent), real estate taxes (10 percent), and operating profits from the metro rail system (30 percent). The captured value paid for the construction of the metro by repaying the €2.3 billion debt incurred during construction process.
Metro Toronto Subway, Canada (built during the 1950s and 1960s)	Metro Toronto Subway was constructed during the 1950s and 1960s. Analysis concluded that the tax assessment value increased by 45 percent near the city center and by a massive 107 percent in the region of the suburban stations compared to a 25 percent increase in other areas. Along with these significant rises, rentable values of office space adjacent to the station were, on average, 30 percent higher than in the city. Between 1959 and 1964, 90 percent of new office space and 40 percent of apartment buildings were constructed beside metro lines.
Milan Metro, Italy (1972–2002)	The special levy, INVIM (specific improvement assessment), was assessed on properties within 500 meters of a station. This form of levy raised significant revenue, but following its initial success the levy was replaced by a real estate transfer tax that feeds into the local general fund.

Source: Medda and Modelewska 2011.

development value accrues to the government. International experience raises many policy and administrative questions that are relevant to China. In particular, the following important questions need to be answered: What is a fair approach to dealing with the legitimate property interests of farmers from both an administrative and a value capture perspective when land is acquired for urban expansion or for infrastructure development? Should these legitimate interests attract a greater share of the development value? How should development value be defined and assessed? Which institutions will be responsible for addressing and overseeing the urban development? What type of appeals process will be available to the legitimate interest holder, and what will the institutional responsibility be? These questions may be expressed as three scenarios.

***Modification of the current approach based on compulsory acquisition and compensation.*** This scenario would include the continuation of the current expropriation practices, but compensation could more closely reflect the development (market) value of land. The development value could be shared equally between the acquiring authority and the farmers whose land was expropriated. Whereas farmers would gain significantly under this model, municipal government revenue from land development would be halved. Municipal finance reform would need to proceed in parallel to ensure sustainability. This approach could also create short-term municipal cash flow and solvency problems if compensation is paid at the time of acquisition, and demand for the land or land values may be reduced when the government sells the land. Such risks could be managed by avoiding land banking and by deferring expropriation and compensation payments until a buyer is in place. This scenario, though, raises sophisticated land administration and valuation issues that will demand substantial capacity, ranging from registration to real property valuation, for which there is very limited administrative provision or capacity currently available in China.

***Developed-country approach.*** The developed-country approach leaves existing tenure rights in place but changes the planning designation of the land and allows the government to capture some of the development value through taxation. City planners rezone land to shape the city and guide investment. Rezoning includes defining the use, height, and density restrictions of the development area. Market forces, on the basis of existing tenure rights, are then allowed to operate freely, thus allowing collective construction land to be directly sold to buyers. The market will determine the highest and best use within the planning restrictions. Purchase and development of land will take place at a time and at a price that is supported by the market, leading in principle to a more efficient allocation of resources based on market demand. The recovery of all or an appropriate part of the development value can be achieved through one or more of the range of tax or betterment levy approaches discussed above. A similar approach is the zone-taking approach practiced in Taiwan, China. This model also demands substantial capacity, ranging from registration to real property valuation, for which there is very limited administrative provision or capacity currently available in China.

***Mixed approach.*** A possible mixed approach could give more freedom in the use of existing farmer tenure rights and involve municipal authorities as partners through exercise of their development planning authority. The mixed approach could allow for leasing and shareholding options under which farmers would retain their property interest in the land. Private investors could deal directly with farmers to assemble larger plots of land for development. This approach also raises the above issues of site assembly, valuation, management, and governance, and municipal authorities could become involved as third-party stakeholders, for example, by rezoning, facilitating site assembly, and being party to agreements (thereby receiving part of the development gain). Recovering the development gain would be complex and could be achieved through a variety of approaches,



including possible shareholdings in the enterprise or annual or other taxation regimes.

### **Land and property taxes and local government finance**

Countries have different approaches to financing local governments. Most countries have policies of decentralization in common. Although decentralization and subnational government policy may differ, the authority of decentralized governments to raise and spend revenue is normally related to their devolved functions and responsibilities, set forth in the constitution, laws, and administrative provisions. Finding appropriate and politically acceptable bases for raising income to finance decentralized expenditure, however, remains a challenge in many countries.

Most developed countries impose real property taxes of one form or another. These include property transfer taxes and capital gains taxes levied on property sales, and inheritance tax or estate duty levied on inherited properties, both of which are usually under the jurisdiction of the central government. Annual property taxes, however, are usually imposed as a local tax, mostly to fund local administration and services. In addition, taxes can be designed to encourage socially, economically, and environmentally desirable behavior. Annual property taxes, as a source of both local and current budget financing, have a number of advantages: the concentration of wealth in land and real property, particularly in urban areas, provides a substantial base for taxation. Annual property taxes are often widely accepted by the taxpayers because they are often considered to be fair; they are stable and predictable and provide a sustainable source of revenue and a hedge against inflation over time, thus ensuring the maintenance of revenue in real terms.

Annual property taxes are particularly suitable for financing local services because real property is locationally fixed and property taxes are generally difficult to avoid. Also, a clear link exists between the types of services typically financed at the local level and the benefits received by the tax-

payer, including benefits to property values. Local annual property taxes are therefore often advocated as a means of improving the accountability of local governments to residents. Annual property taxes are also less prone to cyclical swings than other forms of tax revenue. This stability is in part the result of tax assessments, where those assessments are based on market-related property values, being adjusted more slowly than actual prices of properties. Property taxes may even restrain housing booms and land banking by making it more expensive to buy and hold homes and land for purely speculative purposes. An Organisation for Economic Co-operation and Development study (OECD 2010) suggests that taxes on immovable property are the least harmful type of tax for economic growth, particularly for urbanizing emerging economies with large informal sectors.

Despite the advantages, property tax systems can be expensive to establish and are unlikely to provide sufficient funds to finance all the expenditure requirements of local governments. Revenue from such taxes is normally limited to funding public services, such as administration charges, street cleaning, refuse collection, among others. Capital expenditure on infrastructure, education, and health and welfare services generally require funding from central government transfers, development charges, land leasing, and public-private partnerships and other sources. For the administration of property taxes, the system must be efficient and transparent, with well-trained professional staff. Assessments of valuations and taxable amounts should be made public, and government should provide taxpayers with a right to appeal against valuations.

### *International practice*

The amount of revenue generated from recurrent property taxes varies significantly. High-income countries tend to generate proportionately larger amounts than middle-income countries, whether viewed as a proportion of GDP or as a share of tax revenue. Average revenue from recurrent property taxes



in high-income countries represents generally less than 5 percent of GDP (Norregaard 2013). However, this does not fully reflect the potential contribution that such taxes can make. At the upper end of the scale, property taxes account for almost 17 percent of GDP in the United States, whereas in Great Britain and Canada the figure is around 12 percent. The significance of annual taxes on land and property at the local level is often evident when viewed as a proportion of overall revenue of local government. In the developed market economies of the United States and Europe, in particular, recurrent taxes on land and property provide a varying element of municipal finance, with some jurisdictions relying more on such sources of revenue. Most land and property tax systems are tied directly or indirectly to the market value of land and immovable improvements. In most cases, this is the capital value, although, for example, the United Kingdom's commercial property tax, the Uniform Business Rate, is tied to the rental value.

### *Germany*

Local governments in Germany have a relatively modest level of dependence on recurrent taxes on land and property and have responsibility for water supply and sewage, waste disposal, local roads maintenance, local welfare and health services, as well as construction and maintenance of primary and secondary schools. Local governments' share of all government expenditure was 22 percent in 2005, representing 7 percent of GDP (Schlosser 2007). The German system includes a strong element of revenue sharing and redistribution between different levels and units of government. Local authorities received €151 billion in 2005, representing 24 percent of the total income of all three government levels. Of the total local tax revenue of €54 billion, the dominant source is the local business tax, with €23 billion, followed by €18 billion from a 15 percent share of the national income tax. The local property tax, which is much lower than in other countries, contributed €9 billion, or 17 percent of local tax revenue. Fees and rates, two-thirds of which are from water and solid waste dis-

posal, returned €16 billion, and commercial activities returned €9 billion. The most important single source of revenues, however, is grants from higher government levels, at €49 billion. These come from established mechanisms for providing designated grants from higher levels of government for local infrastructure and urban renewal. An important complementary element for financing local infrastructure is a legal provision that enables municipalities to recover significant amounts of these expenditures—usually up to 90 percent—from property owners.

Table 4.7 highlights the challenge that the property tax needs to be designed either so it can be regularly revalued through computerized mass appraisals, or so revaluation is not a key element; otherwise it becomes politically difficult to update valuations. Germany's property tax system is frequently criticized for favoring landowners by using implicitly low tax rates derived from out-of-date valuations.

### *Other countries*

The United Kingdom, with its long history of substantial property taxation, has a higher dependency on real estate taxes at the local level than most other high-income economies. Annual property taxes account for approximately 9 percent of national tax revenues and 50 percent of local government self-generated revenue. The United States has a similar profile, having adopted property taxes as a significant revenue source at the local level from the earliest stages of its urban development. Property taxes account for approximately 50 percent of all local government self-generated revenue. Annual taxes are based on regular market-value assessments carried out by assessment offices. These offices often maintain an open-access website that contains practical information about property values and the assessment process, providing easily accessible comparable sales data and maps, together with information on liabilities, exemptions, and so forth.

Globally, assessment methodologies have recently been greatly improved, particularly with the implementation of computer-assisted mass appraisal, which provides reasonably

**TABLE 4.7 Land and property tax in Germany, 2003**

Elements of the property taxation system	Description
Tax authority	The state tax administration is responsible for assessment of the standard tax as the basis for levying the municipal tax. The municipality applies a variable "leverage ratio" to this standard tax.
Object of taxation	Agricultural land and forests; other real property Land: 61.5 million parcels; registered strata/condominium units: 14 million
Taxpayer	The owner is liable to pay the tax. In addition, the user of the property (usefructur) may be rendered liable to pay the tax.
Tax base	According to the valuation law, this is the price that could be realized in the case of sale. Land and buildings are supposed to be reassessed every six years, but 1964 data (price adjusted for 1974) have been used until 2003 without further update.
Tax rate	The state applies a standard base rate to the value, for example, for agricultural land: 0.6 percent, and for other real estate (with/without buildings): 0.35 percent. Municipalities apply a municipal leverage factor; national averages at 2000 were: agricultural/forestry land: 278 percent, and private/commercial real estate: 367 percent.
Tax revenue	Land and property taxes: €8.85 billion in 2000 (15.5 percent of total municipal taxes; 0.44 percent of GDP.

Source: Spahn 2003.

accurate and consistent, largely automated, assessments. Similarly, developments in IT have made electronic billing and payment a key feature of both local and central government financial management. In Japan, key features of market-based value, regular revaluations, and significant contributions to local tax revenue are common (table 4.8).

#### *Specific issues of relevance to China*

In China, municipal authorities use their revenue from land conversion to fund both current and capital expenditure. This model places an undue burden on a single, unpredictable revenue source and encourages the geographically extensive development of cities, which in turn requires further capital expenditure

on infrastructure, including roads, utilities, and transport networks. One of China's main concerns in considering alternative forms of local government finance is that revenues from annual property taxation will be insufficient to replace funding from the current land conversion system. China's challenge is to convert its local government financing model to one that is sustainable, predictable, transparent, accountable, and less dependent on cyclical land conversion markets.

International experience shows that separating current and capital budgets creates a more direct link between revenue sources and local authority functions and responsibilities, which could be managed in different and directly relevant ways. The introduction of recurrent property taxes could provide a

**TABLE 4.8 Land and fixed property tax in Japan**

Elements of the property taxation system	Description
Tax authority	Municipalities (cities, towns and villages) assess, levy, and collect the tax
Object of taxation	Land, buildings and tangible business assets: 177 million parcels; 59 million buildings
Taxpayer	Owners of land, buildings, and depreciable property—of land: 37 million persons; of buildings: 35 million persons; of tangible business assets: 4 million persons
Tax base	Value (fair market value) as of January 1; land and buildings reassessed every three years
Tax rate	Standard tax rate: 1.4 percent; maximum tax rate: 2.1 percent
Tax revenue	¥9,257 trillion at 1999; 45.3 percent of total municipal taxes; 0.37 percent of GDP

Source: Kitazato 2003.

significant contribution to annual budgetary operating costs, possibly in the region of 50 percent of locally generated revenue. Nonetheless, alternative sources will be needed for the balance. Alternative funding for capital investments will also need to be considered. These might include, for example, the issuing of long-term loans or bonds, central government grants, cost-recovery service charges, user fees and licenses, and greater private involvement, such as through public-private partnerships.

Although China has some experience with land-related taxes, the design and introduction of a municipality-wide, equitable, and sustainable annual property tax system should be undertaken in a planned and holistic manner. The administrative (and political) challenges in resolving such issues and bringing about local government finance reforms in China should not be underestimated (box 4.3). The strategy for reform requires a strong political will, clear objectives, careful plan-

ning (including adequate resource planning), and resolute action. Important questions will arise such as: Which properties will form the taxation base and which will be excluded? What will be the basis for determining the market value of the property? What will be the level of payment—what is a reasonable amount and who will set the level? What level of technology will be required to administer the taxation system? Which institutions will be responsible for administering the tax: valuing property and levying and collecting the tax? What levels of technical resources are required, and how will they be procured or trained? What changes to laws and regulations will be required? How will the initial setup costs be funded? How will taxpayers be sensitized to accept such a new tax? Will the tax be phased in or introduced as a one-time reform?

Introducing annual property taxes will require the development of strong institutional and technical expertise in land admin-

### BOX 4.3 China's property taxation

Taxes on land and real estate have become increasingly important in China's cities. The share of land-based taxes in overall tax revenue has grown fast in recent years as a result of booming real estate markets (Wong 2013). China currently taxes property in the form of an urban land use tax, which is levied on the land area of the property; a real estate tax for business use, which is levied on original value; a land value added tax that is levied on the appreciation in land value; a farmland occupation tax, which is levied on land area; and a deed tax, which is levied on the self-reported value of property at the time of transfer. Real estate is mostly taxed at the time of transfer. Land-related taxes have grown to more than 16 percent of total local tax revenue and have increased from RMB 51 billion in 2001 to more than RMB 1 trillion in 2012. The taxes on real property account for about 1.6 percent of GDP (Man 2013).

Broad-based annual property taxes and capital gains taxes have not been introduced in China, except for small-scale pilots on annual property taxes in Shanghai and Chongqing. The pilots, however, have been designed as levies with minimal coverage. The

Chongqing experiment covers only very high-income residential housing and less than 3 percent of all parcels in the city. It involves no valuation (the tax base is original purchase price less a standard deduction for area) and yields annual revenue of only about RMB 100 million. The Shanghai experiment is similarly restricted to a small segment of the residential housing stock and does not generate much revenue relative to the size of the city budget. Because valuation is the core of property taxation, these pilots do not move China significantly closer to implementation of a full property tax that covers a significant portion of the urban property base.

A possible approach for China would be to pilot a comprehensive tax on property in urban areas. The existing taxes might be combined into a new property tax regime that would include the annual property tax, a capital gains tax on transfers of real property, and a set of value capture taxes on real estate. The capital gains tax is relevant in the discussion of land market integration of collective and state land markets. Valuation, cadastre, and even collections could be combined, and the revenue yield could be significant.

istration, including regulatory frameworks, spatial planning, land records, valuation, financial management, and appropriate technology. Those, in turn, will require academic and professional training and the development of professional associations to enforce licensing, standards, and ethics. Not least of these challenges will be the development of a functional property market to facilitate the transfer of land and property to its highest and best use and to provide appropriate evidence for an equitable basis of assessment.

### Expropriation and compensation

Countries retain powers of compulsory acquisition in order to acquire land for public purposes, usually relating to social and economic development or the protection of the natural environment. The nature of these powers and the ways in which they are used are sensitive and have wide implications. Compulsory acquisition is disruptive for those who are affected and whose property is taken, and it may have serious negative impacts on people and livelihoods. Therefore, having satisfactory approaches in place and implemented is important, including compensation that ensures that people are placed in situations at least equivalent to those before the land acquisition. Prerequisites for compulsory acquisition include appropriate legal frameworks, capacity for implementation, good governance, and adherence to the rule of law. The expropriation of tenure rights is generally governed by relevant legislation and regulatory provisions, which generally address the circumstances under which expropriation may take place and for what purpose, what procedures are required, and how compensation is assessed. Those provisions will determine to a large extent the political acceptability of the process. In circumstances where acquisition is accompanied by a change of use, land acquisition is likely to be particularly contentious when the new use is more intensive and of much higher value. Most countries have therefore developed principles dealing with three broad themes:

- **Due process and fair procedure.** Modern practice provides rules that ensure appro-

priate advance consultation, participatory planning, accessible mechanisms for appeals, and limits on administrative discretion. Rules that place reasonable constraints on the power of the government to expropriate land strengthen people's confidence in the justice system, empower people to protect their land rights, and increase the perception of tenure security.

- **Good governance.** Transparency and checks and balances are features of good governance, and they reduce opportunities for corruption and abuse of power. Officials who expropriate land should be accountable for the good-faith implementation of the laws. Laws that are not appropriately observed by local officials undermine the legitimacy of compulsory acquisition.
- **Equivalent compensation.** Policies and laws should ensure that affected owners, occupants, and users receive fair and prompt compensation, whether in money or in alternative land. Regulations need to set clear and consistent valuation bases for achieving this.

Most developed market economies have resolved the core issues of concern and achieved a working consensus that is accepted by most stakeholders. Periodic adjustments of policy and practice happen for many reasons, but these tend to be marginal. The situation in transitional economies is often far more complex because the interrelation of evolving legitimate tenure rights and municipal management and finance makes it harder to make meaningful marginal changes to fix the system. Instead, major integrated reforms are required. In China, the widespread discontent of those whose land is being taken is a clear indication that compulsory acquisition and compensation processes and results are not working well. China is not alone in not having found acceptable formulas for dealing with this challenge.

### *International practice*

Compulsory land acquisition is a problematic area of public policy in which norms, regulations, and expectations change as (a)

political systems transition from one set of political norms, (b) countries grow wealthier, (c) people change their views on the value of their resources, (d) technologies change, and (e) people recognize the impacts of public schemes on land values. Reviewing how other countries deal with the process and implementation of compulsory acquisition is helpful.

### *United Kingdom*

The United Kingdom's provisions for compensation have varied significantly, reflecting changing political balances, expectations, and technologies. For example, the question of how to deal with development value caused substantial oscillation of policies from the end of the Second World War to the early 1980s. Expectations and ability to afford more than basic compensation were legislated for in the 1970s in the form of supplementary home loss payments. Also in the 1970s, the adverse impact on properties near development was increasingly recognized, along with the need for compensation for the physical impacts of public schemes on properties where land was not taken, for example, air traffic noise or the impact of motorway flyovers. The principle behind compulsory purchase (expropriation) in the United Kingdom, embodied in existing legislation and case law, is that individuals whose land is expropriated should be financially compensated so they are left in no worse a position than if the expropriation had never taken place. Equally, landowners should not make windfall gains simply as a result of public policy decisions that require substantial public investment. However, the amount of compensation for land should also reflect the prospects for its development prior to the designation of the scheme. The level of compensation to be considered is therefore not limited to the existing use. The process of acquisition is based on consultation, negotiation, and the right to appeal both the project and the amount of compensation.

### *United States*

Urban development in the United States has largely been achieved through private sector investment, with limited use of state

expropriation (or eminent domain) powers. The Fifth Amendment of the Constitution imposes limitations on the exercise of eminent domain: the taking must be for public use, and just compensation must be paid, both of which have largely been established through determination by the courts. The general premise is that public use, if left unrestricted, could jeopardize private property rights. Courts have acknowledged the difficulty of articulating a universal standard for defining public use. Historically, it was held that the definition precludes the government from seizing land from the hands of the owner and turning it over to a third party on the vague grounds of public benefit for a more profitable use. However, state courts have upheld the use of eminent domain for a variety of urban renewal programs.

American courts have also held that the preferred measure of just compensation is fair market value, that is, the price that a buyer would pay a seller in a voluntary transaction, with both parties fully informed of the property's good and bad features. Also, this approach takes into account the property's highest and best use (that is, its most profitable use), which is not necessarily its current use or the use mandated by current zoning, if there is a reasonable probability of zone change. The courts have also held that due process must be followed, which includes consultation, negotiation, prompt payment of compensation, and the right of appeal. The property may be taken either for government use or by delegation to third parties, such as utility companies, that will devote it to public or civic use or, in some cases, economic development. The most common uses of property taken by eminent domain are for government buildings and other facilities, public utilities, highways, and railroads; however, property may also be taken for environmental reasons.

### *Japan*

In Japan most land acquired for public purposes is through processes of purchase by agreement, a normal transaction under the Civil Code. Where agreement is not possible, compulsory purchase powers will be invoked under the Land Expropriation Act. The compensation for the loss of the land is assessed

distinctly from the cost of removal or other loss associated with the buildings. *Just compensation* refers to the full compensation of the acquired property based on the fair market value that is identified as the normal transaction price that could be expected in the market. As in many other countries, land severed by the acquisition will be compensated by any consequent reduction in value. Where there is a leaseholder, the parties are asked to apportion the compensation value by negotiation. Compensation is also given to cover other losses, such as removal costs and loss of business goodwill or profits. Finally, since the 1960s, the Land Expropriation Act has provided for additional life-rebuilding measures where appropriate, including, for example, training for new occupations.

#### *Specific issues of relevance to China*

Local governments in China use their expropriation powers more frequently than do those in most other countries. The degree to which China's land expropriation system can be reformed is linked to and dependent on the wider land policy reforms, the state's monopoly in primary land markets, and the associated dependence of local governments on income generated from land conversions. The goal of significantly reducing the need to use expropriation powers will depend on several assumptions, for example, that appropriate alternative sources of local government funding can be developed, that broader participation in land markets will be permitted, and that land use policies will be developed to encourage the redevelopment and regeneration of brownfield sites to more intensive uses.

In effecting such reforms, China will need to respond to questions such as the following: For what purposes may the compulsory acquisition power be used? Which organs should hold the power of expropriation? What is the nature of the legitimate rights that exist, and how should they be compensated? How can appropriate compensation be assessed, and what capacities are required? What mechanisms for appeals should there be? What institutional changes, including capacity development, will be necessary? In addition to the process of developing appropriate policies for compulsory acquisition and

compensation, the reforms will involve a substantial overhaul of existing policy, legal and administrative frameworks, and capacities.

### **Rural land registration and property markets**

The call for the registration of rural land over the next five years under Central Document No. 1 of 2013 is particularly relevant and significant to China's urbanization. Not only will the registration of rural land provide increasing certainty and confidence to rural land rights holders, but it also will affect how markets develop and how development value is treated, how local governments can be sustainably financed, and how expropriation and compensation will function.

#### *International practice*

Markets are one of the principal mechanisms used around the world to transfer tenure rights and duties. Urbanizing areas are vigorous in terms of volumes of market activity, yet property markets are inefficient and inequitable if not appropriately designed, regulated, and supported with the appropriate capacities. Developed market economies recognize the recording of tenure rights as vital to the governance of tenure. Appropriate and sustainable systems for recording tenure rights should be maintained and updated to enhance their security and underpin all forms of market transactions. Land registration has been a key policy in the transitional former socialist economies of Central and Eastern Europe and the Commonwealth of Independent States. Since 1990, these countries have invested heavily in designing appropriate systems for the administration of tenure to ensure that real property, land, and buildings become a positive contributor to economic growth, without compromising equity.

International experience shows that rural land registration programs often take decades to complete. In Thailand's land registration program, for example, completing the process of rural land titling took about 20 years. The Thailand Land Titling Program, which commenced in 1984, was one of the world's largest titling programs, issuing over 8.5 million new titles to landholders. Almost 19 mil-



#### BOX 4.4 Land markets and institutions in the United States

Land and property, and their effective administration, are critical to economic growth. Urban development in the United States is typified by private sector real estate market activity, with private parties contracting with each other directly to transfer rights in an open market. Within the confines of the framework set forth by state agencies, such as, zoning legislation, land has tended toward its economically most valuable use. Market information in all sectors is available from many sources, both the public sector (such as the U.S. Department of Agriculture's National Agricultural Statistics Service) and the private sector. Although interference in market activity is comparatively low, federal, state, and local governments are responsible for significant aspects of the institutional support to real estate and its regulation and administration. Those aspects include responsibilities for land use planning, recording of deeds, and the assessment of real estate for property tax by the assessment offices.

Urban development is regulated at the local government level by land use and zoning laws, regulations, and policies that guide new development while

implementing community goals and protecting community resources. At the federal level, land use controls provide environmental protection. For example, the National Environmental Policy Act requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed action. The National Historic Preservation Act requires federal agencies to act as responsible stewards when their actions affect historic properties. The Bureau of Land Management maintains a cadastral survey of all parcels and interests on all federal lands.

Mortgage lending to finance property acquisition is the norm. Financial institutions are a fundamental element in the stability and functioning of the market system. In addition, a wide range of professional services based on specialized approaches have developed in relation to real estate, which enable markets to operate more efficiently. Those services include the U.S. Appraisal Institute, National Association of Realtors, and attorneys. These entities are largely self-regulating in terms of professional ethics and standards and academic and vocational training.

lion of the estimated 20 million to 30 million parcels in the country had been registered by 2001. About 4 million registered parcels were affected by some form of transaction in 2001, of which almost 2.5 million were transfers. On average, producing a certified copy of a title took 30 minutes and completing the registration of a transfer took about 2.5 hours. Despite some shortcomings, Thailand's program is seen as a success and as a potential model for other countries. Land administration and land titling have generally occurred in a fairly orderly and structured manner. The program is confined to nonforest land, and the rights of those living in areas formally classified as forest remain a major unresolved land issue. England and Wales still have registered only about 80 percent of the land parcels in the Land Registry since the policy went into effect in the Land Registration Act of 1925.

Although each case reflects the specific circumstances, constraints, and priorities of a particular country, global experience shows that undertaking national land regis-

tration is a major policy and logistical exercise, requiring the mobilization of substantial resources and capacity (box 4.4). Although the volume of investment in land titling has been less in Asia than in Central and Eastern Europe and the Commonwealth of Independent States, most countries have recognized the fundamental importance of secure tenure and are aware of the ample evidence of increased property transactions following land registration.

#### *Specific issues of relevance to China*

The policy laid out in Central Document No. 1 of 2013 to complete rural land registration over the next five years is a major new development in land registration, land market development, and urbanization, and the scale of activity envisaged is unprecedented. The timescale for implementation may be ambitious by international standards of achievement, but the effort will have a major impact on all of the above areas. Progress in registration is likely to be rapid in economically

advanced provinces, which are most subject to market pressures, and in peri-urban areas with development pressure and market activity. The likely impact of large-scale registration of rural tenure rights in China in relation to urbanization, and land acquisition and assembly for urban development, will be a considerably greater propensity to conduct transactions, whether through sale, lease, mortgage, or other permitted transaction.

Much will depend on what transpires in other related policy areas. What will happen in relation to development value and to whom will it be attributable? How will municipal finance develop? Will compulsory acquisition and compensation laws and practices change? Areas considered for urban expansion could become both more active and more competitive, and types and levels of transactions will likely be more sophisticated, particularly if municipal finances are effectively addressed and development value is made more accessible to stakeholders, notwithstanding policies to reclaim value through various mechanisms.

Critical questions will include the following: Have the impacts of rural land registration and market development on urbanization been effectively considered and, if so, how will they be managed? What implications might these developments have on the process of spatial planning? Addressing these questions and the associated political and administrative challenges requires major change in relation to rural land registration and the development of markets. Planning at such a scale will require strong political will, a clear and practical vision and clear objectives, meticulous program planning, development of resources and capacity, and sustained action. Finally, addressing these responsibilities appropriately requires the development of strong institutional and technical expertise in land administration in the key areas identified.

## China's land pilots: Guidance for the national reform agenda

### Synthesis of domestic reform pilot experiences

Reforming China's land tenure system will have extensive ramifications and will likely

reshape the social structure of rural China and urban-rural relations (box 4.5). In view of the complexity of land reform and the difficulty of reaching consensus on the direction of reform, China's local reform pilots and their institutional and policy innovations can provide useful guidance for the broader reform direction. The pilots discussed in this section—Shenzhen, Chengdu, Chongqing, Beijing, and Guizhou—cover issues including the clarification, confirmation, and titling of land rights; market integration of rural-urban construction land and new arrangements for the transfer of collective land for urban development purposes; benefit-sharing arrangements involving incremental land value between rural and urban land holders; integration of urban-rural land use planning and land allocation; and redevelopment of informal industrial areas and housing areas in urban villages.

The principal lessons from these pilot reforms include the following:

- **Optimizing land use can provide more flexibility in the urbanization process.** Despite the variability in development across China's regions and different land demand and supply conditions in different localities, all pilot areas are exploring new institutional arrangements to increase land use efficiency. The experiences in Chengdu and Chongqing, for example, demonstrate new approaches to optimizing land allocation between urban and rural areas by combining a reduction in the inefficient occupation of rural land in rural areas with increased land supply for urban development. By comparison, the experiments in Guangdong, Shenzhen, and Beijing reveal that large land inventories of low use efficiency are frequent across China's coastal areas and big cities, resulting in great potential for better use of this land for urbanization.
- **Market entry for collective land is critical for long-term land supply for urbanization.** Various pilots have demonstrated new approaches that allow collective construction land to enter the urban land market to increase land supply and use efficiency. These approaches have involved the restriction of government-driven land sales, thereby allowing collectives to generate

### BOX 4.5 China's rural and urban land rights

**Agricultural land rights.** The scope of agricultural land rights is defined in the law as the right to use, profit from, and transfer land contracting and operating rights; the right of autonomy over production and operation and over disposition of products; and the right to receive the compensation for the land taken by the state or collective for nonagricultural purposes. The Rural Land Contracting Law (2002) allows rights to be transferred (to other village households); leased (to nonvillage households); and exchanged, assigned, or transacted by other means in accordance with law. Land rights are for 30 years in the case of farmland, 30–50 years in the case of grassland, and 30–70 years in the case of forestland. The Property Law (2007) permits the extension of the rights when such land rights expire. The Third Plenary Session of the 17th CPC Central Committee in 2008 concluded that existing agricultural land rights should be maintained stable “for a long term without change,” thus expressing implicitly the intent to upgrade term-specific land rights into perpetual rights.

China has also made substantial progress in laws and policies designed to increase tenure security. The Rural Land Contracting Law emphasizes the principles of consultation, voluntariness, and compensation to prevent compulsory land transactions and land rights violations. The Land Management Law, the Rural Land Contracting Law, and the Property Law all prohibit village-wide land readjustments while allowing small readjustments for individual households in special circumstances, based on the consent of the village representatives and on approval by the township government and county line agencies.

Central policy has repeatedly expressed concerns over the potential threat of corporate land acquisition to the livelihood of farmers that rely on land as their primary income source. The central intent to tighten restrictions on corporate acquisition of rural land rights for agricultural purposes is demonstrated in Central Document No. 1 of 2013 (*Several Opinions on Speeding Up Development of Modern Agriculture and Further Strengthening Rural Development Vitality*). The document distinguishes between land transfers to farmers and farmer associations and land transfers to enterprises. While encouraging and supporting transfers of use rights to rural land, including forestland, to farmers, family farms, and farmer associations, Central Document No. 1 also emphasizes the need to establish rules on permitting and regulating industrial and commercial enterprises' leasing of arable land, forestland, and grassland. Land transfers

should not be compulsory, nor should farmers' interests be adversely affected through such land transfers.

**Rural residential land rights.** *Rural residential land* refers to land used to build residences for farmer households. Rural residential land is categorized as construction land that may be used for nonagricultural development without triggering increasingly stringent control over farmland conversion; therefore, it could have much higher market value than farmland. The total area of rural residential land reached 166,000 square kilometers, almost five times the land taken by urban construction uses (34,000 square kilometers) (Wang and others 2012). This land, virtually untapped for development, may become an important source of land for urban and nonagricultural development. The Property Law defines rights to rural residential land as usufruct property rights but treats such rights differently than agricultural land rights and urban construction land rights. Rights to rural residential land include only the right to possess and use the land, but the law is unclear as to whether these rights include the right to profit from such land. Central policies also declare transfers of rural residential land rights, either to the urban transferee or for nonagricultural development, as impermissible. Mortgaging of such land rights is also explicitly prohibited. Existing laws also do not specify the duration of such rights, but the Central Committee's Revised Regulations on Rural People's Commune, promulgated in 1962, provide that farmers should be allocated residential land and be permitted to use it for a long term without change, and farmers' houses built on such land should be owned in perpetuity. Registration of rural residential land rights is managed at the county level.

**Urban land rights.** China's Constitution and Property Law define urban land as land owned by the state. The State Council exercises land ownership rights on behalf of the state. Similar to its laws regarding rural land, China has a dual-track tenure system under which the state assumes ownership of all urban land but permits institutional and individual holding of use rights to such land. Such use rights are also usufruct property rights. However, a different set of legal rules and policies are used to regulate rights to urban land.

Use rights to urban land are allocated directly or granted for value through contractual arrangements between the government and the user. Use rights for residential purposes are granted for 70 years; for

**BOX 4.5** (continued)

industrial development projects, for 50 years; and for commercial, tourism, or recreational purposes, for 40 years. The use rights term of urban land is renewable. Upon expiration, land use rights, together with structures and other fixtures, will be taken back by the state without compensation. Rights may be granted to any institution or individual through open auction, tender, bidding, negotiated sale, or public listing. The granting of land to be used for commercial, tourism, entertainment, and luxury residential purposes must go through open auction or tender bidding. To prevent local authorities from abusing power in granting use rights through negotiated sale, the Property Law requires that tender bidding, auction, or other competitive approach be adopted when use rights to state-owned land are granted for industrial, commercial, tourism, recreational, and commodity housing purposes, and where two or more potential users are contending for the same land parcel.

The land use rights holder has the right to possess, use, and benefit from the land. She or he may transfer, lease, and mortgage the acquired use rights for the remaining years of the term. The granted use rights may also be exchanged, bequeathed, or contributed as capital investment. If the grantee is an individual, the granted use rights may also be inherited. However, restrictions apply to these rights. Land may not be transferred for uses other than the uses identified in the original granting contract unless the change in use is approved by the government and the transferor pays the difference between the paid granting fee and the would-be granting fee under the new use. Where the transfer price is lower than the market price, the government can purchase these rights back. To prevent land speculation, the law prohibits assignment or lease of granted rights when the land is not developed and used pursuant to the provisions of the granting contract.

*Source:* Li and Wang 2013.

land use quotas from reclaiming rural construction land and transfer and trade such as construction land conversion quotas in the urban land market. These efforts have resulted in increased and more efficient land supply and greater capture of land value appreciation by collectives and rural residents. Reform efforts have also shown new ways to reallocate industrial land to urban land, improve planning and management regulations, and integrate government functions with voluntary farmer participation in the reform process.

Although the various pilots have demonstrated new approaches for encouraging collective construction land to enter the urban market, further experimentation and deepening of the pilots may help answer related important questions: Should the entry of collective construction land apply to the current land inventory only, or should collective land supply be increased? Should entry patterns be different for rural homestead land, collective business land, and collective land for public purposes? Should land outside and inside the

city border be treated differently? How can rural construction land rights be safeguarded to prevent farmers' interests from being abused for compulsory urbanization by the government to achieve its targets?

- **Secure property rights are the foundation for China's future efficient and socially inclusive urbanization.** Various pilots have demonstrated that clear and documented property rights to land are the key institutional foundation for socially inclusive and equitable urbanization. Clarification, confirmation, and titling of land rights are essential for facilitating rural-to-urban labor transfer and farmland consolidation. Secure land rights are also the foundation for the redevelopment of peri-urban areas. In Meitan County of Guizhou Province, land allocation to households and demographic change have already been decoupled for many years, and farmland rights have been granted without term limitation. In Meitan the pilot reform has facilitated rural labor transfer to urban areas and resulted in local industrialization, in

particular rural land consolidation, and urbanization. Chengdu municipality has mobilized local land survey results and village authorities to conduct a comprehensive campaign of land and property rights confirmation, thereby providing a blueprint for rural-urban integration. Guangdong Province and Chongqing municipality have also used property rights confirmation as a foundation for their reconstruction programs and land rights transfer approaches. Local land reform experiments have also identified the need for further experimentation in other aspects of property rights confirmation, such as overcoming the current separation of institutional responsibilities in land rights registration.

- **Without the reform of the rural land expropriation and public finance systems, opportunities for collective construction land to enter the market will remain limited.** Local government incentives and the practice of land finance cannot be altered without addressing land finance and land collateralization through reform of the public finance system. A possible solution is to adjust the expenditure and revenue assignments and the tax-sharing ratio between the central and local governments, and to accelerate the introduction of a comprehensive property taxation system. National-level legal reform can also ensure that collective land enjoys the same pricing and rights as state-owned construction land. The reform of national laws is necessary for advancing the establishment of a unified rural-urban land market.

### **Shenzhen: Integration of collective and state construction land markets<sup>10</sup>**

Shenzhen has been a forerunner in economic and land policy innovation throughout the reform process. Over the past decades, a large share of Shenzhen's current built-up area has been developed by collectives on collectively owned rural land. Shenzhen has allowed a dual-track urbanization process whereby extralegal development by collectives coexists with the formal urban land market in which the state remains the only legal supplier of

land. In 2013, Shenzhen attracted nationwide attention when it relaxed the state's monopoly in the urban construction land market and allowed collectives (or succeeding collective shareholding entities) to sell land directly to urban users. The challenges of this process include integrating the informal collective land market into the urban development process, defining and clarifying the property rights to all land, and determining how benefits from urbanization will be shared fairly and transparently between rural and urban citizens. Despite Shenzhen's specific conditions, the city's policy innovation to consolidate the collective and state construction land market is of national policy significance.

In 2004, the Shenzhen municipal government promulgated the incorporation of all remaining rural districts into the municipal urban boundary to promote urbanization. Rural residents were issued an urban hukou, village and township administrations were turned into urban subdistrict committees, and rural collectives were transformed into collective shareholding entities. About 260 square kilometers of collectively owned rural land were converted to state-owned urban land. This made Shenzhen the only municipality in China that owns all the land within its jurisdiction.

Across China, the taking and conversion of rural land occurs on a project-by-project basis following urban land use plans. Shenzhen's nationalization of land is therefore an unusual case. The government converted all rural land within its jurisdiction into urban land prior to the identification of urban construction projects (Wang, Wang, and Wu 2009). Remaining land for urban construction had become extremely limited within the city boundaries, and extralegal construction on collective land had developed uncontrolled in response to high demand for land. Shenzhen nationalized all its land resources to avoid a situation in which the requisition of collective land and property would have become prohibitively expensive and prevented future urban development. Given Shenzhen's status as a special economic zone and its history of legal and regulatory breakthroughs in economic development, the Ministry of Land



and Resources allowed the nationalization of land on an exceptional pilot basis.

In 2004, Shenzhen also began to address the illegal development and construction on former collectively owned land. It refrained from demolishing extralegal construction and penalizing collectives. Although land was converted to state ownership, the government did not take the land but acquiesced to the collectives' de facto land rights and allowed collective entities and their members to continue to profit from existing real estate. Although collective ownership has ceased to exist in Shenzhen with the nationalization of all rural land, new challenges over land control and management in the urban development process have arisen.

In 2012, Shenzhen announced a comprehensive plan to reform the city's land management, backed by the Guangdong provincial government and the Ministry of Land and Resources. The guiding reform principles were to clarify property rights, allocate land through market mechanisms, promote a more efficient use of land, and regulate the city's land market. The municipal government also announced a short-term plan for 2012 to 2015 to complete all outstanding land rights transfers from former collectives to the municipality, and to settle disputes over land controlled by former collectives with a view to remove the remaining obstacles to full marketability of land that is under the control and management of collective entities.

Shenzhen outlined the city's agenda for spatial development in *Opinions on Optimizing the Allocation of Spatial Resources to Promote Industrial Transformation and Upgrading of 2013*. The Shenzhen Commission of Urban Planning and Land Resources also released supporting guidelines that detail how transactions of collective construction land are done in the market. The new policy targets industrial land under collective management within the city boundary. Some of this land has been formally allocated to collective entities but has remained vacant for years. Other parcels have been developed by collectives, but property rights have remained unclear, are disputed, or are not legally rec-

ognized. Collective entities thus face difficulties in trading such land. Potential land users are concerned that their rights would not be protected after the purchase. Shenzhen's 2012 agenda seeks to address this vacuum by allowing collective enterprises that have received legal allocations of land to sell undeveloped land in the urban land market. In the case of extralegal construction, collectives are required to clarify property ownership, work out compensation plans, and then demolish illegal construction before listing and selling land on the market.

Shenzhen's new policy remains consistent with existing Chinese law that currently does not allow the sale of collective land in the urban market. Shenzhen is the only city in China that owns all the land within its jurisdiction, which it achieved by nationalizing collective land and converting rural collectives to shareholding companies in 2004. From a regulatory perspective, the policy deals with sales of state-owned land but not collective land and, specifically, with extralegal construction land for industrial use (which accounts for only a small share of all extralegal urban construction). The policy is a first step toward extending property rights to extralegal property and legalizing its transferability in the urban land market. A larger share of extralegal construction involves residential property, for which reform is regarded as more complex.

The policy is innovative because for the first time it involves rural collective entities in the process of land sales and allows them to engage directly with potential bidders and in the land transaction. Transactions are limited to industrial-use land. Different from previous requisition and compensation practices, the new policy allows collectives to benefit from the sale of land. Two schemes are currently being implemented: one requires an equal sharing of proceeds from land sales between the municipality and the collective; the second requires the collective to pass on 70 percent of the proceeds to the municipality and retain only 30 percent. In addition, the collective is guaranteed a 20 percent ownership share in the property to be developed on the land under both schemes.



Shenzhen's policy advances are significant. Although local governments rely heavily on land sale proceeds and retain control over land allocation and investment planning, Shenzhen has been willing to relax its monopoly power in the urban land market to respond to the need for more efficient urban development in view of limited land availability. Many other fast-growing cities in China fuel their spatial expansion by aggressively converting rural land to urban use. In Shenzhen most of the land suitable for construction has already been built up, and urban expansion land is limited. The redevelopment of existing, poorly built property and inefficiently used construction land is therefore an important way to ease the development constraint.

The particular challenge for Shenzhen is that the majority of sites suitable for urban redevelopment contain extralegal unregistered property with unclear property rights. In 2011, of the city's 918 square kilometers of developed land area, 390 square kilometers belonged to former collectives, of which an estimated three-quarters either were illegally built up or suffered from property rights disputes. Much of the extralegal development is a legacy of Shenzhen's bottom-up, farmer-led industrial development during the early reform era of the 1980s, when large areas of collective land were converted to nonagricultural uses and leased to investors or developed by the collectives themselves. That development contributed greatly to Shenzhen's economic growth during the reform period as collectives provided factory space and cheap housing for millions of migrants. The wave of development preceded the promulgation of the Land Management Law and the stricter enforcement of land use controls. The Shenzhen government tolerated such development to advance its growth. The extralegal development and unregistered property is now problematic in many ways. It falls outside the purview of the city's formal urban management, violates regulations of urban planning and construction, poses threats to public safety and health, and hinders more efficient redevelopment. However, because extralegal development has been per-

vasive and important for collective members' livelihoods, the municipal government cannot simply dismantle and demolish the sites because such an action would likely lead to social discontent. In addition, requisition of and market-based compensation for collective property would exceed the city's financial capacity.

Shenzhen's policy of allowing collective entities to sell industrial land provides a partial administrative solution to addressing urban redevelopment challenges. However, the policy does not yet entail the establishment of an integrated open market for urban construction land, in which collective and state land will be treated equally in the urbanization process. A real breakthrough in the market integration of collective and state land would allow collectives to retain ownership of collective construction land while being able to lease use rights to urban users and renew leases upon expiration. Current policy allows the city government to take back the land upon the expiration of the first lease period. Despite limited progress, Shenzhen's policy change signifies a shift in the thinking of municipal governments that may guide future land market integration. This shift is relevant for many cities where redevelopment rather than spatial expansion will be the main pattern for change. Many of China's cities have to contend with extralegal and unregistered development sites and property. Clarifying and legalizing the property rights of peri-urban rural communities provides possibilities for more efficient redevelopment, equitable benefit sharing and inclusion, growth in household incomes, and reform of the municipal finance system away from concessions revenues and toward taxation.

### **Chengdu municipality: Land reform and urban-rural integration<sup>11</sup>**

In 2003, Chengdu municipality started implementing a "Three Concentrations" development strategy, which promoted the concentration of industries in designated industrial zones, the consolidation of rural land to promote large-scale production in agriculture, and the resettlement of farmers

in rural towns. Chengdu is the largest provincial capital in western China and a growing metropolis with a population of 14 million people, including an estimated 1 million migrants and 5 million registered rural residents in 2010. By 2007, the problems associated with the collective land ownership system had become evident. The existing system could no longer ensure the efficient allocation of land resources or the protection of farmers' interests in the urbanization process. In response, Chengdu began to implement a rural-urban integration reform pilot in mid-2007 to reduce rural-urban disparities. Among other aspects, the pilot promoted the titling of all rural land and assets.

Chengdu's Three Concentrations strategy involved the resettlement of a large number of rural residents, the construction of new houses, and the reclamation of old village sites. The relocation of people and assets also raised complex questions about farmer compensation and long-term economic interests and benefits. To implement an acceptable resettlement program, Chengdu needed a clear and comprehensive picture of the historical and current status of property rights to land and buildings. Particularly important was to prevent infringements on property rights by collective entities, individuals, or the government itself, in light of significant and fast appreciation of land values. In 2008, the Chengdu municipal government commenced the property rights reform and the titling program in rural areas by issuing Document No. 1 of 2008, *Provisional Opinion on Strengthening Protection for Arable Land and Further Reforming and Improving the Property Right System of Rural Land and Buildings*. The program was completed in 2010, with issuance of 33,400 certificates of collective land ownership, 1.5 million certificates of use rights to collectively owned land, and 1.8 million certificates for contracted land management rights. The strategy made significant investments in developing a unified registration system for all arable, forest, and rural homestead land. The titling program was implemented under the authority of administrative villages. Village councils were given the decision power over surveys

and measurement of land plots for titling and over land adjustments prior to land titling. In some villages, the designation "long term without change" was included in the formal contract of the land management right, indicating that land management rights are contracted for an indefinite (renewable) period.

The titling program included an assessment of all collective construction land in each administrative village within the municipal area based on the Second National Land Survey. Titles to land use rights were issued for the rural homestead land of farmers. Titles to homesteads were given on actually occupied land, although household plot size frequently exceeded the legal standard and the area documented on past certificates. This practice, in combination with close consultation within the village, helped to minimize disputes over homestead land. Use rights to other collectively owned construction land, such as rural enterprises, public interest, and land for other purposes, were documented as well.

With regard to farmland, inconsistencies in the particulars of farmland plots, including the actual user, information on record with the village authorities, and migration, posed significant challenges to the titling of farmland. Land use is often adjusted, but these adjustments are rarely updated on land use certificates and contracts, and the written records do not represent actual rural land use. An approach based on "land titling on actual land use" was therefore implemented. Every parcel within the village was remeasured and recorded under the name of the actual user. Adjusted management contracts were issued for all farmland and included information on location, size, and land management and use rights holders. The land titling approach also supported a new form of village self-administration and governance. An elected village council assumed responsibility for reviewing the results of the property survey, mediated disputes over land use rights, and supervised readjustments to contracted land. Village councils were also responsible for publicly disclosing the results of the land titling plan prior to submission for county government approval.

Chengdu has now put in place a rural land–titling approach that is based on relatively clear operational principles and procedures. It includes village mobilization, surveys and on-site measurement, public disclosure, and statutory publication and title issuing. Land readjustments have become significantly more difficult, and as a result, a stable property-rights structure in rural areas has evolved. As part of the reform, Chengdu has also established a fund to strengthen protection of farmland. The fund is replenished by the city and county governments through fees from transfers of land use rights and charges on newly developed construction land. The fund is used for covering farmers' contribution to the old-age pension insurance and provides subsidies for land protection.

#### *Dynamic balance approach and construction land swaps*

In 2004, the Ministry of Land and Resources issued a new Construction Land Offset Policy to provide implementation guidance to the “dynamic balance” provisions of the Land Management Law. These provisions stipulate that any parcel of arable land converted to urban use needs to be offset by newly generated arable land of the same quality and area. The offset policy aims to address the long-term supply of urban construction land by getting local governments to reclaim underutilized rural construction land and convert it to arable land, thereby creating additional urban construction land conversion quota. The policy has stimulated rural land consolidation on a much larger scale than in the past. By late 2011, Chengdu had implemented nearly 400 land consolidation projects, thereby reclaiming 28,000 hectares of rural construction land and relocating about 900,000 rural residents into 1,400 newly constructed rural settlements. Infrastructure investments associated with the projects had exceeded RMB 20 billion by 2010.

Chengdu has applied the offset policy to allow swaps of reclaimed rural land and the construction land quotas across the municipality. Newly generated construction land is sold through public tendering. Income

from land sales is used to compensate farmers whose land is taken by the government for urban construction use as well as farmers whose residential land is being reclaimed to create the offset quota. The swaps allow urban construction land to be made available in areas where demand and land prices are high. Detailed research results are not yet available, but the model is expected to have facilitated the transfer of capital from urban to rural areas; promoted new rural settlements with better public facilities and services; and led to better compensation and resettlement arrangements for affected farmers. Economic efficiency gains in land allocation and agglomeration effects are expected as land is sold where demand and prices are high.

Reports of government misuse in the form of forced property demolition and involuntary resettlement in some rural localities illustrate the risks inherent in this approach. Infringements of the rights and interests of farmers ran counter to the objective of integrated and coordinated rural and urban development, and farmers remain vulnerable in terms of protection of their land and property rights. Local governments or other entities with administrative power are sometimes dominating land transfers and land swaps. The approach also does not address the rural-urban disparity, because rural and urban communities remain segregated by separate registration. Such segregation might even be reinforced through the concentration of the rural population in exclusively rural settlements. Social impacts and risks involved in the concentration of the rural population in new settlements have not been well researched to date.

The Chengdu Rural Property Rights Exchange, established in 2008, serves as a platform for transactions of rural property rights, including transactions of contracted management rights to farmland, use rights to collective construction land, rights to forestland, property rights of rural residences, and agricultural intellectual property rights. The exchange also allows transactions involving construction land quotas, making such quotas transferable objects. To some extent the

establishment of the exchange responded to farmers' increased awareness of their property rights (confirmed through land titling) and to their demand for more equal sharing of the appreciating urban land values resulting from consolidation and offset policy projects.

The exchange aims to improve the land transaction system to become more market oriented and transparent. Governments are no longer exclusively involved in matching buyers with sellers of land use rights and quotas. Instead, farmers and collectives have gradually become involved in the implementation of offset policy projects and are allowed to auction construction land quotas through competitive bidding. As the autonomy of the collectives and farmers has increased, the government's role has shifted to that of supervisor and service provider with responsibility for acceptance checks, quality supervision, and dispute settlement. Beginning in late 2010, the first rural communities started to implement consolidation and offset policy-related projects.

Market-based practices for transferring collectively owned construction land for urban business purposes have also entered a pilot stage. In 2008, Jingjiang District listed the use rights to two parcels of collectively owned construction land for public bidding by applying the procedures for land use rights transfers that are applicable to state-owned land. Several villages entrusted the development and management rights of the collective construction land to a platform company under the district government. The company consolidated the land, carried out primary land development, and listed the land for public bidding. Two private enterprises obtained use rights to the collective construction land at a selling price of RMB 800,000 per mu (1/15 of a hectare) for a term of 40 years. The platform company issued certificates of use rights to collective construction land. The company received the payment for the land on behalf of the collectives, deducted predevelopment and other costs, and distributed the remaining income to the collective entities for redistribution among the collectives and villagers. In 2010, the exchange listed the

use rights to a parcel of collective construction land of 34 mu for public bidding, the first-ever case of farmers initiating a transfer of use rights to collective construction land. The final transfer price was RMB 442,000 per mu. Total income received by the farmers was RMB 13 million, an amount far exceeding the possible benefits through the offset policy. Many similar cases followed.

The significance of Chengdu's land reform pilot is reflected in its comprehensive approach to property rights protection, rural land titling, and asset verification. These steps are critical in advancing the protection of rural property rights and, even more important, promoting the marketability of farmers' rural land use rights. The rural property rights reform pilot in Chengdu therefore offers valuable lessons for gradually advancing a nationwide rural land titling program but also points to the enormous challenges of getting the reforms right. The central government has long been contemplating the reform of the rural property rights system and the nationwide rural land titling program, but progress has been slow, and practical approaches have yet to be defined. Rural land titling, asset verification, and the confirmation of rural property rights will require considerable investment. Government support is essential to develop a rural property rights system; the role of the market will remain limited for the foreseeable future. In addition, Chengdu's arable land protection fund provides a model for generating the financial support for land titling but also for simultaneously advancing the rural social security system. Chengdu has also shown the feasibility of a unified registration system for all types of rural property.

In the course of urbanization, land resources will undergo continued drastic changes in the form of a reallocation of rural land to urban areas. The offset policy for arable land works well as an administratively managed control mechanism of land conversion that ensures, at least in theory, that total arable land neither decreases nor degrades. At the same time it allows usage swaps between lands of different value and location. The offset policy has succeeded so far because it

exercises land use and land conversion control while creating more flexibility for better spatial planning.

The Chengdu land system reform pilot has demonstrated ways to increase farmers' income from land transactions. The transfer of farmland through leasing has left farmers' land ownership unchanged and helped to increase land-related profits. In the case of collective construction land, the transfer through direct transaction rather than compulsory expropriation has increased collective profits by up to 10 times profits from compensation. In the case of the construction land quota, the change from government-led transactions to transactions between private entities or public bidding more than doubled the average price of such quotas.

Chengdu's pilot is also an important step in moving beyond the narrow, traditional focus on rural land management contracts between collective entities and farmers. The pilot opens up new opportunities to increase rural income by transferring rural land rights and assets. Such rights were defined for urban areas many years ago. Closing the legal and regulatory gaps between urban and rural land rights transfers is an important step toward allowing a more equal sharing of the benefits of urbanization through the flow and transfer of production land.

Chengdu's land system reform offers an alternative approach to the current land expropriation system that may have potentially far-reaching consequences. Because the land-conversion quota system allows collectively owned construction land to be sold in the urban land market, where demand and prices are high, economic efficiency gains seem possible. In the process, rural income may increase while disputes over expropriation potentially decline. Further regulation also is needed to govern the private transfer of nonagricultural land between farmers.

A balance needs to be found between government intervention and village autonomy. Land readjustments, coordination, and arbitration should be the responsibility of the village authorities. Governance mechanisms and transparency at the village level therefore need to be strengthened. At the same time,

the government should safeguard equitable and authoritative land titling and also assume responsibility to oversee and monitor the process of land titling.

A significant challenge will be to reform the current regulatory framework to give the transfer of collectively owned land, in particular collectively owned construction land, a sound legal basis. Current laws do not allow for such transfers, and if transactions occur, parties find themselves without legal protection. Also, collateralization of collective land remains illegal. Chengdu allowed mortgaging as part of its pilot and established a trial venture capital fund financed by fiscal resources to cover any mortgage losses. Given such security, some local banks issued loans backed by collectively owned land on a pilot basis. However, because collective land is unable to play a financing role under current national law, demand for land transfers remained suppressed. These and other issues undercut the incentives for legitimate land and property transfers and indirectly lead to illegal and informal transfers.

Government-led land expropriation remains an integral part of projects under the offset quota policy. Although the pilot areas showed some signs of reduced land expropriation and increased market-based practices, the overall scale of land expropriation has not decreased nor has the scale of government land management. In practice, construction land quotas generated by demolishing rural residences followed by subsequent resettling can be used for urban construction projects only when such quotas are assigned to a specific location in the planned construction area. However, the planned construction areas will still undergo a land expropriation process. More land expropriation will increase demands for land quotas, which in turn will generate capital to finance rural land consolidation. The continued demand for compulsory expropriation of rural land at low prices will therefore run counter to the integrated urban-rural development approach.

The Chengdu pilot experiences, along with other local reform pilots, will remain relevant only if the quantity of transfers



increases and the transfer mechanism is supported by a comprehensive national legal and institutional framework. If legal reform does not follow, Chengdu's pilot reform will remain a limited experiment, and solutions to the more fundamental issues in China's regulatory framework will be postponed into the future. Under China's government-led economic development model, local governments continue to have strong incentives to manage land, despite their involvement in the reform experiment. The underdeveloped property tax system means that the sources of government income are limited, and therefore no incentives will be made available to reform the land-based local finance system. In fact, the recent macrolevel control measures have further slowed down the land system reform. In response to the global financial crisis, the central government launched a large number of state-invested projects to boost domestic consumption, thereby accelerating land expropriation. Without reform, urbanization will continue to advance along the course of wholesale expropriation with land-sourced fiscal revenues and land-based finance.

*Specific recommendations on land system reform based on Chengdu's pilot experiences*

China's Land Management Law should be amended to restrict land expropriation by the state to purposes furthering public interest. It should also accord equal rights to land for commercial purposes through an integrated urban-rural market of state-owned and collectively owned land. Land to be used for public interest purposes can be obtained through expropriation, provided that strict procedures are enforced and compensation is paid based on market prices. All land resources for purposes other than public interest should be allocated through an integrated urban-rural market following market principles. With the mechanism in place to control land use, governments should confirm and recognize the rights to use, transfer, lease, and mortgage collectively owned land. Farmers should be given the right to transfer their land for building houses, both to ensure that they receive incomes from transferring

or leasing their houses in accordance with the law and to improve the living conditions of urban residents.

A nationwide cadastral survey should be carried out to support the measurement, definition, registration, and titling of property rights for all types of land. Policies governing compensation for protecting arable land should be developed and budgeted. Supervision of land titling procedures and relevant acceptance checks should be enhanced with the aim to title land based on current actual use. As a follow-up to the completion of registration of collectively owned land, government agencies should make land titling, certificate issuance, and other related work part of their standard services.

Land use control mechanisms should control overall quantity and quality and allow flexibility in spatial planning of land. Land quota exchanges between different localities should be allowed to both accelerate urbanization in economically better-developed areas with higher population densities and strengthen arable land protection in areas with relatively low land prices. In implementing projects involving land transfers and concentrations of rural residences, diversified resettlement arrangements should be made available to meet the different needs and demands of farmers. Centralized planning should help lower the costs of supervision over the reclamation of collectively owned rural construction land.

The scale of land expropriation should be reduced, and the current land-based finance model should be reformed. Given local governments' high level of dependence on land-sourced fiscal revenue, alternative long-term fiscal revenue sources should be developed to replace the cycle of land expropriation to land conversion to revenue generation with a comprehensive property tax system. In the short term, a dual-track system can be put in place for a transitional period. During the transition, the applicable tax and fee systems for state-owned land could remain unchanged, but certificates of use rights to collectively owned construction land could be issued to allow such land to be transferred and developed for urban commercial pur-



poses. Property taxes should then be levied on such transfers and on the properties.

### **Chongqing municipality: Balancing rural and urban land supply<sup>12</sup>**

Chongqing municipality features urban and rural areas with wide disparities in income and living standards. Large numbers of migrants originate from its rural areas. In 2007, 3.5 million migrants resided in urban Chongqing, and an additional 4 million migrants worked in other provinces. From 1997 to 2006, migration drove an increase in Chongqing's urbanization rate, from 31 percent to 48 percent. With urban development, demand for urban construction land increased significantly. But unexpectedly, construction land in rural areas also increased, despite a decrease in the rural population. Rural-to-urban migration did not provide exiting farmers with the incentive or the mechanism to effectively dispose of and benefit from their rural construction and residential land rights in the urbanization process. As migrants found settling in the cities difficult, they continued to invest in larger rural homesteads, which resulted in underutilized rural settlements and inefficient use of rural land.

#### *Chongqing's rural-urban integration model and land securities system*

Chongqing redesigned its land management system to match the conditions of urbanization and migration and to better use its large stock of fragmented rural construction land. Chongqing needed to devise a system that allowed for the voluntary and permanent exit of migrating farmers from rural areas while protecting their land and property rights, and that promoted the integration of rural land into the urban land market, including more efficient land allocation and land use planning and control, fair benefit sharing, and farmland protection. In 2007, the central government selected Chongqing to pilot a new rural-urban integration model. As part of the reform pilot, Chongqing established a Rural Land Exchange to experiment with the market-based integrated allocation of con-

struction land across urban and rural areas, transparent land use transfers, and new ways of capturing land value for migrating farmers. Specifically, the Chongqing pilot links urban land supply to a simultaneous, deliberate reduction of rural construction land and allows for more efficient allocation of construction land across rural and urban areas in the entire jurisdiction of Chongqing.

The Chongqing Rural Land Exchange is a market for integrated trading of urban and rural construction land rights. To foster the transfer of rural construction land rights to urban areas, Chongqing created land securities, which are tradable land development and construction rights. In contrast to the government's quotas for rural land conversion, which are issued annually and are limited in number and scale, land securities can be created flexibly by various land rights holders to supply additional urban land at market prices. Other types of land use rights, such as for arable land, forestland, collectively owned construction land, and equity shares of rural land, can also be traded or exchanged; however, the Rural Land Exchange is the only trading place for the rural land securities.

Land securities quotas are created through reclamation of rural construction land outside the urban development plan. Holders of rural land use rights can convert rural collective construction land into arable land rights anywhere in Chongqing. Reclamation is allowed for rural homestead land, land used by township enterprises, and land for rural public service facilities. Upon approval from the collective, reclamation can proceed in accordance with local procedures. Local authorities confirm the reduction in the rural construction land quota and the increase in arable land and farmland quotas. Households that apply for the conversion of their homestead land must prove that they have a legitimate permanent place of settlement elsewhere. Reclaimed rural land can be turned into a land security certificate, but rural construction land already located in the urban planning zone cannot be reclaimed and transformed into a security certificate.

Land security certificates can be traded at the exchange. Various stakeholders involved in urban development may bid for the cer-

tificates. Trading is open, transparent, legal, fee based, and voluntary. Once the bidding process is completed and land security quotas are awarded, the Chongqing Land and Housing Administration issues a land securities certificate to the winning bidder, which provides the right to acquire a certain quota of urban construction land in the urban development zone. The holder of the certificate can choose land earmarked for development within the urban-rural development area and urban master plan area. Local governments are responsible for processing the application for urban construction land, for carrying out land expropriation and conversion procedures in the designated urban development area, and for supplying the land rights to the user. Land used for profit purposes, such as industrial and commercial land, is usually supplied through competition, such as tender, auction, and public listing.

The land securities system provides a mechanism for rural collectives and individual rural households to use rural construction land more intensively and to set aside excess construction land for reclamation, security trading, and transfer. Each land security certificate contains a quota for both reclaimed construction land and newly generated arable land. Holding a security obliges the holder to supply arable land (through reclamation) and provides a tradable right to construction land in the urban construction zone. On obtaining a land security certificate, the holder gains the right to convert farmland to construction land in the designated urban-rural planning zone. Land securities can be used for construction throughout the municipality as defined in the urban-rural development plans. Each security certificate can be used only once. They are not tied to any specific block of land. The value of the security is not dependent on where it was generated originally, although construction land in more remote areas with poorer infrastructure generally has lower land value.

After seven years of experimentation following the initiation of the pilot in 2007, Chongqing's land securities system has progressively matured. Farmers' land rights are better protected, market operations in land trading have improved, and property rights

are more clearly defined. The system features voluntary reclamation, open trading, gains for the farmers, direct cash payment, and governance based on more clearly defined rules. The land securities model has become an effective means for farmer households to cash in on their homestead land and provides a workable approach to satisfy the demand for land in Chongqing's urbanization process. According to Chongqing's master plan, during 2013 to 2020, the municipality will require an additional 700 square kilometers of urban land. Only 300 square kilometers will come from the government-issued land conversion quota. Reclamation of rural construction land and land securities trading will be critically important to generate sufficient land supplies to meet actual demand.

To provide the institutional foundation for the land securities system, Chongqing began to expand the systematic registration and issuance of titles to rural land and rural residential property in 2010. The titling program covered the registration and certification of collective land ownership; land use rights to collective land, including homestead land and rural construction land; and farmers' residential farm properties. Chongqing also created a specialized agency to oversee the rural land consolidation program and set forth transparent principles and procedures for the reclamation, inspection, trading, and use of land securities.

Farmers or collectives can apply to the authorities to reclaim construction land and obtain rural land security quotas to engage in land trading. The government does not encourage or compel farmers to reclaim land against their will but acts primarily as a service and information provider. Farmers can choose to implement the reclamation individually or as a group or to recruit land consolidation agencies to help ensure that appropriate engineering codes and quality requirements are met.

Land transactions are managed centrally by the exchange, and the price for land securities is determined by the market. Information is made public on the website of the Chongqing Land and Housing Administration. Public notices are also displayed in townships and villages regarding land that

has been reclaimed and is intended for trading. Furthermore, the various stakeholders can select land based on their preferences. Other issues related to land expropriation, such as land hoarding and underutilization, are expected to be reduced, because prices for land securities better reflect the opportunity cost of delayed development. The distribution of proceeds from land sales reflects the property rights structure in rural areas. The proceeds from land securities trading are distributed between farmers (use rights holders) and collectives (land owners) at a ratio of 85 to 15. This ratio reflects the understanding that homestead land and farmhouses are the private property of the farmers, whereas the collective retains only a small stake in the land as formal landowner. Land securities have been trading at RMB 178,000 per mu on average, providing a net revenue for farmers of at least RMB 120,000 after deduction of reclamation costs and various fees.

*Specific recommendations on land system reform based on Chongqing's reform experience*

Land securities have been demonstrated to be an effective tool in land administration, in particular for land use control. Land securities provide effective protection and supplement arable land amid rapid urbanization. The economic leverage created by land securities has reversed the trend of simultaneous urban and rural construction land expansion. Rural construction land is gradually diminishing as the rural population declines. Many rural settlements are being gradually consolidated and are likely to have more efficient delivery of public services and environmental improvements. With the introduction of land securities, the amount of arable land has stabilized and is increasing. The land securities model also has positively affected the quality of arable land because reclaimed construction land is generally returned to arable land. By mid-2013, land securities covering about 7,600 hectares of construction land had been traded in Chongqing, corresponding to an increase of 6,800 hectares in arable land.

Land securities directly increase farmers' property-based income and generate benefits

from urbanization. The possibility of trading rural construction land has significantly increased the value of rural properties and land. Land sales profits are in the range of RMB 120,000 to RMB 150,000 per mu, an amount substantially higher than previous sales of homestead rights within the confines of the collective. Furthermore, farmers enjoy full property rights to the newly reclaimed arable land, which can be rented out. Land securities trading has had an impact on poorer areas in particular, with about 70 percent of all land securities generated originating from the less developed northeast and southeast areas of Chongqing. Land securities are an integral part of the urban-rural reforms. In 2010, Chongqing also initiated a reform of the household registration system by linking rural land management and disposal of land offered by the land securities model to the conversion of rural land to urban hukou. By July 2013, 85,000 households had vacated their homestead land and obtained an urban hukou.

The land securities system has helped to mobilize rural financial assets and improved access to finance in rural areas. Under current national law, urban land can be collateralized, but rural homestead land cannot. Urban land and homes can be traded freely, whereas the trading of rural construction land, especially homestead land and farmhouses, is allowed only within the boundaries of the rural collective, generally resulting in property prices below the reasonable replacement cost for farmhouses or buildings. Land securities trading has increased rural property values about 10-fold (from previously estimated RMB 10,000 per farmhouse to more than RMB 100,000). Furthermore, the pilot reform has allowed financial institutions to expand access to finance into rural areas because rural assets have increased in value and can be used as collateral under the pilot. More than RMB 8.3 billion is estimated to have been provided as rural asset-backed loans during the current pilot period.

Chongqing's pilot reform has exposed a number of shortcomings in China's current legal and regulatory framework for land that need to be addressed through legislative reform at the national level. China's rural

property rights reform will take time, and the distinction between rural land use rights and ownership remains ambiguous. Chongqing's model of benefit sharing between land use rights holders and owners can be interpreted as a prelude to further reform of rural property rights and a transition to stronger private property. China's legislation concerning the protection of farmer's land rights, however, remains incomplete. Although the central government has placed great importance on protecting farmers' land-related rights in numerous policy documents, the current laws do not yet adequately recognize farmers' rights and do not offer sufficient protection of property. No consensus has been found among lawmakers and policy makers with regard to the direction the revision of the Land Administration Law should take. Workable rules are still lacking regarding the use of collectively owned construction land for nonagricultural purposes, the right to use and benefit from rural homestead land, the respective roles of rural households and collective economic entities in land transfers, the expropriation of collectively owned land and its conversion into state-owned land, and compensation for expropriation. A long-awaited law on the administration of rural homestead land has not yet come into being.

Despite a clarification of the role of rural collective economic entities in relevant laws, questions of membership in collective economic organizations, their role in the market, collective ownership rights, and collective democratic decision making remain ambiguous and unclear. Administrative collective authorities still dominate decision making within such collective economic entities, and participation of and consultation with all members remain limited. Membership criteria for rural collective economic entities are not defined in any law, regulation, or judicial interpretation.

China has no unified rural land registration system. Although use rights to farmland, forestland, and homesteads have been confirmed and registered, these have been done separately by various authorities without a unified set of procedures or technical specifications. The lack of accurate surveys causes confusion and disputes of land parcels and

use rights, making the scaling up of successful pilot experiences difficult.

Despite government's recognition of land rights to farmland and homestead land, the transfer of rural homesteads remains confined within the collective under current law. This constraint poses a bottleneck to asset mobilization, restricts collateralization, and encourages the prevalence of vacant or deserted homestead land. Little policy and regulatory guidance addresses the development of the rural land market. The Third Plenary Session of the 17th CPC Central Committee envisioned the establishment of a harmonized construction land market between urban and rural areas. But the limitations associated with rural planning and value appraisal have limited the progress toward that objective. Finally, effective governance mechanisms at the grassroots level remain underdeveloped. The protection of farmers' rights depends to a large extent on local governance and control. But because of migration, limited knowledge of policy and regulations, and lack of participation and grassroots governance, farmers usually have little influence on rural land administration. In particular, in land expropriation and land securities trading, rural collectives have seen a rapid increase in their asset pool. An inclusive, transparent, and well-governed decision-making process could maximize the protection of farmers' rights and interests.

Revision and modernization of the Land Management Law, Property Law, and Regulations on Land Expropriation and Requisition are needed. For provisions that are not yet fully compatible with the need to protect farmers' rights and interests, immediate revisions are needed. Encoding and institutionalizing proven best practices from various local experiences in higher-level laws is recommended in the near to medium term, including those demonstrating rural land reform, land market development, and rural land asset distribution and management. Also needed are new and clear definitions and interpretation of the right to become a member of the rural collective economic entity.

A revision of the Law on the Organization of the Village Council or, alternatively, the formulation of a law on collective assets

could be considered. As collectives see their land asset value materialize, their asset pool will grow rapidly. Asset management and profit distribution are increasingly urgent topics. The economic mandate of collectives could be defined in the Law on the Organization of the Village Council. Alternatively, a law on collective assets may be formulated with reference to the Law on State-Owned Assets Held by Companies. The laws should clarify that the party to exercise the collective ownership right is the rural collective economic entity on behalf of its member owners. Its corresponding rights and obligations, and the management procedures and norms, should be clarified as well.

Homestead land rights and their management, including the right to profit, require further clarification in the Land Management Law. Buildings and yards should all be included in the concept of homestead land rights and be subject to approval and registration as a whole. The right to profit on farmers' homestead land should be clarified, allowing farmers to use their housing for profit without compromising their living conditions. When homestead land is allowed to be traded in the market, farmers should be able to receive the proceeds, and when they vacate homestead land, they should be compensated. It may be advisable to remove the provisions in the Regulations on Confirming Land Ownership Rights and Land Use Rights that stipulate that, on homestead land that has remained vacant or on which housing has ceased to exist for more than two years, the rural collective in the area of the homestead land may apply to the county-level people's government and, with its approval, retract the land use right on the homestead land. For homestead land obtained by the farmer household based on the "one home for one household" principle, such homestead land should have its property right recognized and protected. At the same time, new administrative measures on rural homestead land should be promulgated as soon as possible to provide the legal framework for homestead land management.

To advance the trading of rural collective-owned land for construction, land securities were created as a flexible alternative to land-

holders' cashing out on the property right to rural construction land. These mechanisms have allowed the municipality to discover the market value of rural construction land outside the rural construction planning area. For legally obtained, collectively owned for-profit construction land, the recommended reform would include transfer, leasing, and collateralization under the current land market management system.

### **Beijing: Redevelopment of urban fringes<sup>13</sup>**

Beijing's urban villages emerged in the 1990s when industry and service sectors began to attract large numbers of migrant workers who sought affordable housing in the rural areas surrounding Beijing. Today, Beijing municipality has an estimated 1,700 urban villages that house 3.7 million local residents and an additional 3.5 million to 4.0 million migrants, accounting for more than half of Beijing's total migrant population. Beijing's urban villages stretch over 700 square kilometers within the fifth ring road. About two-thirds of the urban villages are located within the eight urban districts of Beijing proper, and the remainder are situated in nearby rural areas that are targeted for gradual integration into Beijing's urban area. In many places, rural migrants outnumber the native residents by a wide margin.

Since 2010, the Beijing municipal government has been implementing a comprehensive redevelopment and rural-urban integration program in 50 selected pilot villages to address issues associated with urban villages. The program aims to rationalize urban planning, address informal development within and around the city, and explore ways of integrating local rural residents into the urbanization process while protecting their property rights. Key reform elements include collective property reforms, integration of rural-urban construction land markets, and integration of the rural-urban social security systems. The redevelopment program is also integrated into Beijing's urban development master plan framework and involves upgrading residential housing in situ and



integrating redeveloped areas into the urban public infrastructure and services networks. The program, however, does not target the migrant population, nor does it address issues related to migrants in peri-urban areas. The 50 pilot villages are located between Beijing's third and sixth ring road in the districts of Chaoyang, Haidian, Fengtai, Shijingshan, Fangshan, Shunyi, Daxing, Tongzhou, and Changping. As of 2013, many pilot villages had completed the demolition of old villages, including formerly illegal and informal developments, and begun to move former residents back into upgraded residential housing. Conversion of local residents to urban status was also completed in most of the villages, along with the reform of rural collective property arrangements.

#### *Rural collective property rights and urbanization*

At the core of the redevelopment program are land and property issues. Beijing's pilot approach to peri-urban development departs from the conventional approach of government-led expropriation and conversion of rural land for urban development projects. The government limits expropriation, conversion, and sale of rural land to just the amount needed to generate sufficient revenue to finance the redevelopment program. The new approach allows rural residents in peri-urban areas to finance their transition to urban citizenship through capitalizing on their own rural assets in various ways. Decisions on how much land needs to be converted are based on an estimation of the total redevelopment cost, including the cost of demolishing old residential areas and constructing resettlement units, compensation payments, and costs associated with hukou conversion and access to the urban social security system. Residents are generally compensated with new housing for the demolition of previous residential property. The physical redevelopment allows for higher land use efficiencies in urban villages because residential areas are being modernized, concentrated, and integrated into the urban infrastructure networks. The transition from rural community organization to urban community man-

agement also requires developing regulations and procedures for electing village committees and clarifying conditions and procedures for establishing community residents committees and for managing public facilities and community services in the redeveloped areas.

The inclusion of the pilot villages in the urban development master plan requires adjusting and optimizing the urban planning process. Planning needs to consider the specific conditions of rural areas that previously had been left to informal urbanization and development while traditional urban planning focused narrowly on urban development projects on government-requisitioned rural land. The urban master planning process now needs to consider the extent of construction land required for upgrading residential units for resettling local residents and the associated public infrastructure, including green spaces, transport infrastructure, utilities, schools, and health care facilities. Provisions need to be made for setting aside land for industrial and commercial purposes to provide resources for economic development of the remaining collective organizations. In the 50 pilot villages, new planning standards included 50 square meters of floor space per person for new residential units and 50 square meters of floor space per person for industrial or commercial development. In pilot villages where rural construction land was still abundant, land resources were divided into reserve land (planned for conversion and sale for revenue generation), land for public infrastructure development, and land for future economic use by rural collective organizations. In villages with insufficient construction land stocks, the planning process needed to go beyond individual villages, to pool remaining construction land resources, and to integrate the redevelopment program across several villages or even townships.

Collectively owned construction land, which is not expropriated in the redevelopment process, remains with the collective organization for industrial or commercial urban investment and development. A second characteristic of Beijing's pilot that departs from common practice across China is that rural residents no longer have to forgo their



ownership rights to rural assets as they become urban residents. Instead, they retain their status as members of collective organizations and their property rights to collective land and other collective assets. When further expropriation is needed, compensation payments are shared by the members of the collective business organization, thus also benefiting those with urban hukou.

The reform of the rural collective property system toward collective shareholding arrangements is an important aspect of peri-urban development and rural-urban integration. As rural residents become urban residents and peri-urban areas are integrated into the city proper, traditional rural collective ownership arrangements are no longer relevant. Whereas in rural agricultural areas land-related reforms focus on confirmation and registration of farmland rights, farmland transfers and rural land market development, and agricultural sector modernization, in peri-urban areas, such issues are no longer relevant because collectives have lost their farmland resources and retain only some construction land resources and other property assets. Instead, cooperative shareholding arrangements for collective economic assets provide the opportunity not only to retain the collective ownership system in urban areas but also to make collective assets portable in the form of transferable shares, independent of the residency status of the shareholder. Portability and transferability of rural assets are an important factor in facilitating their integration into the urban society.

In many villages, collective property reform has transformed former rural collective administrative entities into collective business organizations that manage collective assets based on shareholding arrangements. Although establishing a standardized valuation of collective assets remains challenging, collective property reform has progressed in recent years. The quantification of collective assets, including land, has created significant capital stocks for many collective business organizations. In 2012, collective business organizations in Changping District owned and managed assets with a total value of RMB 37 billion (US\$5.7 billion equivalent), jointly owned by 354,000 shareholders. A

total of 278 collective business organizations paid out dividends on shares of RMB 548 million (US\$84 million equivalent) or RMB 1,550 per shareholder (World Bank 2013).

#### *Integration of collective construction land into the urban market*

Beijing's urban village program allows rural collective organizations to trade construction land in the urban land market subject to the provisions of the urban master plan. Beijing's program is a national pilot for constructing rental units on collectively owned construction land (first piloted in Tangjialing, Haidian District). Prior to the redevelopment program, many urban villages generated income from leasing informal housing units to migrants or engaging in illegal construction projects. The redevelopment program created the possibility of converting illegal property into legally recognized commercial properties or industrial parks owned by local collective business organizations. Collective organizations can develop construction land by themselves or through leasing to private investors. The government encourages collectively managed urban development projects and has reduced administrative restrictions. Public agencies have intensified guidance and services to collectives, including training in project application, public bidding procedures, technical supervision, and financial management. The pilot experiences are encouraging for advancing the integration of the rural-urban construction land market.

Collective organizations are still subject to administrative restrictions and face challenges in accessing finance for development projects despite favorite locations of collective construction land close to urban centers. The urban village redevelopment program involves resettlement and large-scale development of modern housing for local residents to promote rural-urban integration. Urban village redevelopment is different from commercial real estate development in urban areas but is currently subject to the same restrictions, such as a limited land conversion quota and government controls to limit the oversupply of commercial urban housing. Because of current legal restrictions, collective construc-

tion land cannot yet be fully mortgaged, specifically when land still contains buildings and has not yet been fully reclaimed. To overcome these difficulties, Beijing municipality offers loan securities for collective housing construction projects and provides preferential allocation of construction land quotas to collectives to facilitate urban market entry.

### *Urban social security*

The urban village redevelopment program also provides new avenues to integrate local residents into the urban social security system. Although conventionally farmers are enrolled in China's rural social security system, Beijing has allowed the enrollment of local residents into the urban social security system, which is based on voluntary contributions. Enrollment is independent of land and property issues. Whereas under the widespread "land for social security" scheme, compensation from land expropriation is being used by local governments to cover farmers' contribution to the social security system, Beijing's urban village program does not link compensation payments with enrollment in the urban social security system. In reality, because enrollment is based on voluntary contributions, entry into the urban social security system depends more on the employment and income opportunities of local residents than on compensation.

### *Specific recommendations on land system reform based on Beijing's urban village program*

The implementation practices and experiences of Beijing's urban village redevelopment program provide a new direction for mobilizing rural assets for more inclusive urbanization and rural-urban integration in urban fringe areas. Urban village redevelopment explores options for an autonomous and self-governed urbanization process of rural residents based on more market-oriented principles. The program has provided the opportunity for urban villages to undertake resettlement and redevelopment projects for higher land use efficiency and integration into the urban infrastructure network. It has also allowed the integration of the rural construc-

tion land market into the urban land market and empowered the collective to trade or develop construction land for profits.

Restricting the scope of land expropriation for financing urban village redevelopment needs to be complemented by rural collective property rights reform. Collective ownership of assets can be protected in the urbanization process. Shareholding arrangements involving land and assets represent an innovative approach to securing and managing economic assets as rural citizens urbanize. Collective assets can be monetized, and collective business organizations can accumulate significant stocks of collective assets in the course of expropriation or of new zoning for collective industrial or commercial development projects and land appreciation. A pragmatic choice for maintaining and capitalizing on collective ownership is to introduce cooperative shareholding arrangements under transparent democratic management.

Social security enrollment is decoupled from land. Rural residents do not need to forgo their rights to collectively owned land to be eligible for enrollment in the urban social security system. As rural residents find employment that enables them to voluntarily contribute to social security, they are encouraged to join the urban social security system and bridge the gap between the rural and urban systems. Social security enrollment is clearly separated from land and property issues and does not require liquidating property for enrollment.

Collectively owned construction land can be integrated into urban development within the framework of urban planning regulations. Owners of rural and urban construction land should have equal rights to develop and participate in the market for construction land. Beijing and other cities have allowed urban construction projects to be built on rural collective construction land within the scope of urban planning, although the land is not expropriated.

Financial innovation is needed to allow rural collectives to access financing. Collectively managed urban development projects are hampered by restrictions to collateralize collective construction land and access to

finance, causing many collective construction projects to seek capital investments from private developers. The lack of formal channels to access finance creates risks for collective property rights and adequate benefit-sharing arrangements. Comprehensive reform is needed to address access to finance and protection of collective property in the urbanization process.

### **Guizhou: Experimenting with land readjustment in Meitan County<sup>14</sup>**

The introduction of the Household Responsibility System in 1978 stimulated unprecedented agricultural growth in rural China. The new system of contracting farmland to individual households also created challenges for rural collectives that needed to balance contractual land use rights with demographic change. Many collectives resorted to land readjustments. Although these adjustments accommodated rural population growth, they undermined tenure security, led to smaller and fragmented land holdings, and caused a drop in land investments and productivity.

#### *Meitan's innovations in land use contracting*

In the early 1980s, Meitan, an agricultural county in Guizhou Province, began to implement the Household Responsibility System, and village collectives contracted village farmland to individual households. Experiencing strong population growth, the county experimented with land readjustments and direct grain subsidies to safeguard the livelihood needs of new collective members and to protect equity. From 1983 onward, readjustments became more frequent, negatively affecting the perception of tenure security under the new arrangements. In addition, land became more fragmented. Cultivated land per household decreased from 7.3 mu in 1980 to 5.9 mu in 1987, and average plot size declined from 0.7 mu to 0.6 mu because of readjustments. In some townships, households had up to 15 plots, varying between 0.01 mu to 0.2 mu in size. Investments in land were affected as well. Productivity growth of land dropped from 7.0 percent per year dur-

ing 1979–84 to 3.3 percent per year during 1985–87. Land reallocation also brought an administrative and financial burden to collectives because it involved verification of land plots and land quality and discussions to reach consensus on land division and reallocation within the village.

In 1987, following the State Council's endorsement of innovative land policy reforms, Meitan introduced a new policy to address the challenges related to its limited land supply and population changes. Although land was generally allocated based on the number of members within a household and readjusted as household size changed, Meitan decoupled land contracting from changes in household size, thereby providing stronger tenure security to households. Land readjustments in response to demographic change were basically eliminated, and the Household Responsibility System became more stable and sustainable. The pilot involved the following elements: Collective land ownership was confirmed to rest with the administrative village and not with townships or natural villages. The village and households entered into land use contracts, guaranteeing that land rights would remain unchanged for several decades. The scope of land rights was clarified as well, including the rights not only to manage and operate the land but also to profit from and transfer (subcontract, transfer, lease, have joint operations, and exchange) the land. As a result of property rights clarification, rural land became a more meaningful and important asset for farmers. The pilot also stipulated that the collective could take back allocated land for distribution through public bidding in the event that a household converted contracted farmland to nonagricultural use, left the land unused, or refused to pay agricultural taxes or fulfill state grain procurement obligations, or when household members had passed away.

Meitan's approach, which decouples land contracting from demographic change, represented an important innovation in China's collective ownership of rural land. Instead of allocating collectively owned land equally among village members through routine readjustment, the new system specified that

only those farmers who had obtained land use rights before 1987 were eligible members of the collective with ownership rights to collective land, including the right to contract farmland for a 30-year term. This definition of collective membership excluded all rural residents that entered the village or were born after 1987. These newcomers no longer enjoyed collective membership rights and, more specifically, were no longer eligible to obtain 30-year property rights to land.

When the pilot started, Meitan's total population of 380,000 people was overwhelmingly rural. Per capita land resources were 1.3 mu. The total rural labor force in the country was 154,000, of which 30 percent were estimated to be surplus labor. Unlike the coastal areas, Meitan had very few employment opportunities in the industry and services sectors. Annual income per capita was RMB 400. From 1987 to 2012, Meitan's rural population grew to 500,000. With land tenure stabilized under the Household Responsibility System and Meitan's new policy, an estimated 25 percent of the population remains outside the local collectives and is ineligible for land contracting from the collective. The fundamental challenge now is to find new ways to address the livelihood needs of these landless village members. Structural adjustment within the county, labor migration to the coastal areas, and complementary new policies on rural land transfer have become important for stabilizing the new land tenure arrangements.

Initially, in the early 1990s, the majority of the surplus labor force was absorbed through the reclamation of nonarable hillsides and development of the household-based nonfarm sector. Hillsides were contracted to villagers without farmland resources and transformed into tree crop plantations. The government provided capital and subsidized loans for agricultural investments and encouraged enterprises to provide inputs, technology, and information to households. By 1993, Meitan had developed 155,000 mu of nonarable land resources managed by 15,000 households. An additional 11,000 villagers were employed at township and village enterprises. As migration to the eastern coastal areas increased, pressure on land resources

declined. In 2011, 47 percent of Meitan's rural residents were employed in agriculture, while the industrial and services sectors had absorbed 26 percent and 27 percent of the local labor force, respectively. Farmers' per capita income increased from RMB 343 in 1987 to RMB 5,841 in 2011, while the share of farming income out of total rural income declined as more people engaged in nonfarm activities. About half of the rural income was derived from nonfarm employment.

Despite these structural changes, Meitan remained a relatively poor country and faced difficulties in addressing the so-called *san nong* issues: improving agricultural productivity, accelerating rural development, and increasing rural incomes. In particular, land transfers and consolidation of farmland remained slow, preventing agricultural efficiency and productivity increases through larger-scale farming, as well as increases in farm incomes. In response, Meitan began to promote land transfers to increase voluntary and compensation-based land consolidation. Implementation guidance was provided through a plan called *Interim Methods for Circulating the Right to Land Contractual Management in Meitan County*, which outlined that individuals, enterprises, and economic organizations, including those from outside the village, would be allowed to participate in land transfers; that the government would provide subsidies to farmers who contracted more than 50 mu to support a larger scale of operations; and that the government would provide agricultural facilities to the land-leasing parties under special circumstances. To protect the property interests and rights of the transferor and transferee, the county government also issued detailed regulations for land transfers, including reporting, registration, formation disclosure, filing of documents, eligibility requirements to participate in transfers, annual inspection of larger-scale operations, complaint handling and dispute resolution, and benefit assessments.

In 2009, Meitan further deepened the local land management system by standardizing land transfer procedures, managing land transfers based on market principles, encouraging larger-scale land transfers, and strengthening rural land and property rights.

Meitan carried out baseline surveys of all land across the county and registered and titled all contracted farmland, residential land and buildings, and forestland. In 2010, Meitan issued the final *Methods for Circulating the Right to Land Contractual Management in Meitan County*, which stipulates the principles, methodology, contract format, and management procedures for rural land transfers, thereby providing the regulatory basis for formal land transfers to support larger-scale operations in agriculture.

In 2010, Meitan established its first centers for rural land transfers. These collect and manage information for households interested in land transfers, establish and maintain a land transfer registry, contact enterprises interested in land acquisition, and facilitate exchanges between farmer households and enterprises. By the end of 2011, the total land area transferred to new operators reached 126,000 mu, or 26 percent of the total registered cultivated land area of 480,000 mu. About half of this land was obtained by specialized farming households; 33 percent was circulated to 149 economic cooperation organizations; and 17 percent was circulated to agricultural enterprises. Meitan's new system has increased the perception of tenure security, resulted in more rapid land consolidation and larger-scale farming, and stimulated productive investments in land and input use, resulting in a 42 percent increase in grain output, from 120,000 tons in 1987 to 170,000 tons by 2011.

The experiences from Meitan have gradually been incorporated into central government policy. From 1993 onward, the policy of decoupling land contracting from demographic change was promoted nationwide, which led to the stipulation of the 30-year contract term for farmland in Central Document No. 1 of 1997. The 30-year contract term was subsequently embedded in the Rural Land Contracting Law in 2002. In 2008, the Third Plenary of the 17th CPC Central Committee stipulated the central policy of "long term without change," further enhancing and protecting the property rights to rural land. This policy was further detailed in Central Document No. 1 of 2013 and reiterated by

the Third Plenary Session of the 18th CPC Central Committee in 2013.

*Specific recommendations on land system reform based on Meitan's experiences*

From the perspectives of system reform and institutional change, changes in entitlement to land rights, as implemented in Meitan, have profound impacts. They fundamentally alter the rural collective economy and demonstrate that institutional change is needed to modernize the agricultural sector and achieve efficiency and productivity increases that can provide incomes competitive with those from off-farm employment. During the implementation of Meitan's land system experiment, various issues emerged that are of wider relevance for national policy formulation and require further careful assessment and continued experimentation.

*Clarify collective ownership arrangements.*

Under collective ownership, the terms *owner* and *user* of the land, and their relationship, are ambiguous. The legal status of collective organizations is often not clear under current laws. Uncertainty exists with regard to where the collective authority is located. Disputes often arise between the three levels of rural collectives—townships, administrative villages, and natural villages or villager groups—over collective administrative authority. In reality, many collectives at the administrative village and the natural village or village group levels exist in name only, without legal status or administrative, management, and fiscal capacity. In Meitan, the village collective authority is generally with the administrative village. But experience has shown that collective administration and management are often difficult at the administrative village level because administrative villages cover numerous natural villages, with hundreds of households holding several thousand mu of land. By comparison, natural villages are often much smaller and are more traditionally grown communities with common perceptions and values; thus management of collective assets is often easier at the natural village level. Further consideration is



therefore needed to determine where collective authority should be located.

***Deepen collective ownership reform through strengthened membership rights.*** Implementation of Meitan's land system reform has shown that the approach of decoupling land contracting from demographic change can be regarded as part of the foundation of the central government policy of "long term without change," but it requires well-developed supportive policies in order to be successfully implemented over a long time, especially given limited land resources and pressure from demographic change. Surveys among villages in Meitan have actually found that villagers still view land adjustments as necessary during demographic change, which may reflect a deep-rooted sense of community responsibility for the sharing of resources. Despite stronger tenure security, the approach in Meitan has raised concerns about new community members being treated unfairly because they are excluded from access to the village's land resources. Migration and off-farm employment are more frequent among households that are not eligible to contract collective land. Local surveys clearly show that views differ with regard to whether land rights should be readjusted from time to time and who should be eligible for land allocation.

***Deepen rural land market development.*** The implementation of the approach of decoupling land contracting from demographic change is an important condition for agricultural-sector modernization and structural adjustment. Because employment opportunities in agriculture are decreasing as a result of rising labor costs, land transfers provide an opportunity to consolidate farms and achieve larger-scale operations that allow those who remain in agriculture to increase their incomes to levels competitive with off-farm employment. Rural farmland markets are under development; land transfers are mostly informal and based on oral agreements, contract periods are short term, and transfer prices are relatively low. Disputes over land and contracting terms are

frequent. In addition, little information flows between those interested in transferring land and those interested in contracting land. To address these issues and deepen rural land market development, and to capitalize on the structural changes occurring in rural areas, the institutional arrangements, policies, and regulations concerning land transfers need to be developed and implemented.

***Integrate migrants into urban areas and social security.*** In the course of Meitan's policy innovations, conditions for landless rural residents have emerged. However, strengthening property rights of those with land has not created social problems, because outmigration has provided alternative income sources of nonfarm employment. To consolidate the stronger property rights arrangements achieved in rural areas, complementary reforms are needed to support the permanent integration of rural migrants into the cities. The establishment of a rural social security and pension system is important for addressing the livelihood problems of rural residents that do not have access to land under Meitan's approach of decoupling land contracting from demographic change. Deepening the social security system is important to address livelihood risks that will emerge as the central rural land policy of "long term without change" further develop.

## A framework for land policy reform

### Urbanization and land reform

Land is of central importance to China's urbanization, economic growth, and social stability. Beginning with the late 1970s, land has been central to China's early transition to greater market orientation. Decollectivization and the introduction of the Household Responsibility System beginning in 1978 laid the foundation for rural and agricultural growth and the development of a rural industrial and manufacturing sector, which was in the form of township and village enterprises throughout the 1980s. In the 1990s, land became a key resource when further market



reforms, along with China's integration into the global economy, provided the foundation for industrial growth and urbanization. Land will remain an essential factor and resource in China's urbanization process and for its industrial and agricultural modernization agenda.

China's economic achievement has been accompanied by the gradual development of a legal and policy framework that governs property rights to land. This change has included a transformation of the previously uniform public ownership system into a property regime under which public ownership of land is maintained. At the same time, use rights to publicly owned land have been largely privatized, either through allocation of land rights to individual households, in the case of rural land, or granting of land rights to entities and individuals, in the case of urban land. Unlike many former planned economies in which reforming the traditional public ownership of land was conducted through privatization, China has focused on strengthening and improving the security of individualized use rights to land while maintaining public (state and collective) ownership. This model has helped to maintain social stability and has greatly contributed to economic growth.

Land and property issues have become more complex over the past decades, thus requiring further comprehensive reform and modernization of China's regulatory and institutional framework for land. The Third Plenary Session of the 18th CPC Central Committee, November 2013, has already provided a broad, forward-looking framework for future reform toward a unified rural-urban construction land market, enhanced and clear property rights and entitlements granted to rural land rights holders, and new management systems and institutional arrangements for land in rural and urban areas. In addition, the formulation of the government's urbanization strategy for the next decade provides an opportunity to build on past achievements and harmonize the existing regulatory and institutional framework for urban and rural land to support more efficient and inclusive economic growth and urbanization.

The reform discussion that follows is based on the directions and guidance given by the Third Plenary Session of the 18th CPC Central Committee on how to advance reforms. The recommendations are based on selected lessons from various institutional innovations piloted in the six provinces and municipalities discussed in this report.

## **Definition and protection of land and property rights**

### *Clarify China's current "long term without change" policy*

Farmers' 30-year farmland rights remain exposed to significant uncertainties because of involuntary transactions for agricultural and nonagricultural purposes and illegal takings, violations of farmers' rights to land, and uncertainty over whether farmland rights can be extended upon expiration of the current 30-year term. Under China's 2007 Property Law, farmland rights may be extended when they expire. But this extension provision is weaker than the parallel provision on urban land, which allows the automatic renewal upon expiration of the present term. The different treatment of the length of tenure rights to rural and urban land conflicts with the effort to improve long-term tenure security in rural areas. Farmers' rights are also threatened by collective entities that readjust land to accommodate population growth, a practice that is in conflict with central policy. Collectives also often take land back from farmers who move to cities, violating the provisions of the Property Law.

The Third Plenary Session of the 17th CPC Central Committee of 2008 stated that rights to farmland should be for "long term without change." The Third Plenary Session of the 18th CPC Central Committee of 2013 reiterates and confirms the policy direction of strengthening farmers' property rights to land. Given the central policy support to long-term rights to farmland, the term "long term without change" should be defined and clarified in the law through revisions of the Land Management Law, Property Law, and Rural Land Contracting Law. Contractual rights to farmland could be defined explic-

itly as indefinite property rights with no contracting period limitation. Reallocations of farmland through the collective entity should be prohibited, clarifying that those who currently hold contractual rights to farmland will continue to hold them into the future. Legal revision should also clarify the scope of the associated rights, such as the rights to occupy, profit, transfer, and inherit. The laws also need to clarify that collective land ownership rests with the collective members and not with the collective administrative entities. Embedding these provisions in the law is an important step in harmonizing the treatment of rural and urban land rights and allowing rural citizens to enjoy the same property rights and tenure security on land that are accorded to urban citizens. The strengthening of property rights to farmland will also help ensure that local governments uphold these rights and give farmers the possibility to bring cases of land rights violations to the courts. Secure rights to farmland are likely to lead to higher agricultural investment and a greater value creation in the markets for farmland.

*Design and implement a unified land registration system*

A well-designed and functioning system of land rights registration and documentation tends to strengthen farmers' confidence about their property, enhances transparency in land transactions, and is likely to stimulate investment and facilitate land market development. Currently, documentation of rural land rights remains weak. Boundaries of individual farmland parcels are often unclear and generally not well documented, making progress toward change problematic, such as enforcing use and contract rights, resolving land-related disputes, and identifying those whose land is affected by requisition, lease arrangements, or other actions. In addition, a reliable and complete inventory of land parcels does not yet exist but is needed to provide a foundation for land tenure security, land use planning, land allocation and conversion, taxation, and monitoring of land market development. After several years of piloting various approaches, Central Document No. 1 of 2013 now calls for a program

to document and register farmers' land rights throughout the country. Specific reforms to be considered include the following.

***Develop a unified land registration system over time.*** A unified land registration system will require the development of unified rules, standards, and procedures in the land rights registration process. Along with the establishment of the land registry, unified land classification standards need to be developed and applied to all types of land, including farmland, forestland, grassland, and rural residential land, and to land surveys, cadastral data management, and registration of land transfers. Following international best practices, the currently scattered administrative responsibilities for rights and property registration for various types of land should be consolidated within one agency responsible for the registration (box 4.6). A transitional approach could involve the requirement that various agencies follow unified procedures in land surveying and registration until a new single land registration agency has been established.

***Make the transition from the current method of deed registration to title registration.*** China's Property Law requires a title registration under which land rights are created when they are registered. The Rural Land Contracting Law, however, stipulates a deeds registration under which land rights are established when the land contract is created, regardless of whether those rights are registered. Land title registration is generally superior to systems based on the registration of deeds (recordation) because it tends to make land titles more reliable and is also simpler and less costly to administer once the registry is built. For China's rural land registration system, a title registration system may be most appropriate in the longer term. However, given the current de facto deeds registration of rural land rights, uniformly applying the rule of "no registration, no rights" to land currently held by hundreds of millions of farmers would be difficult. It is therefore necessary to recognize the legal force of rural land rights under the new system and, in addition, of those rights that remain to be registered and merged into the new system.

## BOX 4.6 Documentation and registration of land

China's laws recognize the benefits of documentation and registration for collective ownership. The Land Management Law provides that collectives can register their ownership with the county government. Evidence of ownership is the county-issued ownership certificate. It also requires the collective entity to issue land use contracts to farmer households.

The 2002 Rural Land Contracting Law reiterates these requirements and establishes a set of minimum requirements for all such contracts and a parallel set for contracts that involve transactions of rural land rights. The Rural Land Contracting Law also mirrors the legal requirements for documenting collective land ownership by requiring that county governments issue land rights certificates to farmers to affirm such rights. Also, the Property Law includes requirements for documenting and registering rural land rights and stipulates that the state adopt a unified registration system for all real properties. The law also provides that the register guarantees the accuracy of the recorded information, and it imposes liabilities on the register if damages are caused by a registration error.

Many challenges remain in establishing a functional land registration system. Although the Property Law requires a unified registration system, it does not provide guidance on institutional responsibilities or operating rules. Currently, the Ministry of Land and Resources registers collective ownership rights and use rights to collectively owned construction land. The Ministry of Agriculture is responsible for registering use rights to collective farmland and grassland. The State Forestry Administration is

responsible for ownership and use rights to collective forestland. Rural houses on collective construction land are registered by the Ministry of Housing and Urban-Rural Construction.

Despite many unresolved issues, the government is addressing the registration of farmers' land rights. In 2005, it began establishing a land registration system for farmland and conducted a land registration experiment in Anhui Province. In 2008, Central Document No. 1 (*Fortifying the Foundation of Agriculture*) stated that the local governments would enhance the administration and regulation of rural land contracting and expedite the establishment of registration systems for rural land use rights. Central Document No. 1 of 2009 (*Achieving Steady Agricultural Development and Sustained Income Increases for Farmers*) provided that the governments should carry out pilot projects for registering rural land use rights to verify size, location, and title documents of contracted land for each farm household.

Central Document No. 1 of 2010 set forth that the governments should scale up the scope of registration pilots for rural land use rights, with guaranteed financial support. In 2012, Central Document No. 1 repeated the instruction on rural land use rights registration and called for steadily scaling up the scope of registration pilots, with the costs to be covered by the central financial resources. In January 2013, Central Document No. 1 called for a nationwide land registration initiative with a completion goal of five years. To date, land registration pilots have been conducted in 230 towns and have registered 7,936,000 mu of farmland belonging to 653,000 rural households.

### *Consider moving from household-based registration toward parcel-based registration.*

Another step to consider would be how to make the transition from the current system of registering all land plots of a household on one single document (land use contract and land certificate) to a system where individual plots are registered separately. A land parcel-based registration and documentation system would simplify future land transfers and the recording of transfers of individual plots. Legal reform should also explicitly require registering both husband and wife as household representatives to improve gender equity

in future land registration. Eventually, a unified rural and urban land and property rights registration system could become the institutional basis for land and property rights protection and transfers.

### *Reform China's collective ownership arrangements*

Under Chinese law, collectively owned land and assets are owned jointly by members of the collective (box 4.7). The Property Law authorizes the collective administrative entity, such as the administrative village, natural vil-

### BOX 4.7 China's collective land ownership

Under China's Constitution, all land in rural and suburban areas, except that owned by the state, is owned by collectives. The Land Management Law (1998) authorizes collective economic entities at various levels to operate and manage collective land. Neither authority further clarifies the relationship between collective members (farmers) and the collective administrative entity on questions of land ownership. The Property Law (2007) provides that collectively owned property is owned by all members of the collective, namely, the households of the community.

Regarding the relationship between member owners and the collective entity, the law further prescribes that the collective entity merely exercises ownership rights on behalf of the collective. While authorizing the collective entity to exercise ownership rights, the Property Law specifically requires that the land contracting plan and the contracting of land to nonvillager units or individuals need to be approved by the member owners. The 2010 Organic Law of Village Committees further specifies the relationship of member owners with the collective entity with respect to land. The law provides that land contracting plans, residential land distribution plans, and use and distribution of compensation for expropriation of land shall be decided at the villager conference.

Central policies on forestland reforms reflect this definition of collective land ownership. In 2003, the Central Committee demanded either allocating collective forestland to individual households, if the land is suitable for household contracting, or converting all property interests in that land into shares and allocating such shares among the member owners. The 2008 Central Document No. 1 reiterated that property interests in collectively managed forestland must be ascertained and allocated to villager households in the form of shares of stock.

Both national law and central policy support the principle that farmers, not the collective entity, are the joint owners of collective land. These provisions assert that rural land is owned by the members of the community, not by an administrative entity, such as the village committee, villager group, or collective economic organization. Each member of the collec-

tive has an indivisible ownership interest in all collectively owned land. Accordingly, as a nonowner of rural land, the collective entity should not have any property interest in the land. The collective entity exercises ownership rights that have been delegated by its member owners. The exercise of collective ownership rights must be subject to the approval of member owners, which is authorized by the villager conference.

Existing Chinese law permits all three levels of the collective—township, administrative village, and villager group—to assume ownership rights but does not identify any specific collective level as the primary owner of rural land. Recent Chinese laws are not even as precise as the 1962 Sixty-Article regulation, which clearly specified the lowest level of collective (production team, the predecessor of the present-day villager group) as the owner of the land located within its geographical boundaries.

To guide the reform of laws on registering collective ownership, the Office of Central Leading Group on Rural Work, Ministry of Land and Resources, Ministry of Finance, and Ministry of Agriculture jointly issued the *Several Opinions on Reconfirming and Registering Collectively Owned Rural Land*, requiring that collective land ownership be ascertained at the villager group level and that ownership certificates be issued to the villager group. Only when village boundaries are no longer existent can the land ownership be ascertained at the administrative village level.

The CPC Central Committee *Decision on Issues Regarding the Improvement of the Socialist Market Economic System*, adopted in 2003, suggested new property structures and arrangements for rural collective assets that facilitate the transition to a market economic system and strengthen the role of collectively owned assets in economic development. The document asked for the clarifying and strengthening of property rights and the interests of collectives. Central Document No. 1 of 2010 encouraged regions with suitable conditions to carry out pilot reforms of the collective property rights system and emphasized the importance of collectively owned assets for developing the rural economy and increasing rural incomes.

Source: Li and Wang 2013.

lage, or villager group, to exercise ownership rights on behalf of the collective members. However, collective ownership has become ambiguous since decollectivization because the introduction of the Household Responsibility System in 1978 and subsequent policy changes continuously strengthened household-based land rights. Collective ownership is often mistakenly regarded as ownership by the collective administrative entity. Although the Property Law has sought to clarify the relationship between collective members and the collective administrative entity in terms of ownership of collective assets, ambiguities remain in that collective administrative entities often retain control of farmland contracting, exercise power to take farmers' land, and often manage collective assets, including land and nonland assets, to generate profits for the collective entity itself rather than the collective members they represent.

Reform of collective ownership of collective assets should complement the reform for strengthening property rights to farmland, which was discussed earlier. In particular, reform should strengthen the ownership arrangements and governance of assets by the collective members; clarify the rights to collective assets, particularly assets other than land that has been contracted to households; and clarify the arrangements for collective shareholding organizations that will manage collective assets.

***Clarify collective ownership arrangements.***

Many pilots for collective property reform, particularly reforms for transforming collectives into collective business organizations and farmers into shareholders of collective property assets, show that collective administrative entities often retain a large portion of the shares of collective assets. Legal reform should clarify that all collective assets belong to the members of the collective business organization. The collective administrative entity is not entitled to such property interest in collective land and assets. Where collective property is converted into shares, such shares should be distributed to the members. As an entity that is authorized only to exercise ownership on behalf of its members, the collective entity should not retain any share of the collective property.

***Clarify collective membership arrangements.*** Membership, qualifications for becoming a collective member, and termination of collective membership need to be clarified in the law. Currently, entitlements of collective members to collective assets are only generically defined, and guidance is needed for ongoing collective property reform efforts across the country. Because no legal code clarifies the criteria under which a person becomes a member of a collective, approving or disapproving the membership application is currently subject to the collective's discretion. One approach to clarifying collective membership and protecting collective members' ownership rights would be to define a cutoff date after which a rural citizen moving into a community is no longer eligible to become a collective member. This measure would prevent the dilution of collective assets under conditions of demographic change.

***Clarify rights to collective assets.*** Legal reform should clarify the members' rights associated with collective property. Rights to collective assets include the rights to occupy, use, profit, transfer, mortgage, guarantee, and inherit property. The transfer (sale) of shares of collective property would allow members of the collective to exit the collective permanently. But reforms should, in particular, clarify questions about the inheritance of shares of collective assets. Currently women who married into households after the reform, and the children born subsequently, cannot inherit shares and therefore cannot receive dividends when the shareholding household member dies. This issue will become increasingly critical when members of shareholding households die or move their residential registration outside the collective. Their shares would eventually return to the collective instead of being retained within the household. Legal reform should also consider broadening the bundle of rights to collective land by including the right to obtain a mortgage, that is, to allow the collateralization of assets to mobilize finance in rural areas.

***Make a transition toward corporate governance in collective management.*** Collective property reform pilots have introduced a corporate governance approach to replace tradi-



tional collective management. Reforms have promoted a governance arrangement that includes a shareholder representative board, a board of directors, and a supervisory board. The introduction of modern corporate governance has diminished the previous control of the village committees over a village's economic activities. Reforms have also provided institutional mechanisms to hold local cadres accountable and reduce the potential for rent seeking and malpractice of collective property. Reforms should further seek to reduce administrative intervention by the collective administrative entity in the operation of collective business organizations, separate the political and administrative functions from the economic functions of collective business organizations, and strengthen transparency in the distribution of profits made by the collective business organization.

### **Reform of the rural land expropriation system**

#### *Define legal limits for rural land taking for public purposes by local governments*

Defining the “public interest” for which the state can exercise its power of eminent domain requires balancing the legitimate but often competing policy goals and interests of various stakeholders. Preserving farmland and narrowing the rural-urban income gap are important policy priorities. At the same time, local governments depend on revenue generation from land conversions and land sales, and urbanization would require more land to proceed. The reform of the rural land expropriation regime, and more generally the harmonization of the takings approaches used for urban and rural land in China, could help rebalance these interests and reduce the systemic disadvantages of rural citizens in the urbanization process.

The “needs of public interest” should be defined by listing those interests as part of the law. The reform of the rural land expropriation regime could follow the precedent of the Urban Takings Regulation of 2011 and its principles that define public interest by listing all foreseeable categories of public interest. For rural land, defining public interest in the same way as in the Urban Takings Regula-

tion would remove the current legal dualism and inconsistency that discriminate against China's rural citizens. A meaningful definition of public interest, both for urban and for rural takings, should ideally be included in the new Land Management Law. Because it is not possible for the legislature to envision all permissible public interests at the time of the legislation, a provision under an inclusive list could leave room for future expansion at the legislature's discretion.

Land for public infrastructure development could still be acquired through expropriation channels, but controls need to ensure that conversion is conducted more prudently than in the past. Complementary reform is needed to fine-tune the political incentives structure at the local government level. For example, a current mayor would face reduced incentives to convert excess quantities of land and promote investment if the revenues generated from such land conversion could only be invested several years later, and the mayor would be able to gain credit for the growth years later.

#### *Increase compensation for rural land conversion for commercial purposes*

Compensation for rural land conversion for commercial (non-public interest) purposes should be increased up to the amount of the commercial value of the land, with deductions for the costs incurred by local governments for preparing the land for nonagricultural use. Under the current regime, compensation packages are capped at 30 times the land's average annual agricultural output value. Such a maximum ceiling is often insufficient for expropriated farmers to sustain their livelihoods. Again, the reform of the rural expropriation regime could follow the principles of the Urban Takings Regulation, which have been applied in several provinces.

Because urban housing markets are well developed, the practical method to determine the level of compensation is based on market prices. Under the Urban Takings Regulation, the expropriating agency is required to pay compensation “no less” than a defined standard that is based on comparable market prices. But given the lack of a functional rural land market, the regulation's standard of no



less than market price may not work for rural land takings. Thus, a benchmark tailored to fit the specific circumstances in rural areas could be developed. Currently, under the regulation local governments are encouraged to formulate a “unified annual output value” and a “comprehensive regional price” for determining compensation for expropriation in traditional agricultural and peri-urban areas, respectively. These approaches may be used as the benchmark or the minimum standards.

*Improve the resettlement subsidy to sustain farmers' livelihoods*

The Land Management Law created a resettlement subsidy to account for the fact that compensation payments for the loss of assets during land expropriations alone are often insufficient for restoring rural livelihoods. The current practice of determining the amount of the resettlement subsidy is based on the amount of land expropriated. Considering the small landholding per household and the resulting small amount of resettlement subsidy per dispossessed farmer, the current system disadvantages small farm households in particular.

To achieve the objective of raising dispossessed farmers' original living standard and ensuring their long-term livelihood, reform should consider resettlement subsidies separately from compensation. Several provincial jurisdictions have already set the minimum resettlement standards per affected farmer. For example, in Jiangsu, such a subsidy is between RMB 14,000 and RMB 26,000 per dispossessed farmer, depending on the location of the expropriated land. In Chongqing, the subsidy is RMB 28,000 regardless of the location. In Beijing municipality, a farmer is entitled to 48 to 60 months of the city's minimum wage per dispossessed household farm labor in Beijing.

*Clarify and define rural social security coverage as a government financial obligation independent of compensation for rural land expropriation*

China's approach to compensation seeks to compensate farmers for the loss of property rights to land and to provide (among other

benefits) social security to ensure long-term livelihood security. From the mid-2000s, the central government began to enroll farmers in a rural social security (pension) system with the objective of covering all farmers under the rural social security system by 2020. The government called for contributions from various levels of government, collective entities, and farmers to individual pension accounts. Recent implementation practices, in particular a “land for social security” scheme that was pioneered in the Yangtze Delta and has spread to many locales, link farmers' entitlement to compensation with their entitlement to social security.

The “land for social security” scheme has emerged as a result of ambiguous provisions in China's regulatory framework with respect to the relationship between compensation and social security. According to the Property Law, the state should pay compensation for the loss of land, provide resettlement subsidies and compensation for fixtures on the land and for standing crops, make arrangements for the cost of social security for the farmers losing their land, and protect farmers' livelihood and their rights and interests. The law does not expressly require government to pay for social security as it does for the compensation package, and the law remains unclear as to who should pay for farmers' social security. The Social Security Law (2011) reiterates the need to make arrangements for the full cost of social security of farmers who are being dispossessed but fails to specify who should pay for that cost.

Probably because of this legal ambiguity, line agencies promulgated regulations that favor channeling compensation packages into the social security fund. The Ministry of Labor and Social Security in 2006 permitted local governments to pay for social security by using resettlement subsidies and compensation payments owed to dispossessed farmers. The Ministry of Land and Resources in 2007 added a requirement that only when these two compensation items are not sufficient to cover the dispossessed farmers' social security costs would local governments have to provide social security coverage. The “land for social security” scheme was quickly adopted by local governments as an instru-

ment to lower the cost of rural land expropriation and accelerate urbanization.

In Chongqing, although a dispossessed farmer is entitled to 80 percent of the total compensation payment for lost land (with the remaining 20 percent due to the collective) and 100 percent of the resettlement subsidy, all of the compensation and half of the resettlement subsidy were required to be paid into pension accounts, leaving the farmer with only 50 percent of the resettlement subsidy at the time of land expropriation. Sichuan required the resettlement subsidy to be channeled into the social security fund. Compensation for lost land was paid to the collective entity. In some cities in Liaoning Province, the government provided 30 percent of the social security contributions, and 70 percent was contributed from the compensation payment and resettlement subsidy.

Legal reform should clarify current ambiguities by explicitly requiring social security coverage as a supplement to the compensation package. The rural social security system is a public welfare program unrelated to farmers' land rights or their entitlement to compensation when their land is expropriated. Legal reform should clarify that social security coverage is a government obligation to all farmers, including dispossessed farmers.

*Embody in law the protection of farmers' procedural rights during land expropriation*

China's procedural laws for rural land expropriation need improvement. The central policies on farmers' procedural rights and the Urban Takings Regulation already provide guidance for developing relevant provisions on procedural rights that should be embedded in the law, as follows:

***Establish the right to receive notice.*** Central policies require that farmers be notified of all relevant information concerning the proposed land expropriation before the expropriation plan is approved. Planned expropriations should be publicized and made known to each household that will be affected by the proposed expropriation. The Urban Takings Regulation prescribes a three-stage notification: predecision notification, in-decision notification, and postdecision notification.

This articulation should be followed in any revisions of notice laws for rural takings. Provisions for periods for public comment should also be included.

***Establish the right to participate.*** New procedural laws for rural expropriation should include a mandatory public hearing in the expropriation process, as already stipulated in central policies and the Urban Takings Regulation. The right to participation is even more important if China adopts a "no less than benchmark" standard in determining the compensation package. Procedural laws should empower farmers to negotiate the compensation package with the expropriating agency in good faith, starting from the benchmark standard. Central policies also require farmers' confirmation of government's land assessment as a necessary supporting document for reviewing and approving the expropriation plan.

***Establish the right to appeal.*** Like urban property owners, rural citizens affected by expropriation should be given the right to seek administrative hearings or judicial reviews when they dispute a compensation decision. Existing laws on appealing decisions permit expropriation to continue despite disputes over compensation and should be replaced with new rules permitting farmers to file an injunction when there is a dispute over the compensation package. Provisions prohibiting violent force under the Urban Takings Regulation should also be incorporated into rural procedural laws.

**Developing the construction land markets in urban and rural areas**

Construction land markets in rural and urban areas are developed to different degrees and remain incomplete and inefficient. In urban areas, the government retains the monopoly in the primary land market, while the market for subsequent transactions, the secondary land market, is underdeveloped and nontransparent. Local governments are poorly equipped to monitor transactions in the secondary market, collect proceeds from land transactions, or capture value as land is being converted to higher-value uses.

In the industrial land segment, land is often allocated directly rather than in accordance with national policy, which requires the competitive allocation of land for industrial purposes, as given in Central Document No. 28 of 2004 (*Decision on Deepening Reforms and Intensifying Strict Land Management*). In rural areas, collective organizations can use land for nonagricultural industrial and commercial activities only within the confines of the collective, or they can use land use rights as shareholding rights. However, collective construction land cannot be leased to noncollective entities for commercial or industrial development. Furthermore, rights to rural homestead land are limited: transfer and lease is allowed only between members of the collective. Quotas for converting farmland to collective construction land are limited as well, constraining collectives' opportunities for commercial and industrial development and resulting in widespread illegal use of rural construction land.

Land market development and deepening in urban and rural areas, and the integration of rural and urban construction land markets, are important to increase land supply for urban development and to gradually replace current practices of government-led land requisition and conversion toward more efficient market-based allocation of land. This section discusses a number of reform opportunities to promote the integration of the rural and urban construction land markets toward more equal benefit sharing and more efficient land use.

#### *Deepen the urban land market*

***Strengthen transparency and efficiency in the secondary urban land market.*** Reform should enable local land administration authorities to strengthen efficiency in the urban land market with increased transparency in the secondary land market transactions. Reform also should introduce regulations that require all urban land transactions to register with local land transaction centers. Furthermore, transfers and leases of urban land should be transacted and recorded through land transaction centers to curb direct transactions between sellers

and buyers that circumvent the registration requirements. Compulsory transactions or urban land transfers through the land transaction centers would allow local governments not only to collect fees from transactions but also to capture a share of the value increase in urban land, which currently provides no public value capture.

***Develop the industrial construction land market.*** Reforming the industrial land market will involve reducing the share of industrial land in urban areas and pushing industrial land to higher-value commercial and residential uses. With the expiration of the first 40-year term for industrial land, local governments should be positioned through new regulation to buy back inefficiently used industrial land from industrial land users at current market prices for industrial land, allowing the government and industrial users to share the increase in value of such industrial land. The repurchased land would then be available for competitive auctioning for other than industrial purposes. Furthermore, land allocated to public service entities, which covers large areas within cities (such as public spaces) and is often used inefficiently, should be reclaimed by local governments and be allowed to enter the market.

#### *Develop and integrate collective construction land into the urban land market*

Large amounts of collective construction land have entered the urban market illegally, particularly in China's eastern coastal areas and large cities. At the same time, several provinces, including Guangdong, Chongqing, Anhui, Zhejiang, and Jiangsu, have experimented with innovative measures to let collective construction land be leased, transferred, and mortgaged. However, because current legal prohibitions prevent collective construction land from entering the urban land market formally, such efforts remain at the pilot and experimentation level.

The Third Plenary Session of the 18th CPC Central Committee in 2013 provided a clear policy foundation and direction for collective construction land to enter the urban market. These policy decisions provide the opportu-

nity to adjust the legal framework and legalize the entry of collective construction land into the urban market. Therefore the recommended actions are to revise and amend the Land Management Law, the Property Law, and other relevant laws to clarify and formalize the legality of such market entry. In addition, new implementation regulations need to clarify which rural land will be allowed to enter the urban construction land market as well as define the mechanisms for legalizing collective construction land that has already entered the urban market.

*Clarify and strengthen property rights to rural residential (homestead) land*

Rural residential land management practice has created de facto property rights dating back to the 1960s. However, these rights remain largely undefined, and the Property Law does not allow transferring or leasing of rural residential land. In reality, however, homestead land has been dynamically leased and transferred in many regions; therefore, reform needs to address how conditions have evolved in practice. Legalizing de facto property rights to rural homestead land is important for promoting rural-to-urban mobility as well as integrating construction land markets.

The decisions of the Third Plenary Session of the 18th CPC Central Committee of 2013 call for clarifying and strengthening homestead rights, and they provide more flexibility in developing new methods to transfer homestead land and in promoting market entry of rural residential land. Previous central policies intended to restrict transfers of homestead land because of concerns that full transferability of farmers' residential land rights may trigger uncontrolled conversion of farmland to construction land. Such conversions were considered to pose risks to farmers' livelihoods when they dispose of their homesteads through transfers without having adequate income sources and a residence elsewhere. Existing laws also preclude rural households from getting a new foundation plot once they have transferred their originally allocated plot. Once a rural household has transferred its residential land rights, it would not be allocated a new foundation plot

by the collective even if it ultimately fails to adapt to urban life.

The following are more specific recommendations for reforms to strengthen and clarify rights to homestead land: Rural residential land rights should be defined as indefinite usufruct property rights, harmonizing urban and rural property rights to residential property. This definition of rights would include rights to use, operate, mortgage, transfer, and profit from residential land use rights. Given the cautionary approach to homestead land transfers stipulated by the Third Plenary Session, new regulations to guide this process should ensure that transfers of rural residential land rights are voluntary and contingent on the household's ability to meet certain qualifications, such as relocation of all household members to cities, stable employment, or an urban residential permit.

Land use control mechanisms should also prohibit villages from extending the existing scale of homestead land, ensure that land rights transfers are legal, and prevent uncontrolled farmland conversion. Furthermore, to curb the spatial expansion of residential land in rural areas, collective entities should no longer be allowed to allocate homestead land for free to new community members. New arrivals in rural villages should buy homestead land through market-based transfers based on market prices.

*Allow conversion of rural construction land, including homestead land, into transferable quotas to be traded in the urban land market*

Provincial jurisdictions such as Chongqing and Guangdong have started to permit the transfer of rural residential land rights in recognition of the migration momentum created by urbanization, as discussed in the sections on Chongqing and Chengdu. Such experiments could be adopted nationally through further legislative reforms, while ensuring that land use control mechanisms prevent uncontrolled conversion to industrial or commercial use. Specifically, the Chongqing property exchange experiment demonstrates efficient market-driven land conversion. Rural residents can convert their construction land into agricultural land and obtain a tradable

right for the opposite conversion. This right can be sold on the exchange, and developers, with the agreement of the owners, can use it to convert agricultural land zoned for development in urban areas where demand is high. By unlocking construction land away from the city, this method allows cities to optimize their spatial design and avoid inefficient city expansion that relies solely on available construction land near the existing city boundaries. This approach is of particular interest because it allows the efficient, market-driven transfer of construction land quotas from remote rural areas to urban areas while benefiting rural citizens through the mobilization of dormant rural construction land to generate income, flexibility in decisions about migration, and recurrent income from leasing of newly created farmland in the home villages. This approach could help unlock large amounts of currently remote and underutilized rural construction land for city development in a market-driven way and reduce current social tensions that arise from compulsory land requisition in rural areas.

### **Innovation in land institutions in peri-urban areas**

The proliferation of urban villages, or informal development of urban fringe areas, in many cities across China has created many land- and property-related challenges. Local governments and real estate developers have discovered the economic potential of redeveloping urban fringe areas. But the redevelopment of urban villages and their formal integration into the city space pose serious difficulties to city governments and developers, as discussed earlier. Reform should address those informal developments, along with underdeveloped public services, the legal vacuum around collective construction land in peri-urban areas, and the financial challenges of municipalities related to compensation and to resettlement as peri-urban areas.

#### *Integrate urban villages into urban master plans*

Integrating urban villages into the formal urban development process, based on integrated urban master planning and rural-urban integration of construction land mar-

kets, could increase land supplies for urban development. Integration would also provide opportunities for boosting low-income housing availability and allow collective organizations and rural residents in peri-urban areas to benefit economically from urbanization, because construction land markets are allowed to develop based on strengthened land rights. As discussed earlier, revisions of the Land Management Law and other laws should proceed quickly, based on the decisions of the Third Plenary Session of the 18th CPC Central Committee of 2013. At the same time the reform should include the formulation of implementation guidelines to allow rural collective organizations in peri-urban areas to develop or lease collective construction land to developers for urban commercial and residential development within the framework of urban master plans.

Through appropriate zoning, local governments could provide incentives to build low-income housing in those areas while avoiding resettlement and related costs, because collective construction land remains under collective ownership. Furthermore, formal recognition and legal protection of small-property rights to housing units on collective land could provide rural migrants currently residing in informal housing with stronger incentives to settle permanently in urban areas.

#### *Consider a zone takings law, following the model of Taiwan, China*

China's advancing urban development will be largely commercial. Negotiating with individual landowners to assemble land for urban cluster development may be impractical and delay the urbanization process. To address this dilemma, the government may consider introducing the experiences from Taiwan, China (box 4.8), where the legal framework provides local governments with the option to rezone agricultural land for urban development and allows commercial developers to conduct land transactions directly with rural property rights holders. Transactions are subject to the provisions of urban master plans, including transparent public consultation. China's Ministry of Land and Resources has already planned to permit the reserving of part of the expropriated (and thus converted



### BOX 4.8 General and zone takings in Taiwan, China

In 1953, the Land to the Tiller Act abolished the tenancy system in Taiwan, China, through compulsory government purchase of land from landlords and resale to the tenants. By 1956, the total area of owner-operator farming had increased from less than 50 percent of total farmland in 1948 to over 85 percent. The government protected private tenure following the land reform using legal protection, a broad publicity campaign to improve farmers' awareness of laws and government policies, and a government-led annual survey to closely monitor the implementation of the land reform program. In the subsequent urbanization, authorities took measures to control the use of land for urban purposes and to facilitate nonfarm development by farmers themselves.

**General and zone taking.** Taiwan, China, takes an approach of listing the circumstances under which private land can be expropriated. *General taking* refers to expropriation for the public interest. *Zone taking* refers to the expropriation and conversion of private farmland to nonfarm use for the purpose of (a) development of new urban areas; (b) renovation of old urban areas; (c) farmland conversion in planned urban zones into construction land, or conversion of industrial areas into residential and commercial areas; (d) development of nonurban land; (e) rural development for improving rural public facilities and public health; and (f) other uses in accordance with relevant laws. General and zone taking are subject to different procedural and compensation laws.

For general taking, a compensation standard is the agricultural land value that has been assessed for taxation purposes. Each year, the local land administration bureaus publish the assessed values for farmland throughout Taiwan, China. That present-value standard has recently been replaced with a market-value standard that is based on recent comparable agricultural land market transactions. The relatively simple procedures include public hearing, public announcement of the taking decision for 30 days, written notification of the affected landowner, filing period with the local land administration within 30 days in case of dispute over compensation, appeal of the local decision to a land price review committee, and filing of administrative litigation with a court.

Zone taking, in contrast, represents the de facto permission of the government to take private prop-

erty for commercial purposes, with landowners being entitled to higher compensation and better procedural safeguards. Landowners can claim a monetary compensation based on the market value of the land's agricultural use or, alternatively, take back 40 to 50 percent of the expropriated land as offset land. Such offset land is the previous farmland that has been converted into higher-value urban construction land. The landowner may also select a compensation scheme in which one part of the compensation is paid in cash and one part is given in offset land.

Procedurally, the government is required to purchase land from landowners through negotiation before launching zone taking. If negotiations fail, the government may resort to zone taking. Prior to the taking, the government must conduct public hearings to explain compensation modalities to the affected landowners. Landowners who choose to take compensation in the form of offset land are given the opportunity to choose the location of the offset land within the designated construction area. Landowners are also given the opportunity to negotiate the exact compensation ratio (40–50 percent) to be applied.

**Infrastructure financing under zone taking.** The government is required to set aside a portion of the expropriated land for public facilities such as schools, roads, and public utilities. Although there is no legal requirement with respect to the ratio of such public facility land, in practice, 40–50 percent is for public use. After setting aside 40–50 percent of land as offset land and 40–50 percent as public use land, the government retains 10–20 percent of the expropriated land for sale to developers.

To prevent irrational urbanization, the law requires balancing the budget for the development using funds from the sale of the land acquired through zone taking and prohibits the use of other local revenues to finance such development. The government therefore needs to rely on the proceeds from selling the 10–20 percent share of taken land to finance the construction of all public facilities within the zone.

Expropriated land is first converted and registered as state owned upon the completion of zone taking. After offset land selection, such offset land will be reregistered as privately owned land. The remaining construction land sold to developers will also be registered as developer-owned land. In the end, only the land used for public facilities remains state owned.

Source: P. Li 2013.



use) land for compensating affected farmers in planned urban areas.

The Taiwan, China, model may provide an approach to balancing the property interests of collectives and farmers in peri-urban areas with the need for the government to provide and finance public infrastructure. A new zone taking and city redevelopment law could permit urban commercial development whereby farmers affected by the change in land use will be able to share the benefits of such development through compensation in the form of land for urban development and greater procedural safeguards.

If forthcoming reforms could permit farmers to retain part of the expropriated land as resettlement land zoned for nonagricultural purposes, the legal nature of the ownership of such land and the use rights to such land must be determined. Because the expropriated land was collectively owned in perpetuity before it was taken by the state, the recommendation is to allocate the use rights of the expropriated land being retained by the rural citizens as allocated urban land rights without term limitation.

#### *Consider introducing property taxation for new construction land*

In line with the reform recommendations on the introduction of an annual property tax discussed in Supporting Pillar Report 6, *Financing Urbanization*, collective construction land that enters the urban land market could be made subject to a capital gains tax. Doing so would allow local governments to capture a share of the value increase when such land enters the urban market for commercial purposes as well as to collect an annual property tax. The introduction of such property taxes on new construction land would be gradual and depend on the development of the various elements of a tax administration system, including land registration, valuation, and documentation.

### **Land reform and agricultural sector modernization**

Migration, land rights transfers, and farmland consolidation, as well as mechanization and technological change, are reshaping

China's household-based farming model, thus creating new challenges to the traditional arrangements of land contracting under the Household Responsibility System of 1978. From 1996 to 2009, the total agricultural labor force decreased from 317 million to 259 million people, with an estimated 250 million farmers working in cities for more than six months every year. In 2011, about 1.28 billion mu of farmland (out of the 1.38 billion mu of total collectively owned farmland) was contracted to nearly 230 million households. About 200 million households (85 percent of all rural households) owned less than 10 mu (Xu and others 2013). Large-scale migration has resulted in the gradual separation of contractual and management rights to farmland, which traditionally were fully integrated in China's smallholder farm operations under the Household Responsibility System. Migrating farmers have retained their contractual (property) rights to farmland but are increasingly transferring the management or operating rights to others because they no longer work on the farm themselves.

Transfers of management rights to farmland have rapidly increased in recent years, in peri-urban areas as well as in many agricultural regions. By 2011, about 20 percent of all farmland was subject to transfers, with shares as high as 41 percent in Jiangsu, 40 percent in Zhejiang, and 26 percent in Guangdong (Xu and others 2013). More than two-thirds of land transfers take place between rural households, although specialized cooperatives and enterprises have become more prominent in acquiring farmland through transfers. Most of the land transfers are between 10 and 50 mu, allowing individual rural households to achieve some level of large-scale operation and specialization commensurate with labor and technical capacity and generating incomes competitive with off-farm incomes from migration. In 2011, only about half a million households operated farms of 100 to 200 mu (7 to 13 hectares).

Land transfers and consolidation of small farms face challenges. Small farm size, land fragmentation, and the lack of regulated, transparent markets for farmland are considered to be some of the challenges imped-

ing China's agricultural modernization. The central policy is to encourage voluntary and market-based land transfers between households and other agricultural operators and entities. However, most of the transfers are informal and lack written formal agreements. No formal market for rural land transfers has been established, prices are negotiated individually and may not reflect real land value, procedures are not developed, and no formal documentation of such transfers takes place. With confusion about contractual (property) and management rights, lack of contracting documentation, and the absence of standardized land transfer procedures and recording, disputes over farmland rights have significantly increased. Illegal conversion of farmland to higher-value nonagricultural purposes in the transfer process has become more widespread.

*Promote market development for rural farmland*

***Safeguard contractual (property) and management rights to farmland.*** Legal reform should clarify the separation of land con-

tracting (property) rights, defined as indefinite property rights without term limitation, and management (operating) rights to farmland and provide equal legal protection to both. Management rights, specifically, would include the rights to use and receive profits from land.

***Clarify mortgaging of management rights to farmland.*** Agricultural modernization will also depend on farmers' ability to access finance and make longer-term investments in land. Central Document No. 1 of 2013 provides strong support to the household-based farming operation, and such larger-scale family farms are expected to rely to a greater extent on capital investments and mechanization. With a complete ban on mortgaging of rural land and assets, both small farmers and larger-scale family farms are unlikely to access credit to finance investments and operations (box 4.9). Prohibition of rural land rights mortgaging was enacted in the mid-1990s when the majority of China's farmers were dependent on small-scale farming for their living. But under urbanization and

#### **BOX 4.9 Mortgaging of individual rights to collectively owned land**

In rural land rights, Chinese laws distinguish between allocated land rights acquired for free and land rights acquired with consideration. Land rights, such as rights to arable land, residential land, private plots, and private mountains, that are allocated to farmers as a legal entitlement cannot be mortgaged. In contrast, mortgaging of wasteland rights, which are typically acquired through auction, tendering, or public negotiation, is permitted upon approval by the village collective entity.

The Property Law of 2007 prohibits the mortgaging of contracted rural land rights, but strict prohibition appears to have waned recently. In response to the policy of stabilizing rural land rights for "long term without change," China's Central Bank in 2008 called on local banking institutions to explore innovative ways to improve farmers' access to credit. In 2009, the Central Bank encouraged considering the mortgaging of rural land rights. In 2010, the Central Bank, together with three other financing and banking

regulators, issued the *Guiding Opinions on Pushing Forward in Full Scale Innovations of Rural Financing Products and Services*, permitting financing institutions to carry out mortgaging of rural contracting and operation rights and residential land rights.

Although these documents suggest the policy intent of lifting or reducing prohibition of mortgaging of rural land rights, no legal basis exists. Because of the expressed legal prohibition, a mortgage contract with rural land rights as collateral is deemed legally unenforceable, which in turn would discourage banks from engaging in this business. Even if some banks were induced or forced to make mortgage loans despite the legal prohibition, such loans would be highly risky because the banks cannot foreclose the property in the case of nonperformance of the loans. Clearly, unless China's mortgage legislation is revised to accommodate rural land rights mortgages, improving farmers' access to credit through mortgaging of rural land rights will remain difficult.

*Source:* Li and Wang 2013.

with migration accelerating, there is scope for consolidation in the agricultural sector in many regions across China. The current prohibition of mortgaging effectively precludes the remaining farmers from financing their acquisition of additional land rights. Developed economies show that access to credit is critical for long-term, productivity-enhancing, and income-generating farmland investments, and such conditions increasingly apply to China as it modernizes its agricultural sector. Maintaining the restrictions on rural land rights mortgaging may no longer be advisable.

Mortgaging can cause foreclosure if the debtor defaults on the loan for which the land rights are pledged as collateral. Existing legal prohibition of mortgaging of farmers' land rights evolved from concerns over farmers' loss of land rights due to foreclosure. Such concerns can be addressed through additional legal restrictions as well as improved banking practices, such as the requirement that the borrower produce business plans subject to the mortgage holder's review and approval, credit and risk assessment, and so forth. Measures to reduce potential risks of foreclosure could include a homestead exemption to foreclosure on certain farmland to guarantee farmers' need for livelihood; advance notice informing the defaulting mortgagor regarding possible consequences of default, and judicial sale of land in case of foreclosure to prevent banks from accumulating holdings of foreclosed land rights.

#### *Strengthen service functions of collective organizations and promote cooperative development*

Collective organizations should be strengthened to oversee and monitor farmland transfers and to provide members with services in the land transfer process, including land rights confirmation, registration, and certification, as well as ensure that agricultural operators adhere to certain qualification standards in agricultural production (box 4.9). Although enterprises would also be allowed to acquire farmland through transfers, such land acquisition needs to comply with land administration provisions, thus preventing or

penalizing illegal conversion of farmland to nonagricultural uses. Farmer-driven voluntary cooperative development should be supported to allow farm households to integrate production, access technology and unify product standards, improve market access, and achieve higher efficiency in the use of machinery and other inputs.

## Notes

1. The hukou system is China's household registration system, which distinguishes between rural and urban citizens and imposes restrictions on rural residents' mobility to settle in urban areas and gain access to urban social security and public service (see Supporting Pillar Report 3).
2. For a discussion of China's fiscal system, see Wong 2013.
3. Open auction is competitive bidding for land in which the grantor (the county or city land and resource administration) issues a public notice of land auction. Interested grantees can participate in competitive bidding at a designated time and place. The winning bid goes to the highest bidder. Under a tender bidding process, also called silent auction, the grantor invites the interested grantees to make their tender offer for the land parcel pursuant to a set of criteria announced in public. Negotiated sale is a process whereby the would-be grantee negotiates the deal with the government grantor to reach an agreement on the level of granting fee (Ministry of Land and Resources, *Rules on Granting Use Rights to State Owned Land through Tender Bidding, Auction and Public Listing* (Decree No. 11), 2002).
4. DRC 2013, *Notice on Strengthening Land Asset Administration*, 2001.
5. Ministry of Land and Resources, *Rules on Land Concession through Tendering, Auction or Competitive Bidding*, Decree No. 11, 2002.
6. DRC 2013, *Notice on Relevant Issues Concerning the Strengthening of Land Control*, 2006.
7. Central Document No. 1 of 2013, *Several Opinions on Speeding Up Development of Modern Agriculture and Further Strengthening Rural Development Vitality*.
8. China participated in the negotiations of the *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries*

and Forests in the Context of National Food Security (Food and Agriculture Organization of the United Nations [FAO] 2011). The voluntary guidelines have been endorsed, and their implementation has been promoted, by the following meetings since their initial adoption by the Committee on World Food Security on May 11, 2012: Group of Twenty, Rio + 20, the United Nations General Assembly, and Group of Eight.

9. The value of unequipped agricultural land in the southwest region averaged around £15,000 per hectare in January 2011. The value of land with permission for residential development was around £1,500,000 per hectare for the average-size regional city of Plymouth and around £2,100,000 for the major regional city of Bristol, United Kingdom. Valuation Office Agency, *Property Market Report 2011*, [http://www.voa.gov.uk/dvs/\\_downloads/pmr\\_2011.pdf](http://www.voa.gov.uk/dvs/_downloads/pmr_2011.pdf).
10. This was based on Yuan (2013a).
11. This was based on L. Li (2013).
12. This was based on Wang (2013).
13. This was based on Hu (2013).
14. This was based on Shao (2013).

## References

- CASS (Chinese Academy of Social Sciences). 2013. *Blue Book on CSR, 2013*. Beijing: CASS.
- China Land and Resources Statistical Yearbook. 2001–13. Ministry of Land. Beijing: China Geological Press.
- China Statistical Yearbook. 2000–12. National Bureau of Statistics of China. Beijing: China Statistical Press.
- China Urban Construction Statistical Yearbook. 2001–12. Ministry of Housing and Urban-Rural Development. Beijing: China Planning Press.
- DRC (Development Research Center of the State Council). 2012. “The Current Model of Land Expropriation: Risks and Reforms.” Working paper prepared by S. Liu for the DRC, Beijing.
- . 2013. “Land Concession in China: Revenue and Expenditure and Recommendations for Improvement.” Working paper prepared by S. Liu for the DRC, Beijing.
- FAO (Food and Agriculture Organization of the United Nations). 2011. *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security*. Rome: FAO.
- Hu, R. 2013. “Beijing Redevelopment of Urban Fringes: Experiences and Implications.” Background paper prepared for the World Bank and Development Research Center Urbanization Study, World Bank, Washington, DC.
- Kitazato, T. 2003. “Japan: Fixed Property Tax.” Case study presented at the seminar “Innovations in Local Revenue Mobilization,” World Bank, Washington, DC, June 23–24.
- Landesa. 2012. “Summary of 2011 17-Province Survey’s Findings: Insecure Land Rights: The Single Greatest Challenge Facing China’s Sustainable Development and Continued Stability.” Landesa, Seattle, WA. <http://www.landesa.org/china-survey-6/>.
- Li, L. 2013. “Chengdu’s Experiments on Land System Reform and Urban-Rural Integration.” Background paper prepared for the World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- Li, P. 2013. “Letting Farmers Share in the Benefits of Land Value Increment in the Urbanization Process of Taiwan, China. Practices and Experiences.” Background paper prepared for the World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- Li, P., and X. Wang. 2013. “Legal Review of China’s Property Rights Regime.” Background paper prepared for the World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- Man, J. 2013. “Evaluation of Property Tax Reform and Experiments in China.” Background paper prepared for the World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- Medda, F. R., and M. Modelewska. 2011. *Land Value Capture as a Funding Source for Urban Investment: The Warsaw Metro System*. Warsaw, Poland: Ernst & Young.
- Norregaard, J. 2013. “Taxing Immovable Property. Revenue Potential and Implementation Challenges.” IMF Working Paper WP/13/129, International Monetary Fund, Washington, DC, May 2013.
- OECD (Organisation for Economic Co-operation and Development). 2010. *Tax Policy Reform and Economic Growth*. Paris: OECD. [http://www.oecd-ilibrary.org/taxation/tax-policy-reform-and-economic-growth\\_9789264091085-en](http://www.oecd-ilibrary.org/taxation/tax-policy-reform-and-economic-growth_9789264091085-en).
- Schlosser, C. 2007. “Case Study: The Municipal Finance System in Germany,” 21st Session of the Governing Council, UN-Habitat, Nairobi, Kenya.
- Shao, X. 2013. “Guizhou–Meitan: Population Growth without Land Increase, Population Decline without Land Decrease. Approaches and Implications.” Background paper prepared

- for the World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- Spahn, P. B. 2003. "Land Taxation in Germany." Case study prepared for the World Bank seminar "Innovations in Local Revenue Mobilization," Washington, DC, June 23–24.
- Tao, R. 2013. "China: Land Policy Reform for Rural-Urban Integration and Sustainable Urbanization." Background paper prepared for the World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- Wang, H., L. Wang, F. Su, and R. Tao. 2012. "Rural Residential Properties in China: Land Use Patterns, Efficiency, and Prospects for Reform." *Habitat International* 36: 201–09.
- Wang, X. 2013. "Role of Rural Land Exchange in Chongqing and Its Effects." Background paper prepared for World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- Wang, Y., Y. Wang, and J. Wu. 2009. "Urbanization and Informal Development in China: Urban Villages in Shenzhen." *International Journal of Urban and Regional Research* 33 (4): 957–73.
- Wong, C. 2013. "Paying for Urbanization in China: Challenges of Municipal Finance in the Twenty-First Century." In *Financing Metropolitan Governments in Developing Countries*, edited by Roy W. Bahl, Johannes F. Linn, and Deborah L. Wetzell. Cambridge, MA: Lincoln Institute of Land Policy.
- World Bank. 2012. "China's System of Municipal Finance: Origins, Impacts, and Agenda for Reform." Technical note, World Bank, Washington, DC.
- . 2013. *Collective Property Institutions and Policies under Urbanization, Reform Pilots in Beijing's Changping District: Observations and Recommendations for Deepening Collective Reform*. Technical assistance report for the World Bank, Washington, DC.
- Xu, X., S. Liu, X. Fan, Q. Li, Z. Wu, M. Tan, Y. Li, and J. Yang. 2013. "Study on Adhering To and Improving the Basic Operation System for Rural Areas." Development Research Center of the State Council, Beijing.
- Yuan, X. 2013a. "Case Study on Shenzhen's Land Policy Innovation." Background paper prepared for the World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- . 2013b. "Urban Villages in Beijing, China: Challenges and Solutions." Background Paper prepared for the World Bank and DRC Urbanization Study, World Bank, Washington, DC.
- Zhai, N., and G. Xiang. 2007. "An Analysis of China's Current Land Acquisition System and Policy Implications." *China Administration* 3.
- Zhang, N., W. Pan, S. Li, Z. Meng, and C. Yang. 2012. "Improving the Regulatory Basis for Strengthening the Secondary Urban Land Market." *China Land and Resources News Network*, January 31.



# China's Urbanization and Food Security

## Introduction

China's urbanization and the accompanying structural changes demand a new look at China's domestic food self-sufficiency objectives. Urbanization is a reflection of and a contributing factor to economic growth and development. In this process, overall output and average incomes rise. Demographic change, change in diets and food consumption patterns, emergence of environmental constraints (such as land or water concerns and environmental pollution), transformation of rural factor markets, food supply-chain development, market and distribution systems transformation, and agricultural technology and farm scale changes are linked in various ways. These factors will affect China's food production capacity and food availability over the coming decades. Understanding how the balance between China's domestic demand and domestic production of food will evolve will be important in formulating appropriate and effective policies.

China has achieved tremendous results in agriculture over the past 30 years. From 1978 to 2011, China's agricultural gross domestic product (GDP) at constant prices grew at an annual rate of 4.6 percent, four times the rate of population growth. Main-

taining such a high average growth rate in agriculture for more than 30 years, while allowing many people to move from agriculture to other sectors, is a truly extraordinary achievement. China's agricultural production structure has also shifted gradually from relatively low-value to higher-value products, largely consistent with resource endowments and comparative advantage. Although still important, cereal crop production no longer dominates but is matched by the development and expansion of higher-value crops and livestock. In 1980, crops, livestock, and aquaculture products accounted for 75.6 percent, 18.4 percent, and 1.7 percent of total output value, respectively. By 2011, the share of crops in total output value had dropped to 54 percent, while animal husbandry and aquaculture had increased to 33 percent and 10 percent, respectively (NSBC 2012).

Growth in agricultural output was first achieved through institutional and market reforms, such as the introduction of the Household Responsibility System and the subsequent lifting of food price and procurement regulations. Later, growth was achieved through agricultural intensification and technological progress. From 1980 to 2012, China's grain production rose from 320.56 million tons to 589.57 million tons, an



increase of 84 percent. Rice production grew by 46 percent, and wheat and corn grew by 118 percent and 232 percent, respectively. Since 2004, China's grain production has continuously increased; since 2007, annual grain output has exceeded 500 million tons. Farmer per capita income also continued to grow, reaching RMB 7,917 in 2012, with an inflation-adjusted real increase of 8.8 percent per year since 2003.

China's food security, as measured both by the aggregate availability of food and by the access of vulnerable individuals and households to food, has improved dramatically over the past 30 years. Food security problems at the level of households and individuals—the problem of subsistence and vulnerability—have been substantially reduced. Consumption patterns have diversified, and nutritional status has improved. Market integration has addressed the problem of regional food insecurity resulting from unequal spatial distribution of resources (J. Huang and Rozelle 1998). At the national level, China has maintained food self-sufficiency and even sustained a net export balance during the period of the 11th Five-Year Plan (2006–10).

China has been able to meet the objective of domestic self-sufficiency in the two major food grains, rice and wheat, with limited dependence on global food markets so far. But concerns about China's future food self-sufficiency—in particular its future grain self-sufficiency—have drawn wide attention both at home and abroad in recent years. As the income of urban and rural households has increased, aggregate food demand in China has also been increasing, along with demand for higher-quality agricultural products (Bai and others 2010; X. Chen 2011; J. Huang, Yang, and Rozelle 2010). At the same time, supply constraints have become more pronounced, particularly because of decreasing land and water resources for agriculture, increasing environmental pollution, and increasing labor and production costs (Han 2010; Ma and Niu 2009).

Strong growth in demand and increasing supply constraints potentially pose challenges for China's future aggregate food self-

sufficiency. Aggregate food self-sufficiency fell below 98 percent in 2010. Grain self-sufficiency fell to 92 percent in 2010 and to 88 percent in 2012 because of imports of soybeans and maize used as animal feed. Although domestic self-sufficiency in rice and wheat remained at nearly 100 percent, soybean imports reached 58.3 million tons in 2012. China has also shifted from being a net exporter of corn in the early 2000s to an importer in 2010, with net imports of 5.2 million tons in 2012. The driving factors behind increasing demand (and domestic supply shortfalls) for soybeans and corn are the growing demand for animal products and the development of China's livestock industries. Imports of other products have also grown: sugar (to 3.7 million tons in 2012); edible oil (to 9.6 million tons); dairy products (to 6.2 million tons for fresh milk); and pork, beef, and mutton (to 0.7 million tons).

Concerns about constraints on sustainable food production as a result of urbanization are increasing. Domestic production patterns have already shifted from naturally rain-fed coastal areas to irrigated areas in the North China Plain and the Northeast as farmland has been converted to urban use in the central and southern coastal provinces. Urbanization is likely to further increase the amount of water needed for domestic and industrial uses, thereby increasing intersectoral competition for water and reducing China's total irrigation area and crop yield (Du and others 2005; Wang and others 2008; Wen and Ding 2011).

Urbanization will also result in continued conversion of farmland to nonagricultural uses. However, although China's agricultural production may decrease with the continuing reduction in farmland area (F. Chen and others 2010; Z. Chen and others 2010; M. Huang, M. Chen, and Zhang 2011) and grain production potential may be threatened (Shu and Chen 2012), urbanization may also stimulate the intensification of land use and thus counteract the decrease in farmland through more efficient use of land for housing in rural and urban areas (Huang and others 2005). The comparative advantage of labor-intensive farming of grains has greatly dimin-

ished. Growing labor constraints and rising input prices (labor, diesel, pesticide, farming tools) have increased the cost of food production. Land transfer costs and farm overhead costs are also rising quickly. With urbanization, rural labor will continue to move to the cities, and migration will further drive up labor and production costs in agriculture (Hu and Ni 2010; S. Li and H. Li 2012; Mu and others 2013). How these shifts will impact China's domestic food production capacity requires careful analysis. Urbanization will also affect food demand and consumption through income growth. Overall demand for food is likely to increase with income-driven urbanization because the demand for higher-cost foods such as fruits, vegetables, and animal products rises much more rapidly with income growth than demand for basic food staples such as rice and wheat. These goods require much higher levels of intermediate and factor inputs than basic staples, particularly for livestock products, given the inefficiencies of feed conversion. China's gradual alignment of trading patterns with comparative advantage following its accession to the World Trade Organization (WTO) and the surge in imports of soybeans and of corn is a reflection of these changes.

Food consumption patterns differ between China's urban and rural residents, even at the same level of income. The aggregate impact of the change in consumption patterns on indirect grain consumption in the course of urbanization has not been well documented. Several studies have suggested that the consumption of staple foods decreases as people move to cities, whereas their consumption of edible oil, sugar, fruits, and animal and aquatic products increases (Huang 1999; Huang and Bouis 2001; Huang and David 1993). Food consumption surveys also show that rural migrant workers in cities consume more grain and more livestock products than rural households. Migration thus may increase grain consumption significantly as both direct demand and indirect demand for animal feed increase (Wu 2013).

The transformation from an agricultural society to an urban society has potentially important implications for access to food

because most urban households and migrating rural residents tend to rely on food purchases rather than their own household production. Decreased reliance on agricultural income reduces the exposure of households previously engaged in farming to adverse output shocks, such as those resulting from droughts or floods, to agricultural output and incomes. However, as people move to cities, households become completely dependent on purchased food. At low levels of income, they spend a large share of their incomes on food and can be very vulnerable to increases in the prices of staple foods. The food security of a household that spends 60 percent of its income on food is seriously threatened when food prices rise.

Trade can allow China to meet the rising demand for particular types of agricultural goods. Increased imports to meet domestic demand are well within the capacity of China's existing trade partners in North America and South America for maize and soybeans and in Australia and New Zealand for dairy products. But policy makers have understandable concerns about large-scale reliance on imports of basic staples, particularly rice and wheat. Meeting the demand for basic staples will remain a strategic focus but is likely to be relatively easy for China both because per capita demand for basic staples is falling and because China's yields continue to grow because of investments in research and development to increase productivity. Investments in research and development also help to raise farmers' incomes.

Providing adequate access to food in rural areas remains an important policy objective, but threats to food access may also increase for urban residents. There are varying levels of food security across regions within China, with some regions still facing food security issues, particularly in western poor rural areas (Nie, Bi, and Zhang 2010). Urban residents that depend on the market for all of their food needs may face risks in accessing affordable food as food supply chains are becoming longer through regional integration and more vulnerable because of fluctuations in transportation and energy costs. As China continues to urbanize, the implica-

tions of urbanization on disadvantaged segments of the population need to be carefully assessed with regard to food price stabilization policies and social protection programs.

## Methodology

This report provides an overall assessment of the projected effects of China's urbanization on domestic food production capacity and food demand over the next two decades. The analysis builds on extensive empirical work carried out for this study in 2013, work that built on the China Agricultural Policy Simulation Model (CAPSiM) of the Center for Chinese Agricultural Policy (CCAP). CAPSiM is a sectoral equilibrium model that covers a wide range of agricultural crops and livestock products and forecasts China's demand for and supply of agricultural products for the 2012–30 period. The model uses the underlying macroeconomic and demographic assumptions included in supporting report 1 on urbanization and growth.

The CAPSiM simulations build on separate empirical analyses of the effects of urbanization on the markets for water, land, and labor. Impacts on agricultural water consumption and agricultural production are analyzed based on (a) historic trends of water usage across the agricultural, industrial, and domestic sectors; (b) quantitative analysis of the relationship between urbanization and agricultural water availability; and (c) application of the China Water Simulation Model (CWSM) to estimate changes in cropping areas and output per unit at the national and individual river basin levels. J. Huang and others (2013) describe the research approach and methodology in their background paper. The effects of urbanization on arable land conversion and agricultural bioproductivity are estimated using remote sensing and econometric analyses (Deng, Huang, and Rozelle 2013). China's rural labor market transformation and its impacts on the agricultural sector are described in X. Wang, Huang, and Rozelle (2013). Urbanization and its impacts on agricultural water are discussed in J. Wang, Huang, and Rozelle (2013). This report also builds on analytical work on income growth and demand for and

supply of food in China that Emiko Fukase and Will Martin (2013) of the World Bank conducted for this study.

## Structure of the chapter

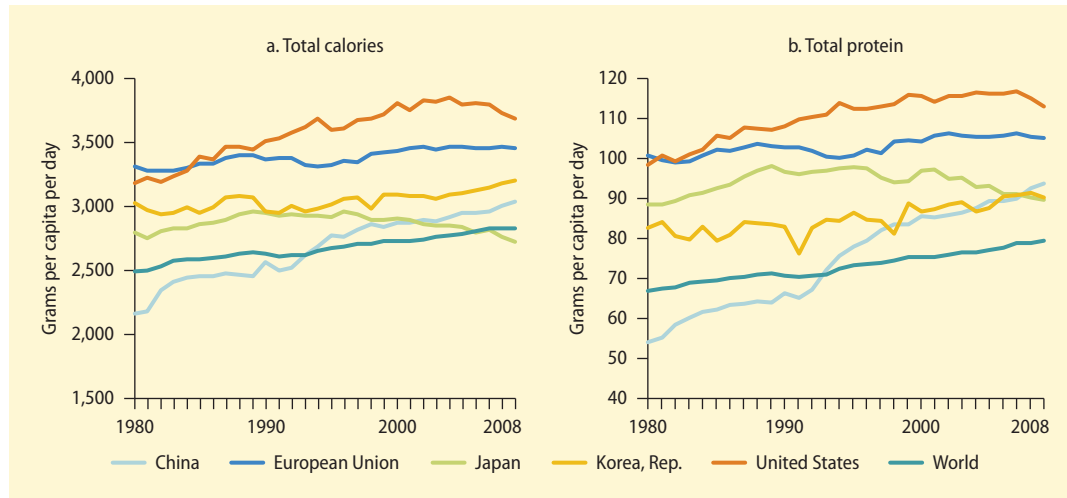
The chapter first provides a retrospective and outlook on China's food demand and supply in an international perspective. It then discusses the supply constraints on domestic agricultural production: water, land, and labor. Next it reviews the quantitative impacts of urbanization on aggregate food supply and demand and discusses the likely supply shortfalls. It concludes with a set of recommendations for China's future food security and social protection policies.

## China's food demand and supply projection in international comparison

China's rapid economic growth since market-oriented reforms began in 1978 has contributed greatly to improvements in Chinese diets both in quantity and in composition. Total calorie intake per capita per day in China has grown substantially, from 2,163 kilocalories (kcal) in 1980 to 3,036 kcal in 2009. China's growth in calorie intake has been much faster than the world average, which grew from 2,490 kcal in 1980 to 2,831 kcal in 2009. Calorie consumption levels are now reported to be approximately equal to those in Japan and in the Republic of Korea but remain lower than levels observed in the United States and in the European Union. Protein intake nearly doubled from 54 grams (g) per capita per day in 1980 to 94 g per capita in 2009, with about three quarters of this growth from increased consumption of livestock products. Fat intake nearly tripled from 34 g per capita per day in 1980 to 96 g per capita in 2009, with about two-thirds of this growth coming from increases in livestock product consumption. Calorie intake among high-income countries, namely the United States and Japan, has declined somewhat in recent years (figure 5.1).

A breakdown of the proportion of calories sourced from crop and livestock prod-

**FIGURE 5.1** Total calorie (in kilocalories per capita per day) and protein consumption in various countries (in grams per capita per day)



Source: Food and Agriculture Organization of the United Nations, Statistics Division.

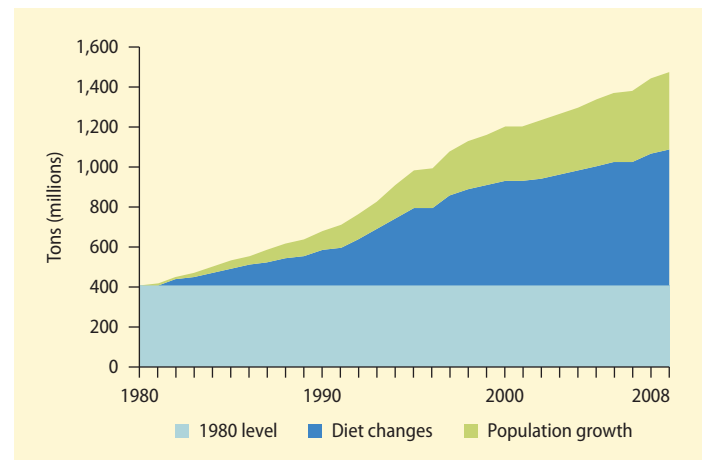
ucts in China reveals that a majority of the increase comes from the rise in the consumption of livestock products, while the calorie intake from crops has been relatively steady at around 2,300 kcal per capita per day since the early 1990s. Calorie intake seems unlikely to rise dramatically in the future but dietary patterns are likely to adjust further as consumers increasingly source their calories from livestock products, which take much greater amounts of resources per kilogram consumed, measured in cereal equivalents (CEs) (K. Rask and N. Rask 2011). This shift in diet will increase the quantity of resources required to meet China's food demand for an extended period to come, and suggests future pressure on world food production.

China's CE consumption<sup>1</sup> expanded nearly four times from 407 million tons in 1980 to 1,479 million tons in 2009 (figure 5.2), while over the same period China's population increased by only about 40 percent, from 1 billion to 1.4 billion. If growth of CE consumption in China since 1980 is broken down into the factors of population growth and diet change, one-third of the increase in food consumption is attributable to population growth, and the remaining two-thirds results from changes in diet. As China's population growth slows—and its popula-

tion is projected to peak around 2025, at a level about 3 percent higher than in 2013—the primary driver of food consumption in the near future is likely to be growth in per capita consumption.

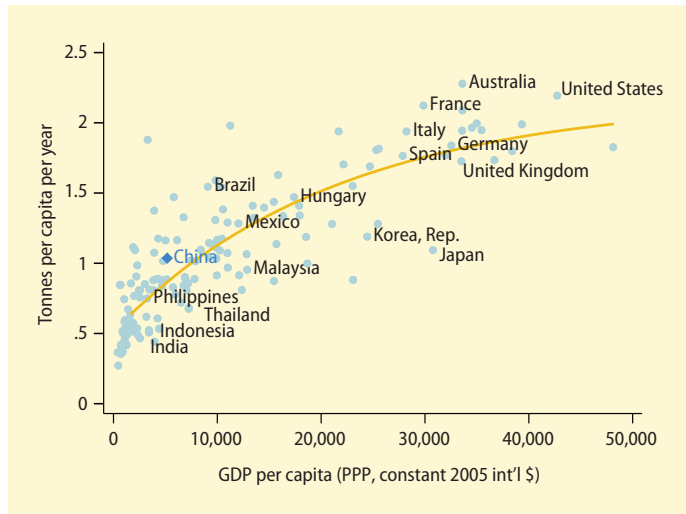
China's per capita consumption levels for both calories and CEs have been very consistent with global trends. Food consumption is closely related to income, and although there is broad variation around the relationship

**FIGURE 5.2** Population growth vs. diet change: Change in CE consumption



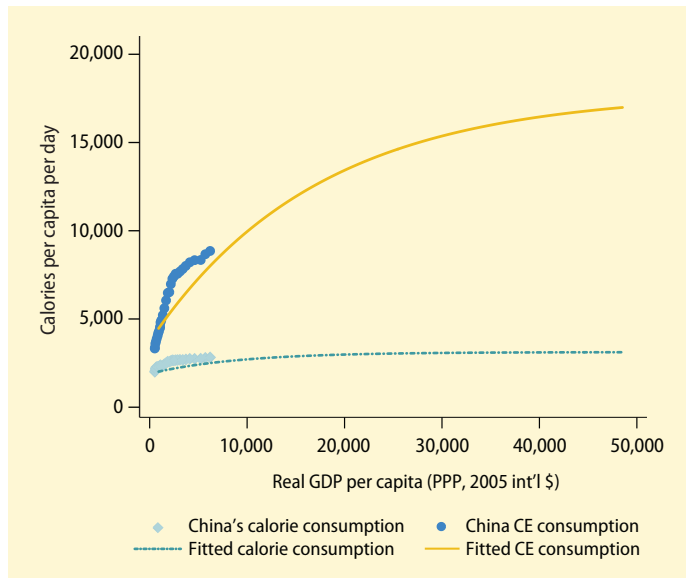
Source: Fukase and Martin 2013.

**FIGURE 5.3** Relationship between CE food consumption and income



Source: Fukase and Martin 2013.  
Note: Data are based on 2005–09 averages.  
PPP = purchasing power parity.

**FIGURE 5.4** Calorie and CE consumption trends against income in China, 1980–2009



Source: Fukase and Martin 2013.

between food consumption in CEs and real income levels, China's food consumption is likely to increase substantially for some time as income levels continue to rise (figure 5.3). Consumption of calories tends to level off

much earlier and at a much lower level than consumption of CEs (figure 5.4).

China has out-performed most countries in terms of agricultural output. Output, which is only slightly below consumption levels, is substantially above the global trend level given China's land endowment and income level. This may reflect the relatively high quality of much of China's agricultural land and almost certainly reflects the extraordinary efforts made in China to increase productivity in recent decades. Agricultural output is likely to continue to increase in response to the productivity growth that is driving increases in national output. Figure 5.5 compares CE consumption with the estimated relationship between income levels and production. To allow for the comparison between countries, the estimated production schedule is adjusted so that each country has the same per capita land endowment as China (0.21 hectares per person). This relationship implies that production rises in line with income, although less rapidly than income because of the secular decline in agriculture's share of national income.

Growth rates of consumption and growth rates of output are likely to be broadly comparable as incomes grow to levels around \$20,000 in purchasing power parity terms. After that level, it seems likely that the consumption growth will slow down relative to production and the gap between supply and demand will begin to close. This is, however, a tentative scenario. If, for instance, China reduced investments in agricultural productivity, or climate change reduced productivity, then the gap between supply and demand might increase.

China is also in a very different situation from neighboring economies, such as Japan or Korea, where the much smaller land endowments per person require that continuing large net food imports are likely to be required. International comparisons reveal striking differences between countries in the extent to which food imports as a share of total consumption have changed. When rice, wheat, maize, and soybeans are considered together, most lower-income countries have maintained close to 100 percent self-sufficiency, but this ratio has declined sharply

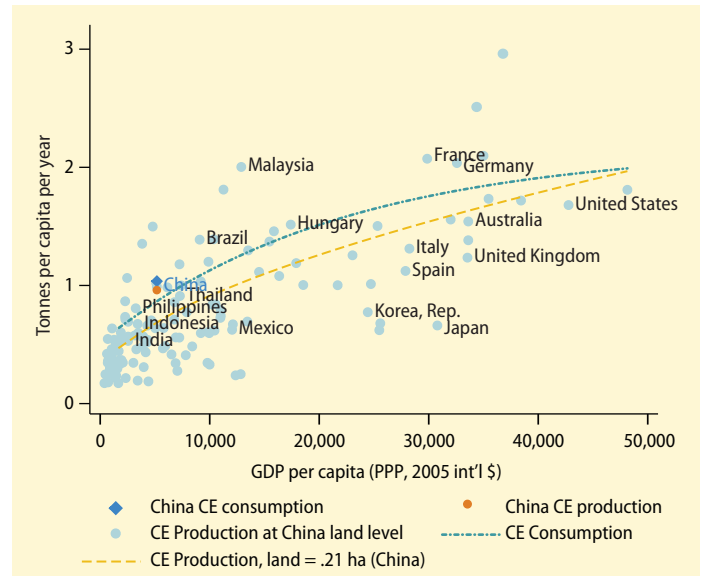
in the higher-income East Asian economies (Japan, Korea, and Taiwan, China) (figure 5.6). China, given its larger land endowment per capita, seems unlikely to follow the path of Japan, Korea, or Taiwan, China, and will retain a much higher level of aggregate grain self-sufficiency. China's recent declining self-sufficiency ratio for grains is predominantly attributable to a large increase in soybean imports (figure 5.7).

## Resource constraints to agricultural production

### Urbanization and water: Intersectoral competition and food security

Water is a scarce resource in China, which has a total annual availability of fresh water of 2,300 cubic meters per capita, less than one-quarter of the world's average. Annual precipitation is unevenly distributed across the country, with more than 800 millimeters (mm) in most parts of southern China, between 400 mm and 800 mm in the north-east and northern regions, and below 400 mm in the northwest. Because of the close relationship between water availability and land productivity, productivity is generally higher in the Southeast and lower in the

**FIGURE 5.5** Production, consumption, and income in China, 1980–2009

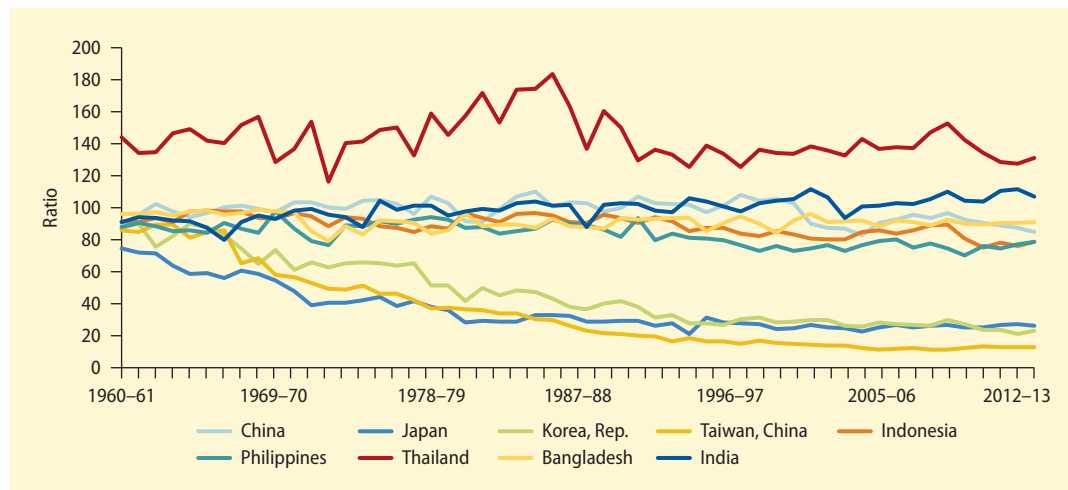


Source: Fukase and Martin 2013.

Northwest, and intermediate in the North-east and North.

Intersectoral competition for water and the increasing reallocation of water from agricultural uses to industrial and domestic uses are likely to have implications for China's

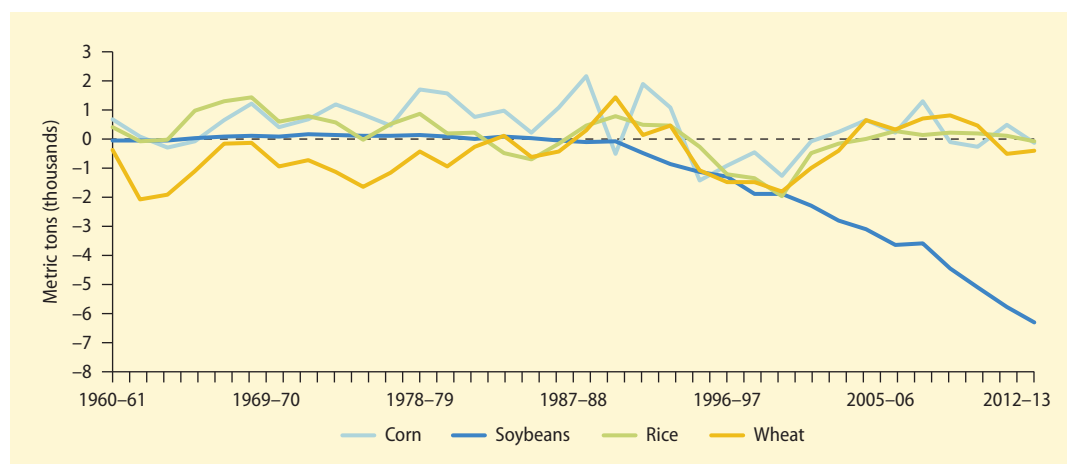
**FIGURE 5.6** Grain self-sufficiency ratios for selected Asian countries, 1960–2013



Source: Production, Supply and Distribution (PSD) data, USDA.

Note: The figure reflects the differences between production and consumption, which are the sum of net imports and the changes in stock (production – consumption = exports – imports + changes in stock).



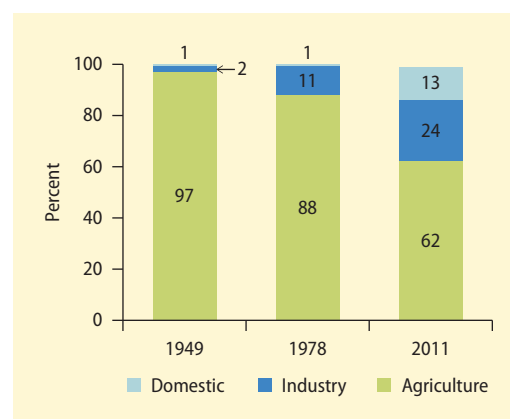
**FIGURE 5.7** Contribution of major grains to China's supply-demand gap, 1960–2013

Source: U.S. Department of Agriculture, Production, Supply and Distribution (PSD) data.

Note: The figures reflect the differences between production and consumption, which are the sum of net imports and the changes in stock (production – consumption = exports – imports + changes in stock).

food production capacity. Total water consumption in China increased from 103 billion cubic meters in 1949 to nearly 600 billion cubic meters in 2011, or by 3 percent annually. The periods from 1949–65 and 1965–80 saw the biggest percentage increases. After 1993, despite further increased total demand, the rate of increase slowed (table 5.1).

Water consumption in industry and for domestic use has increased significantly faster than in the agricultural sector. In fact, during the past 20 years, water consumption in agriculture has remained constant while industrial and domestic water usage has continued to increase (figure 5.8). However, agriculture remains the biggest consumer of China's water, accounting for 62 percent

**FIGURE 5.8** Water use in China: Total and by sector

Source: J. Wang and others 2013.

**TABLE 5.1** Total increase rate of water use in China by sector, 1949–2011

Period	Total increase rate (percent)			
	Total	Agriculture	Industry	Domestic
1949–65	166	154	654	200
1965–80	62	45	152	1,456
1980–93	17	3	98	70
1993–2000	6	–1	26	21
2000–11	9	–1	28	37
1949–2011	481	274	5,991	13,065

Source: Ministry of Water Resources 2006–10.

of the country's total water consumption in 2011 (figure 5.9). Urbanization is the driving factor contributing to rising water consumption through the industrial and domestic sectors. As China's urban population increased from 28 percent to 51 percent from 1993 to 2011, the share of agricultural water use to total use declined from 73 percent to 62 percent (figure 5.10). As rural residents continue move to cities and as living standards increase, domestic water use is likely to further increase. From 2006 to 2010, per capita

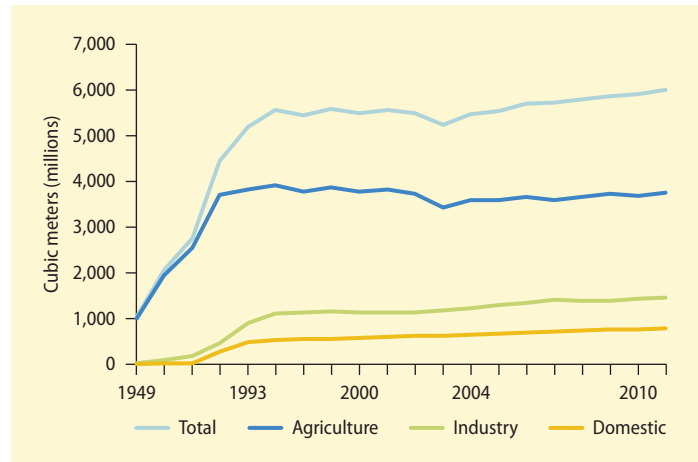
water use for urban residents was 208 liters, already three times that for rural residents (Ministry of Water Resources 2006–10). Based on the CWSM projection results,<sup>2</sup> a 1 percentage point increase in China's urban population will result in a 0.47 percent decline in the share of agricultural water consumption because of intersectoral reallocation. By 2030, according to the CWSM, agriculture's share of total water consumption will have decreased to 52 percent.

China's total water shortage is estimated to have reached 48.7 billion cubic meters, indicating that 8 percent of China's total water demand cannot be satisfied by the country's water supply, given current water resource management policies. Water scarcity is more pronounced in China's northern river basins, including the Hai, Huai, Liao, Songhua, and Yellow rivers. Water scarcity is expected to increase significantly in China; the overall water supply gap is projected to increase from today's 8 percent to 38 percent in 2030. Water demand increases are projected for all river basins in response to urban and industrial growth, population growth, and planned expansion of irrigated areas. China's major river basins are displayed in map 5.1. Water supply and water balance data for the 10 major river basins in China are summarized in table 5.2.

Through domestic food trade and the expansion of irrigated areas in northern and northeastern China, about 52 billion cubic meters of water are transferred annually, in virtual form, through agricultural products to the southern provinces. If the amount of water lost through evapotranspiration is not replenished, crop water use will result in a localized net water loss and will become unsustainable. Overuse of available water resources has resulted in severe groundwater depletion, with the deep water aquifer under the North China plain, for example, already dropping at about 3 meters per year. About half of the communities using ground water in the northern plains reported a decline in ground water levels between the mid-1990s and mid-2000s (Lohmar and Hansen 2007; J. Wang, Huang, and Yang 2009).

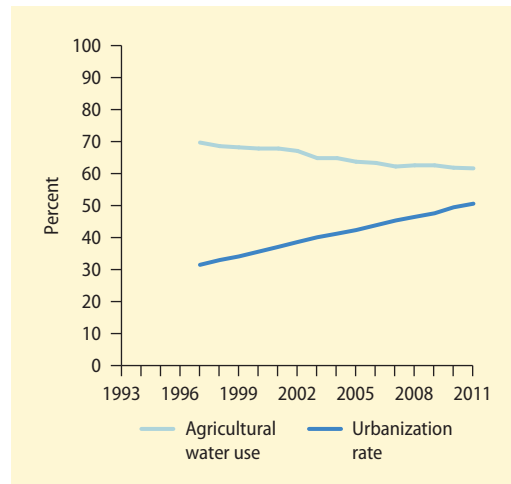
Agricultural water demand will increase in all 10 river basins between 2010 and 2030,

**FIGURE 5.9** Sectoral shares of China's total water consumption



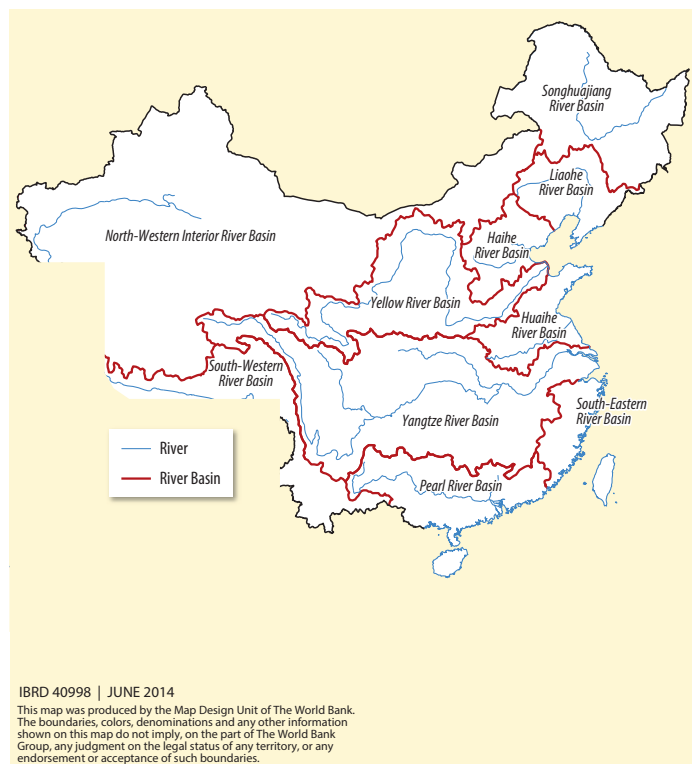
Source: J. Wang and others 2013.

**FIGURE 5.10** Trends in agricultural sector water consumption and urbanization



Source: J. Wang and others 2013.

from an estimated 11 percent in the Huai river basin to as high as 30 percent in the Yellow river basin. Particularly large supply shortfalls are projected for the Hai, Yellow, Yangtze, and Southeast river basins. Water consumption in the industry sector is projected to grow by 170 percent over current consumption, nearly 10 times faster than water consumption growth in the domestic and agricultural sectors. In the Yangtze and Southeast river basins, total water demand will increase by 70 percent and 82 percent, respectively

**MAP 5.1 Major river systems in China and locations of the 10 largest river basins**

Source: J. Wang and others 2013.

while this increase will be about 30 percent in the Liao, Hai, and Northwest river basins. The slowest change in water demand growth will occur for domestic water demand in the

Liao, Songhua, and Huai basins, with a projected increase of only 4 percent.

China's plans to expand irrigation will also be challenged by water scarcity and by intersectoral competition for water. China's National Integrated Water Resources Plan for the period 2010–30 envisions an expansion of China's irrigated areas by 15 percent, from currently 58.6 million hectares to more than 67 million hectares (table 5.3). Most of the rice production in China, which heavily relies on irrigation, comes from the relatively water-abundant southern parts of China. Most of northern China receives sufficient rain for summer grain production during normal years. Winter wheat production, however, relies heavily on irrigation. Overall, it is estimated that 90 percent of China's rice production is irrigated, as is 85 percent of total wheat production, 45 percent of maize production, and 30 percent of its soybean output (Fischer, Ermolieva, and Sun 2010).

Notwithstanding the increase in irrigation envisioned in China's water resource plan, water reallocation from agriculture to urbanization is projected to cause a decrease in irrigated areas and a simultaneous expansion of rain-fed areas, if water policies remain unchanged. A one percentage point increase in the urban population will be associated with a 0.63 percent decrease in total irrigated area for all crops, whereas while rain-fed areas will expand by 0.77 percent. This

**TABLE 5.2 Water supply, water demand, and water balance in China's 10 major river basins, averaged over 2006–10**

River basin	Water supply			Water demand			Water balance		
	Total (10 <sup>8</sup> m <sup>3</sup> )	Share of surface water (percent)	Share of ground water (percent)	Total (10 <sup>8</sup> m <sup>3</sup> )	Share of agricultural water demand (percent)	Share of industrial water demand (percent)	Share of domestic water demand (percent)	Water gap (10 <sup>8</sup> m <sup>3</sup> )	Gap rate (percent)
China	5,902	81	18	6,389	65	22	11	−487	−8
Liaohe	205	44	55	234	72	13	13	−29	−12
Songhuajiang	421	58	42	459	74	17	7	−39	−8
Hai	377	34	64	513	77	10	11	−136	−26
Huai	607	71	28	674	72	15	12	−67	−10
Yellow	388	66	33	453	76	13	9	−65	−14
Yangtze	1,946	95	4	1,992	50	36	13	−46	−2
Pearl	880	95	5	908	58	23	17	−28	−3
Southeast	338	97	3	351	50	34	14	−13	−4
Southwest	106	97	3	117	83	7	10	−10	−9
Northwest	633	82	18	688	91	3	3	−55	−8

Note: 10<sup>8</sup> m<sup>3</sup> = 100 million cubic meters.

trend is projected across all river basin areas but would be most pronounced in the Songhua River Basin, where the respective change will be a decrease of 2.04 percent of irrigated areas and an expansion of rain-fed areas by 0.56 percent is projected. Irrigation area expansion targets may be difficult to achieve.

For China as a whole, average crop yield is projected to decrease by 0.09 percent per 1 percentage point increase in China's urban population, but the effects of urbanization on irrigated and rain-fed areas will differ between regions. Generally, productivity of irrigated areas is greater than that of rain-fed areas. Wheat will face the sharpest decline trend for its irrigated areas, with a projected decrease of as much as 2.61 percent, while its rain-fed areas will increase by 4.37 percent, resulting in an estimated net yield reduction of 0.6 percent. The other important crops whose irrigated areas will be reduced are oil crops and rice. Their irrigated areas will be reduced by 1.61 percent and 0.68 percent, respectively. In contrast, irrigated areas of soybean crops may increase by 3.56 percent, probably resulting from economic incentives for soybean production on irrigated land in view of an overall reduction in water available for agriculture.

China's urbanization will significantly reduce agricultural water use, all other things being equal. Every 2 percentage point increase in the urbanization rate is accompanied by a 1 percentage point drop in the availability of water for agricultural use. Improving water resources management in the agricultural sector will therefore become even more important in the coming decade. Wang and others (2005) estimate that only 40 percent of the water allocated to irrigation in China is actually used. And the potential for improvement is even greater given that much of this 40 percent is used very intensively, such as for flood irrigation. During the 2000s, the amount of irrigation water—0.96 cubic meters—used to produce 1 kilogram (kg) of grain was twice the amount used in developed countries (Zhao and others 2008). Given the great potential for improved water use efficiency in China, there may actually be no need for the increased competition for water from the expanding urban sec-

**TABLE 5.3** Planned expansion of irrigation areas

River basin	2010 (million hectares)	2030 (million hectares)	Planned expansion (percent)
China	58.6	67.2	15
Liao River	2.6	3.0	13
Songhua River	5.2	6.1	17
Hai River	7.6	8.6	14
Huai River	11.1	11.9	7
Yellow River	5.3	6.8	28
Yangtze River	15.0	17.2	14
Pearl River	4.3	5.0	14
Southeast River	2.1	2.3	13
Southwest River	0.9	1.1	18
Northwest River	4.4	5.3	20

Sources: Ministry of Water Resources 2006–10, National Integrated Water Resources Plan 2010–30.

tor to result in any reduction in agricultural output.

However, to really use water more efficiently, it is not sufficient to identify changes in water use technology, such as moving from flood to spray or drip irrigation, or to advocate a move toward greater use of those technologies. Unless farmers have an incentive to move toward more efficient, and typically more costly, forms of irrigation, they will be extremely reluctant to do so. However, international experience has shown that introducing the right management system can allow a large expansion in irrigated area with the same water supply (Easter and Liu 2005).

One way to increase water use efficiency is to introduce pricing schemes that reduce the gap between what agricultural and nonagricultural users pay for water, as well as reduce the costs associated with the distribution of water to its point of use. The reallocation of water from low-valued uses to high-valued uses is the key to achieving greater output from the available water. While retaining these advantages, water pricing schemes can be modified to avoid creating large redistributions of income—and particularly to avoid hurting poor users—by policies such as charging much less on an initial block of water.

If introducing water pricing is not politically feasible, alternative arrangements, such as water users' associations, can be used to improve the efficiency of water use within

irrigation districts. Wang and others (2005) find that these have been effective in reducing irrigation water consumption where they have been implemented in ways that provide incentives for reductions in water use. Further progress on water use reform could substantially reduce water consumption and potentially allow significant increases in agricultural output by allowing expansion of irrigation in some areas.

### Migration and rural labor, wages, and mechanization

Urbanization affects agricultural labor availability and agricultural production in complex ways. Labor costs in agriculture rise because of growing demand for rural labor. Movement of labor out of agriculture is an inherent and unavoidable part of the process of economic growth and urbanization. Consumption patterns within the country shift, and the share of spending on food drops precipitately. Increased investment in the nonagricultural sector creates jobs and creates incentives for workers to move. Migration out of rural areas into China's cities may also be stimulated by progress on reform of the *hukou* system<sup>3</sup> and of land titling, which would provide more flexibility for migrants to integrate into cities permanently. At the same time, rural township development may help offset or balance increases in rural labor costs. Rising wages also accelerate the process of mechanization of agriculture. If machines can replace farmers that are leaving the agricultural sector, production need not be affected. In many areas across China, however, mechanization will remain a significant challenge and its potential may be limited because of topographical conditions, such as small farmland plot size and inaccessibility in mountainous areas. Such constraints to mechanization will likely have negative impacts on agricultural production as rural people move to the cities.

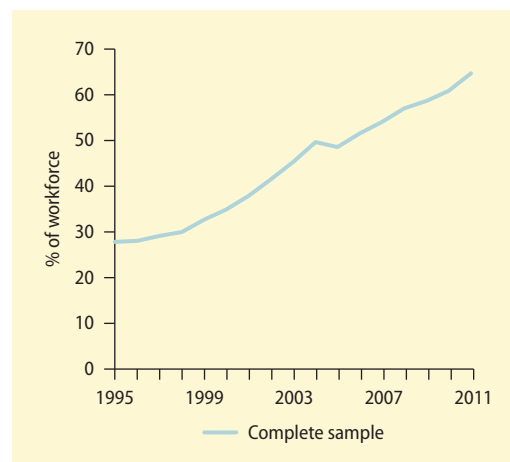
#### *Migration and off-farm employment*

Rural to urban migration and the emergence of off-farm employment have been important in China's transformation over the past two decades. The rise of off-farm employment

has been a particularly prominent feature of China, emerging in the 1980s and 1990s. In the early 1980s, only 15 percent of China's rural labor force had a job off the farm (NSBC 2000). By 2000, the share of farmers working off the farm had reached 45 percent. Another decade later, by 2011, more than 60 percent of China's rural labor force worked off the farm (figure 5.11). In absolute terms, of China's 500 million rural laborers, more than 218 million worked off the farm, full or part-time, in 2000. Nearly 320 million worked off-farm in 2011.

Many of these farmers found employment in the wage-earning sector. They also found or created off-farm jobs in the nonfarm self-employed sector (Zhang and others 2006). Between 1980 and 2000, the number of rural workers that left home and found a wage-earning job rose from 9.3 million to 56.0 million (de Brauw and others 2002). An estimated 60 million rural workers remained at home working in township and village enterprises for a wage during this time (NSBC 1990, 2000). The number of farmers who started nonfarm self-employed enterprises rose from 26 million to nearly 80 million between 1980 and 2000. By 2000, there were far more self-employed migrants than migrant wage earners. Migration expanded steadily and accelerated throughout the 2000s. Although the global economic crisis of 2008 had some effect on migration, the

**FIGURE 5.11** Percentage of rural labor employed off the farm, 1995–2011



Source: X. Wang, Huang, and Rozelle 2013.

**TABLE 5.4** Proportion of rural laborers working off-the-farm, by age cohort, 2011

Age cohort	Total	Male	Female
16–20	77.0	81.3	72.0
21–30	77.6	92.3	62.1
31–40	74.3	88.4	58.7
41–50	59.5	79.0	39.4
51–60	38.4	55.4	21.4
61 and above	26.2	37.2	13.7

Source: X. Wang, Huang, and Rozelle 2013.

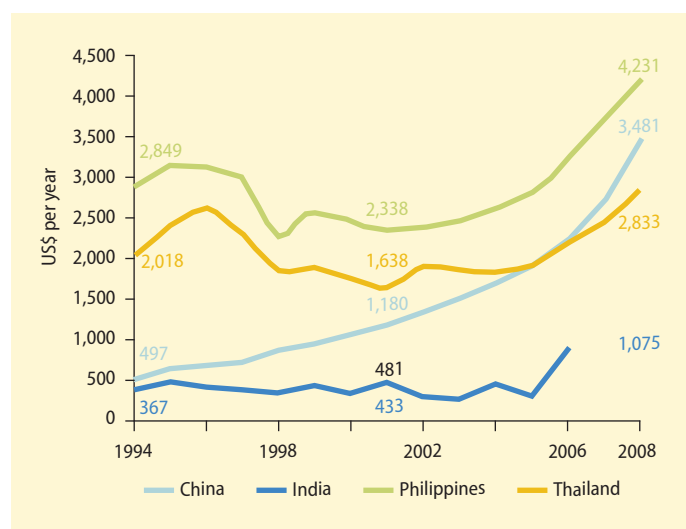
impact was short-lived (Chan 2010; Huang and others 2011). In 2011, off-farm labor force participation was in the range of 80–90 percent for male workers below the age of 40 and between 60 percent and 70 percent for female workers (table 5.4).

### Rural wages

The average wage earned by China's unskilled rural laborers remained fairly stable until the late 1990s but then started to increase (Li and others 2012; see figure 5.12). Hourly wages for migrant workers increased by 32 percent between 2001 and 2005 (Cai and Wang 2010). Despite China's regional heterogeneity, wage differentials for rural migrants have been observed to be small across rich, medium, and poor counties (table 5.5). Remarkably, there is at most a 10 percent gap in average wages between counties, indicating that China's labor markets may no longer be very fragmented and that further pressure on agricultural labor costs is likely across the country. For example, wage earners from the heavily industrialized Jiangsu province earned an average hourly wage of RMB 11 in 2011, only 10 percent higher than that of a worker in the relatively undeveloped Sichuan or Shaanxi provinces (RMB 10). The wage gap is equally narrow when comparing wage earners from sample regions in eastern, central, and western China.

### Agricultural mechanization

With the introduction of the Household Responsibility System in 1979, which allowed rural households to contract collective farmland for private profit-oriented farming, the level of farm mechanization initially

**FIGURE 5.12** Manufacturing wages, 1994–2008

Source: Li and others 2012.

**TABLE 5.5** Hourly wage rate of rural migrant workers across regions in 2011

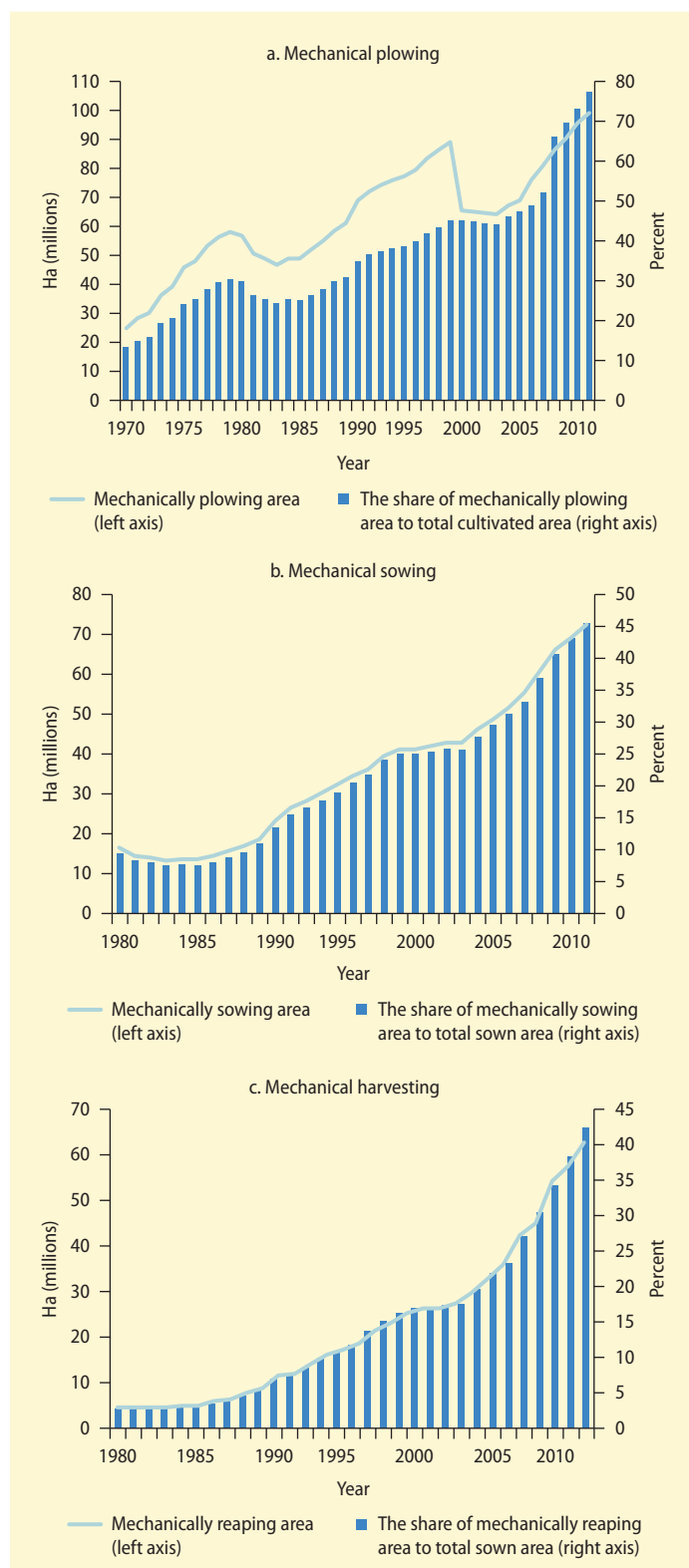
Location	Sample	Hourly wage (RMB)	
		Mean	Sd.
<i>By province</i>			
Jiangsu	612	11	8
Sichuan	559	10	10
Shaanxi	549	11	10
Jilin	393	11	9
Hebei	413	10	8
<i>By region</i>			
East	612	11	8
Central	806	10	9
West	1,108	10	10
<i>By county economic level</i>			
First quintile (highest GVIO)	494	11	10
Second quintile	555	11	9
Third quintile	483	10	8
Fourth quintile	482	10	7
Fifth quintile (lowest GVIO)	512	11	11
<i>By job location</i>			
Own county	1,248	10	9
Outside county	636	11	8
Other province	642	12	10
Total number of observations	2,526		

Source: X. Wang, Huang, and Rozelle 2013.

Note: GVIO = gross value of industrial output.

decreased because households made more use of hand labor and draught animals at the farm level rather than renting costly machinery from the collectives. Between 1979 and

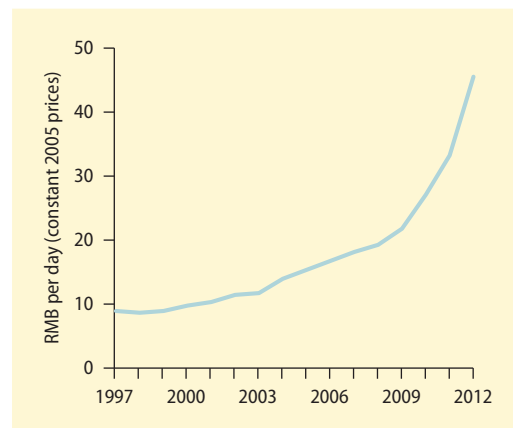


**FIGURE 5.13 Trends in mechanical operation, 1970–2011**

1983, the area of mechanically plowed land declined by around 8 million hectares. But as off-farm employment became prominent in the 1990s, China's farmers restarted mechanization. Over the past two decades, the area of land mechanically plowed has doubled, growing at an annual rate of more than 3 percent. In 2011 more than 72 percent of cultivated land was plowed mechanically. Mechanically sown areas doubled during the 1990s while those with mechanical harvesting almost tripled. In 2011, more than 40 percent of cultivated land was mechanically sown and harvested (figure 5.13).

The process of mechanization is driven by changes in relative prices, particularly the wage rate of off-farm labor. Average on-farm labor cost grew by 8 percent annually between 1997 and 2008, and wage growth has since accelerated to more than 10 percent (figure 5.14). Wage growth in the manufacturing sector and expansion of mechanization in agriculture have been on similar trend paths, in line with findings for developed countries, such as Japan and Korea (Otsuka 2013). Investments in agricultural machinery and migration are also closely related (de Brauw and Rozelle 2008; Li and others 2012; Taylor, Rozelle, and de Brauw 2003).

Labor-saving technology allows labor to be used for nonfarm activities and to access new sources of income. It also changes the

**FIGURE 5.14 Average daily cost of on-farm labor, 1997–2012**

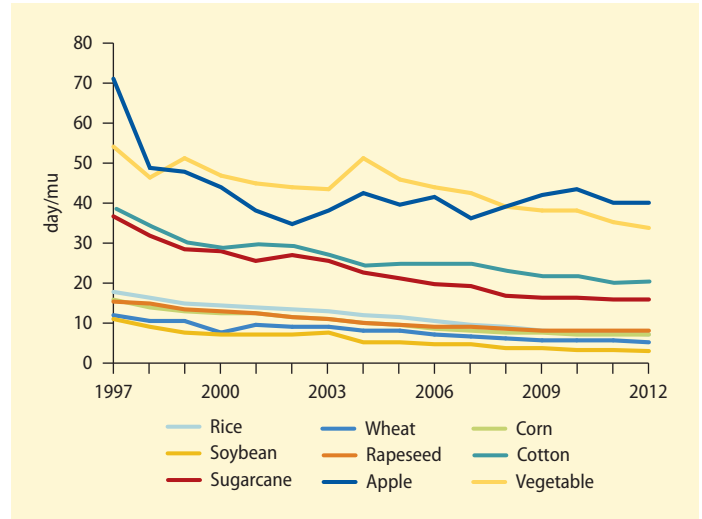
Source: National Development and Reform Commission (NDRC) Cost and Revenue in Agricultural Production database.

composition of the labor input in production. Under pressure from on-farm labor costs, the number of days that China's farmers have devoted to on-farm work has fallen substantially. By the mid-2000s, the average labor days per hectare had fallen to less than 100 days per hectare, less than half the amount used in the 1990s (de Brauw and others 2013). In grain production, the labor input in 2012 was less than half of that in 1997. In soybean production, the number of total working days on one unit of land (*mu*, a Chinese unit equivalent to about 667 square meters) was only three days in 2012. Even for labor-intensive crops, such as cotton, vegetables, and fruit, on-farm work days have declined at an annual rate of 2–4 percent (figure 5.15). Mechanization has increased rapidly across all crops, particularly after 2003. Measured by expense per *mu* (RMB/*mu*) and as a share of expenses on machinery to total input (excluding labor and land), China's smallholders are increasingly substituting agricultural machinery for labor to organize farm production (figures 5.16 and 5.17). Small-size machinery generally dominates current mechanization trends, as a consequence of small farm sizes, land fragmentation, and weak land rental markets that slow down consolidation. Privately operated machinery services, so-called specialized custom plowers, planters and harvesters teams, have emerged widely across China.

In some areas, mechanization and technological improvements that raise yields will allow agriculture to retain labor. In other areas, where mechanization is more difficult, it will be difficult to adjust to higher wage rates.

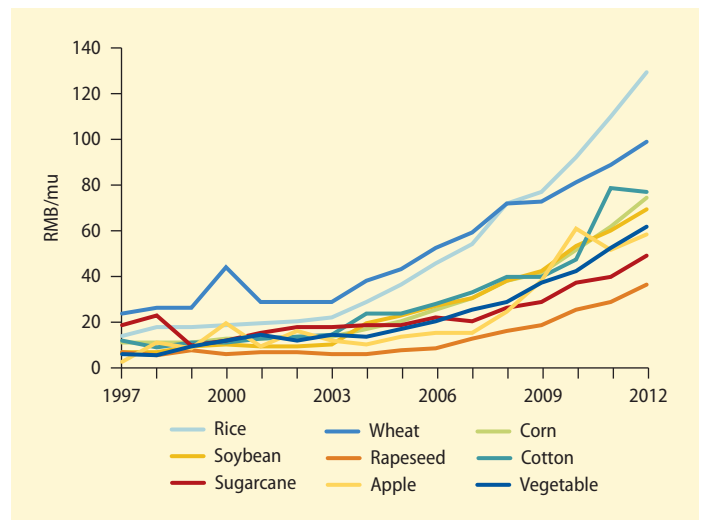
The shift in labor input in agricultural production also shows clear gender traits. Female labor on average dominated in both rice and wheat production from 2002 to 2010, except 2010 (in wheat production). Female farmers work more days on-farm than male farmers across all farm activities, including sowing, spraying pesticide, and weeding. Despite the overall reduction in on-farm labor input, there are clear signs that China's smallholder agricultural production has become more dominated by female farmers since the early 2000s (de Brauw and others 2013).

**FIGURE 5.15 Trends in labor input by commodity, 1997–2012**



Source: NDRC Cost and Revenue in Agricultural Production database.

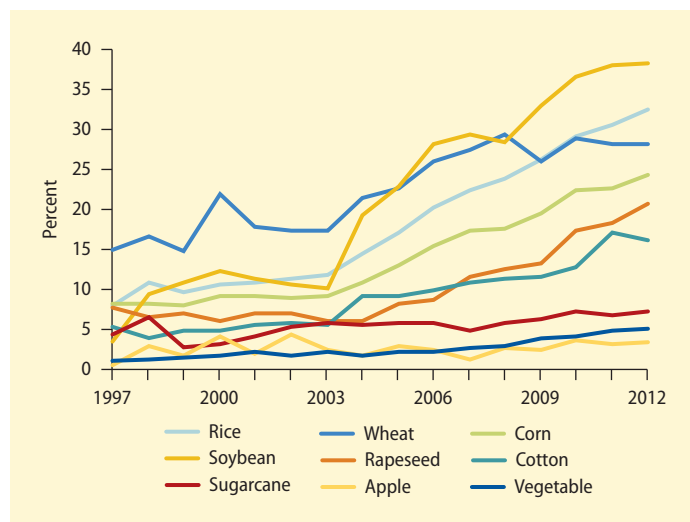
**FIGURE 5.16 Expenditures on mechanization by commodity, 1997–2012**



Source: NDRC Cost and Revenue in Agricultural Production database.

Under the government's agricultural mechanization policy, subsidies for agricultural machinery increased dramatically from RMB 0.07 billion in 2004 to RMB 21.5 billion in 2012. On average, 7.3 percent of the total purchase price of farm machinery is covered by government subsidies (table 5.6). However, machinery purchase is motivated less by government subsidies and more by

**FIGURE 5.17** Share of mechanization expenditure to total expenditure on physical input by different crops, 1997–2012



Source: NDRC Cost and Revenue in Agricultural Production database.

the need to save labor and to allow household members remaining in the countryside to transfer their labor to other activities.

### Urbanization, arable land, and land productivity

One of the links between urbanization and agriculture that has received the most attention is the conversion of agricultural into urban land. This process is very complex, involving higher-density urban living areas replacing lower density rural living areas, the transfer of land from agricultural to urban uses, and even new land entering agriculture. A key issue in making an assessment is the need to compare the productivity of different

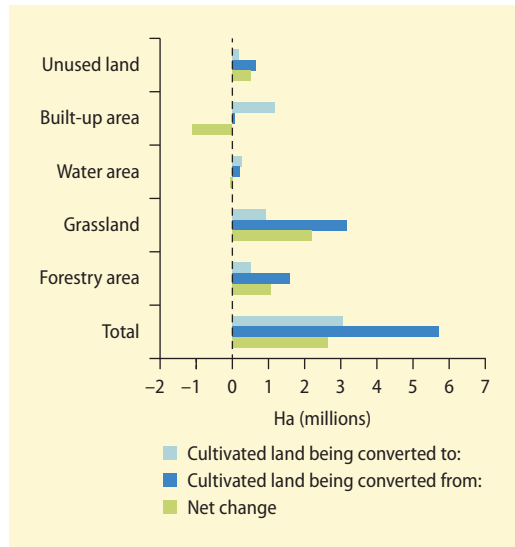
types of land. China has succeeded in retaining sufficient arable land for agricultural production and in supplying land for urbanization at the same time. But China has also experienced significant changes in its arable land over the past two decades, with both the conversion of agricultural land to urban and industrial uses and the conversion of nonfarmland into arable land, which requires careful analysis of the aggregate combined effects. Overall, the changes in total arable land area have slightly reduced China's agricultural production potential (or bioproductivity), as high-value farmland in eastern coastal provinces was converted to nonagricultural use while other land, often of lower quality, was reclaimed for farming in other regions of China.

Between 1988 and 2000, China recorded a net increase of cultivated land of 1.9 percent, which almost offset the decrease of 2.2 percent in agricultural production potential (bioproductivity) through land conversion. During this period, 3.06 million hectares of farmland were converted to nonfarm uses, accounting for 2.2 percent of China's total cultivated land (figure 5.18). The annual average conversion rate was 0.16 percent over this period. About 38 percent (or 1.2 million hectares; 0.08 percent of total cultivated land) of this land was converted to built-up areas, 17 percent was converted to forestland, 30 percent to grassland, and 16 percent to other types of land. At the same time, 5.7 million hectares of new farmland was created, a gross expansion of 4.1 percent. Grassland conversion accounted for 55 percent of the newly created cultivated land, forestland for 28 percent, and reclaimed wetland or wasteland for around 17 percent. Overall, China's agricul-

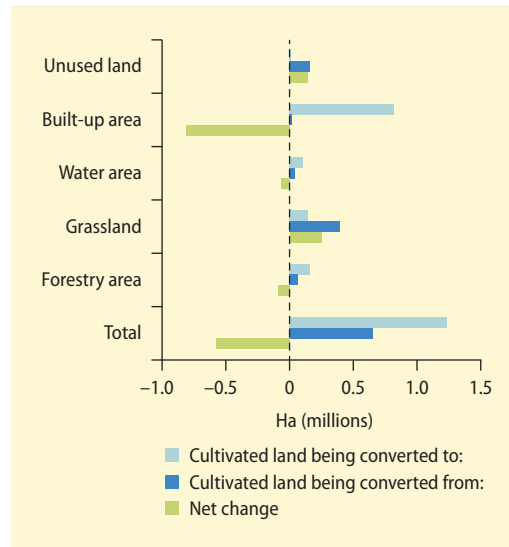
**TABLE 5.6** Machinery subsidies in China, 2008

Categories	Households that purchased machinery	Average expenditure on machinery (RMB)	Number of households with machinery Subsidies	Machinery subsidy (RMB)	Proportion of subsidy to total expense (%)
Lower quartile (< RMB 60 )	59	42.9	0	0.0	0.0
Median (RMB 60–400 )	50	176.6	0	0.0	0.0
3rd quartile (RMB 400–2,055 )	53	1,078.9	1	400.0	44.4
Upper quartile (> RMB 2,055)	54	8,366.5	6	3,313.3	24.4
Overall	216	2,408.9	7	2,897.1	7.3

Source: X. Wang, Huang, and Rozelle 2013.

**FIGURE 5.18 Land conversion trends, 1988–2000**

Source: Deng, Huang, and Rozelle 2013.

**FIGURE 5.19 Land conversion trends, 2000–08**

Source: Deng, Huang, and Rozelle 2013.

tural production potential declined slightly by 0.3 percent between 1988 and 2000.

In comparison, from 2000 to 2008, total cultivated land area decreased by 0.47 percent, and agricultural production potential declined by 1.70 percent. A total of 1.24 million hectares of farmland was converted to nonagricultural use, at an annual rate of 0.16 million hectares. At the same time, 0.66 million hectares of farmland was newly created, resulting in a net loss of 0.58 million hectares of cultivated land (figure 5.19). Compared to the previous period, the share of cultivated land converted into built-up areas to total land conversion increased significantly.

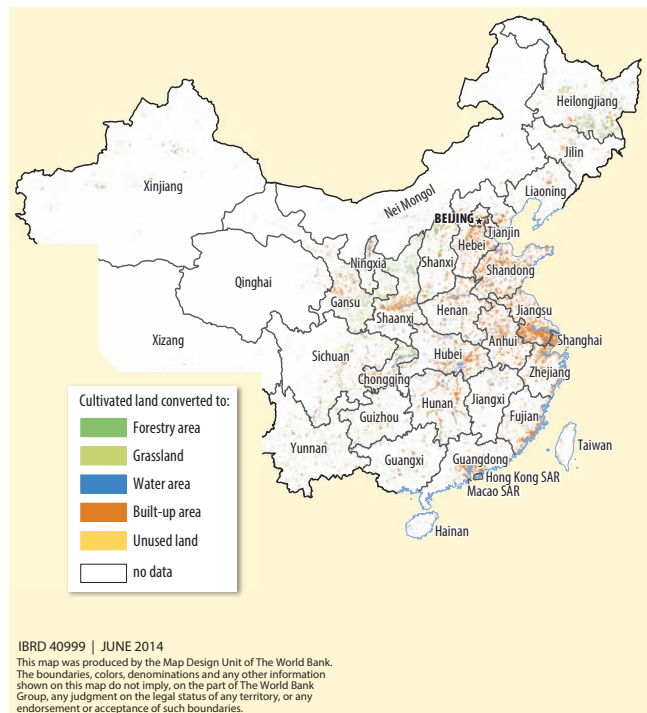
A large share of the conversion of farmland to nonfarm uses, particularly in built-up areas, has occurred in China's coastal provinces and around large cities. The municipalities of Beijing and Shanghai and Zhejiang province saw conversion rates above 5 percent during 1986–2000. But since these jurisdictions are small in comparison to other provinces, the loss of farmland represented less than 0.2 percent of China's total cultivated area. During 2000–08, Shanghai and Shandong experienced the highest conversion rates and net loss in farmland. Chengdu, Chongqing, Xian, and other provincial capitals also

saw high conversion rates to urban industrial, infrastructure, and residential uses. During the same period, large areas of farmland, often farmland of marginal productivity in upland areas, was converted to forested areas in the course of the government's National Slope Land Conversion Program.

During 1988–2000, large tracts of wetlands and other noncultivated lands were converted to farmland in northeast China, especially in Heilongjiang province. Compared to this period, fewer tracts of land were converted to cultivated land during 2000–08, as maps 5.2 through 5.5 show. Such conversion slowed considerably although additional farmland was still created in northwestern China, the western parts of Xinjiang, and Heilongjiang.

Overall, China's agricultural production potential has changed as a result of the conversion of various types of land of varying soil quality conditions into and out of cultivation across the different regions of China (box 5.1). During 1988–2000, the impact of land conversion on China's agricultural production potential was negligible but after 2000, the net change in potential agricultural productivity became more important. Between 2000 and 2008, aggregated for China's total

**MAP 5.2 Land conversion: From cultivated land to other uses, 1988–2008**



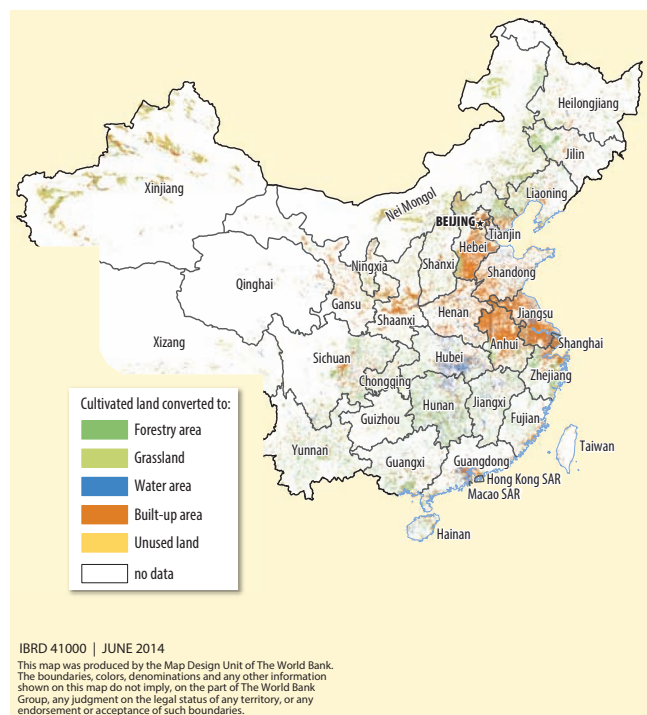
cultivated area, the total production potential fell by 32.9 billion kcal, or by around 1.7 percent, as compared to only 5.8 billion kcal (or 0.3 percent) during 1988–2000) (table 5.7).

About 97 percent of the decrease in agricultural production potential between 2000 and 2008 was due to the conversion of high-quality cultivated land to built-up areas. This high percentage is because mostly high quality (plain) farmland was being converted to nonfarming uses. The decline in production potential was also because much of this land is located in southeastern and eastern provinces where climatic conditions allow for two planting seasons per year. Land in the south and east is also less steep and receives more precipitation. Developed areas in the North China Plain, including Beijing and Tianjin municipalities, also experienced large declines in production potential (figure 5.20).

The recent conversion of cultivated land into built-up areas has not compromised China's ability to feed itself. China has also retained its capacity to improve agricultural production through conversion of nonfarmland into farmland and through increasing yields and productivity on existing cultivated land. From the perspective of China's national food security, a ban on land conversion is not warranted. However, rural land conversions rates have continued and even accelerated during the past five years (2008–12) and pressure on China's farmland resources will inevitably continue as the conversion of cultivated land to other uses continues in the urbanization process. Simulation results indicate that a 1 percentage point increase in China's urbanization rate will cause a decline of 0.065 percent of China's cultivated area and a 0.067 percent decline in China's agricultural production potential.

In general, the conversion of land for purposes of higher economic value than agriculture is a natural element of the urbanization process. China therefore needs careful management and planning to facilitate more rational land use in both the short and long term, given the likely pressures to continue to convert land. Good development policy, in general, and food policy, in particular, will not demand halting the conversion of cultivated land but rather require that the process

**MAP 5.3 Land conversion: From cultivated land to other uses, 2000–08**





of conversion is done rationally and that the productivity of the remaining resources in the agricultural sector is improved.

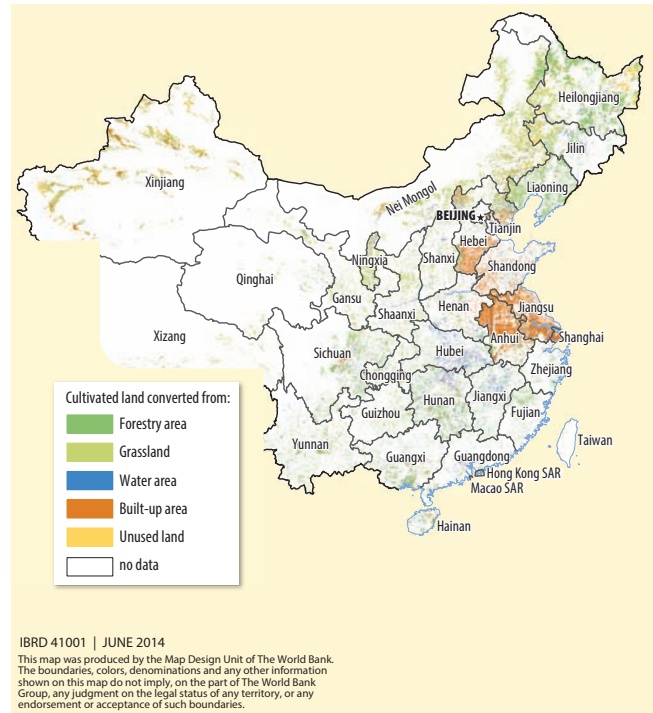
## Supply, changing consumption, and demand

### Projecting agricultural production, output, and supply under urbanization

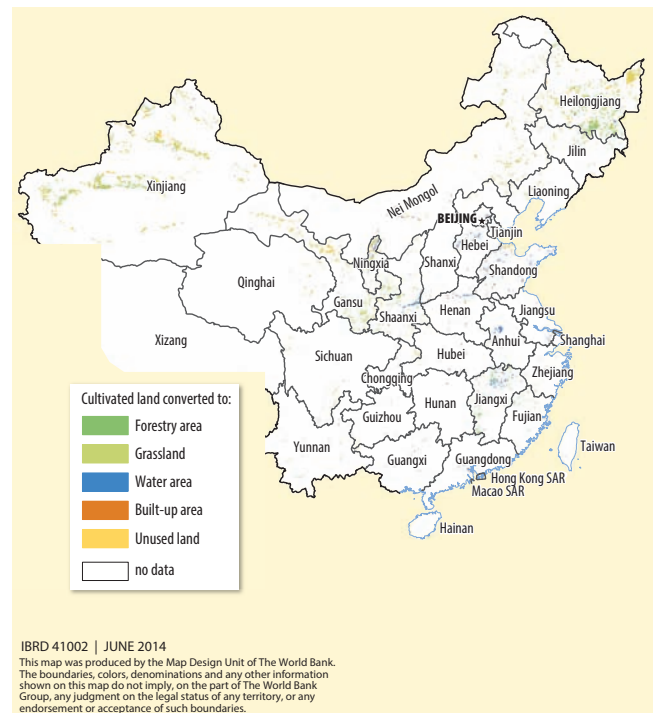
Despite resource constraints, the aggregate effects of China's urbanization on the domestic production of major agricultural products are projected to be modest. China's urban population is projected to reach 67 percent of the total population by 2030, increasing by roughly 1 percentage point per year. Urbanization will affect the availability of agricultural production factors, such as water, land, and labor and will have an impact on agricultural production, in various ways, as discussed in the previous section. China's agriculture will also face challenges associated with high environmental pollution levels. A one percentage point increase in China's urban population—after taking into account the combined effects of urbanization on agricultural water distribution and availability, arable land loss through conversion and changes in bioproductivity, rising rural wages, and other factors—is projected to result in a 0.18 percent decrease in total domestic grain output to 2020 (table 5.8). Water redistribution between sectors, farm-land conversion, and rising labor costs will contribute equally to this decrease in grain output. As China's urban population rises to 67 percent by 2030 (from 52 percent in 2012) total domestic grain output is projected to decline by about 2.7 percent from 2012 levels.

The impact of resource constraints will vary from crop to crop. Domestic rice production will suffer most, with output declining by 0.34 percent to 2020 for each 1 percentage point increase in the urban population, mainly because of the change in water distribution, which contributes nearly three quarters to the fall in output. Outputs of wheat and corn are projected to decrease slightly, by 0.17 percent and 0.18 percent respectively, by 2020 against the 2012 base-

**MAP 5.4 Land conversion: From other uses to cultivated land, 1988–2000**



**MAP 5.5 Land conversion: From other uses to cultivated land, 2000–08**





### BOX 5.1 Agro-ecological zones methodology

In addition to estimates of the quantity of the cultivated land conversion, another technique is to estimate changes in the potential productivity of cultivated land. The Agro-Ecological Zones (AEZ) methodology is a commonly used method of calculating potential productivity. As with any of the alternative methods for estimating potential productivity, a number of assumptions are needed about the crops or mix of crops that can be produced on each plot of land.

In this study, the following classification system of land use categories was used:

- *Cultivated land.* Original data include both paddy and nonirrigated uplands, which is aggregated into total cultivated land for this study.
- *Forestry area.* Natural or planted forests with canopy covers greater than 30 percent; land covered by trees less than 2 meters high with a canopy cover greater than 40 percent; land covered by trees with canopy cover between 10 percent and 30 percent; and land used for tea gardens, orchards, and nurseries.

- *Grassland.* Lands covered by herbaceous plants with coverage greater than 5 percent and mixed rangeland with coverage of shrub canopies of less than 10 percent.
- *Water area.* Land covered by natural water bodies or land with facilities for irrigation and water reservation, including rivers, canals, lakes, permanent glaciers, beaches and shorelines, and others.
- *Built-up area.* Land used for urban and rural settlements, industry, and transportation.
- *Unused land.* All remaining land.

Data inconsistencies should be expected because during the past three decades a number of different agencies have had responsibility for managing China's land. Without access to quality data from traditional statistical databases, this study relies on methods that use Landsat Thematic Mapper/Enhanced Thematic Mapper (TM/ETM) data to generate estimates of changes in land quantity and quality.

TABLE 5.7 Change in total production potential by province, 2000–08

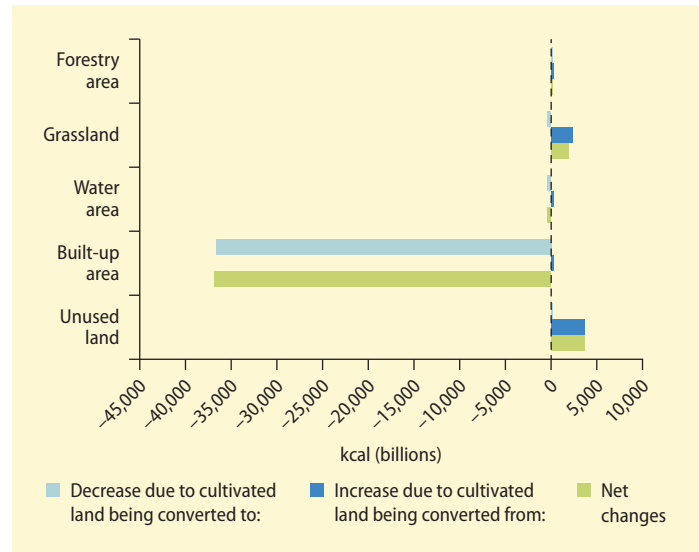
Province	Total production potential in 2000	Increase (billion kcal)	Decrease (billion kcal)	Net change (billion kcal)	Percentage change	Province	Total production potential in 2000	Increase (billion kcal)	Decrease (billion kcal)	Net change (billion kcal)	Percentage change
Beijing	3,306	3.4	280.8	-277.3	-8.39	Hunan	140,173	2.0	1,215.1	-1,213.0	-0.87
Tianjin	6,029	1.9	139.7	-137.8	-2.29	Guangdong	87,407	37.5	2,164.7	-2,127.2	-2.43
Hebei	7,1046	122.6	914.9	-792.3	-1.12	Guangxi	113,488	31.5	787.1	-755.7	-0.67
Shanxi	34,631	1.4	798.4	-797.0	-2.30	Hainan	15,939	23.0	131.1	-108.1	-0.68
Inner Mongolia	39,410	460.6	118.8	341.7	0.87	Chongqing	55,991	23.7	2,111.1	-2,087.3	-3.73
Liaoning	34,965	40.6	221.4	-180.9	-0.52	Sichuan	175,027	68.9	1,553.0	-1,484.1	-0.85
Jilin	32,929	71.9	155.8	-83.9	-0.25	Guizhou	63,814	27.6	1,103.9	-1,076.3	-1.69
Heilongjiang	58,986	1,380.2	802.8	577.4	0.98	Yunnan	67,706	94.4	981.6	-887.2	-1.31
Shanghai	8,160	0.0	1,993.9	-1,993.9	-24.43	Tibet	1,937	0.0	1.3	-1.3	-0.07
Jiangsu	109,240	28.0	8,319.2	-8,291.2	-7.59	Shaanxi	40,855	170.1	550.1	-380.1	-0.93
Zhejiang	66,373	15.7	1,673.6	-1,657.9	-2.50	Gansu	32,379	316.6	408.1	-91.5	-0.28
Anhui	135,361	535.9	3,594.5	-3,058.6	-2.26	Qinghai	2,854	4.6	21.6	-17.0	-0.59
Fujian	47,871	18.0	1,220.3	-1,202.3	-2.51	Ningxia	9,632	249.4	215.2	34.2	0.35
Jiangxi	105,507	633.2	1,060.9	-427.6	-0.41	Xinjiang	30,567	1,781.6	46.1	1,735.6	5.68
Shandong	96,332	166.4	2,967.0	-2,800.6	-2.91	Taiwan, China	13,437	69.0	181.8	-174.9	-1.30
Henan	111,160	99.3	1,243.1	-1,143.8	-1.03	Total	1,959,913	6,449	39,348	-32,899	-1.68
Hubei	147,401	31.9	2,371.1	-2,339.3	-1.59						

line. Soybean output, in contrast, is expected to increase by 1.63 percent. Negative effects on total soybean output caused by decreasing arable land availability and escalating labor costs (−0.33 percent) are expected to be offset by water redistribution to soybean production, in response to high returns from soy production.

Vegetable oil, sugar, vegetable, and fruit output will also be affected, but output declines are projected to be modest. For every 1 percentage point increase in the urban population, domestic output will decline by 0.36 percent for vegetable oil, 0.30 percent for sugar, 0.13 percent for vegetables, and 0.1 percent for fruit. Vegetable oil and sugar will suffer more than vegetables and fruit mainly because of water redistribution away from agriculture. Lower water availability will drive vegetable oil and sugar outputs down by 0.19 percent and 0.13 percent, respectively, while the impact on vegetables and fruit will be small. By 2030, the cumulative impact of urbanization on these agricultural goods will be between 1.5 percent and 5.4 percent. Animal production and aquaculture will experience relatively little impact. Urbanization will cause livestock and aquaculture production to decrease by 0.11 percent and 0.14 percent respectively, for every 1 percentage point increase in China's urban population. From 2012 to 2030, the total impact of urbanization on animal and aquaculture products will be a decrease in output of between 1.7 percent and 2.0 percent. The main driver of declining output in the livestock sector will be rising labor costs. The structural and quantitative changes in China's food production will require additional food imports, driven mainly by imports of feed grains, especially corn. Imports of rice and wheat are projected to be modest given the decline in overall per person demand for these grains by 2030. China's needs for imports of agricultural products are within the capacity of China's existing trade partners for maize, soybeans, and dairy products.

Urbanization impacts on agriculture will lead to slightly higher imports of agriculture products and reduce China's food self-sufficiency. However, overall reliance on

**FIGURE 5.20** Changes in agricultural production potential, 2000–08



Source: Deng and others 2013.

**TABLE 5.8** Impact of a 1 percentage point increase in China's urbanization rate on China's domestic food production to 2020

Food	Total impacts	Decomposition of impacts of urbanization		
		Water resource constraints usage	Farmland conversion	Rising labor cost
Grains	−0.18	−0.06	−0.06	−0.07
Rice	−0.34	−0.25	−0.04	−0.05
Wheat	−0.17	−0.09	−0.04	−0.04
Corn	−0.18	−0.02	−0.07	−0.09
Soybeans	1.31	1.64	−0.20	−0.13
Vegetable oils	−0.36	−0.19	−0.10	−0.07
Sugar	−0.30	−0.13	−0.09	−0.08
Vegetables	−0.13	−0.03	−0.06	−0.05
Fruits	−0.10	0.00	−0.06	−0.04
Pork	−0.11	−0.01	−0.02	−0.09
Beef	−0.11	0.00	−0.01	−0.09
Poultry	−0.12	−0.01	−0.03	−0.09
Dairy products	−0.14	−0.01	−0.02	−0.12
Fishery products	−0.11	0.00	−0.01	−0.10

Source: CAPSiM results.

imports will be small and serious concerns about China's food self-sufficiency do not seem warranted (table 5.9). Urbanization leads to lower domestic output of many agricultural products, as well as to higher prices and decreased international competitiveness.

**TABLE 5.9 China's supply and demand of agricultural products in 2012, 2020, and 2030***Thousands of tons*

Indicator	Grain <sup>a</sup>	Major grains			
		Rice	Wheat	Corn	Soybean <sup>b</sup>
2012					
Sown area	111,267	30,244	24,421	33,842	7,407
Production	589,570	142,965	120,580	208,190	13,600
Inventory change	72,152	27,683	11,595	14,863	7,027
Import	86,890	2,369	3,701	5,208	67,530
Export	2,830	279	0	257	385
Net import	84,060	2,090	3,701	4,951	67,145
Total demand	601,477	117,372	112,686	198,278	73,718
Food demand	316,804	95,727	72,648	15,791	71,560
Per capita food demand (kg/person)	445.3	70.9	53.8	11.7	53.0
Fodder grain demand	158,048	6,283	18,398	119,986	656
Seed demand	12,517	2,219	5,757	1640	688
Industrial demand	90,202	7,055	11,318	53,000	719
Waste	23,907	6,088	4,564	7861	94
Self-sufficiency rate (percent)	87.5	98.6	97.0	97.7	16.8
2020					
Sown area	101,968	24,953	21,536	33,561	7,424
Production	568,122	120,449	110,339	224,070	14,966
Import	108,918	1,244	2,628	19,794	79,536
Export	3,086	531	0	140	327
Net import	105,832	712	2,628	19,654	79,209
Total demand	673,954	121,161	112,967	243,724	94,175
Food demand	337,018	99,656	71,090	10,857	91,800
Per capita food demand (kg/person)	479.3	70.9	50.6	7.7	65.3
Fodder grain demand	191,754	5,525	18,503	155,896	738
Seed demand	12,324	2,184	5,666	1,627	677
Industrial demand	109,875	7,947	13,323	67,791	868
Waste	22,983	5,849	4,385	7,552	92
Self-sufficiency rate (percent)	84.3	99.4	97.7	91.9	15.9
2030					
Sown area	94,939	21,874	19,355	33,642	6,858
Production	563,021	109,314	102,729	243,298	14,972
Import	140,413	1,079	2,459	42,096	89,472
Export	3,168	613	0	97	290
Net import	137,245	466	2,459	41,999	89,181
Total demand	700,267	109,781	105,188	285,296	104,153
Food demand	318,224	88,844	63,072	6,629	101,613
Per capita food demand (kg/person)	491.0	62.3	44.2	4.7	71.3
Fodder grain demand	208,466	4,010	16,929	178,769	729
Seed demand	12,086	2,140	5,554	1,611	664
Industrial demand	139,612	9,223	15,462	91,105	1,058
Waste	21,879	5,563	4,171	7,183	89
Self-sufficiency rate (percent)	80.4	99.6	97.7	85.3	14.4

*Source:* CAPSiM results.*Note:* kg/person = kilograms per person.

As a result, China's agricultural imports will increase, and exports will decrease. However, the projected increases in imports for rice, wheat, and other products (except soybeans) will be small (table 5.10). Grain import vol-

ume is projected to increase by 275,000 tons for each percentage point increase in China's urban population, which is small relative to the current total imports of 105.8 million tons, annually.

### Rural-to-urban migration: Changing per capita food consumption patterns

China's urbanization will affect food demand through income growth resulting from economic growth and development, as discussed earlier. Urbanization will also, of course, involve the migration of rural residents to urban areas. How will consumption patterns of rural residents change as they enter the cities? What effects will rural-to-urban migration have on food consumption? Food consumption patterns differ between urban and rural residents in China. Food grain consumption (at home) in rural areas is higher than in urban areas at the same level of income. Urban residents consume less rice, wheat, and other grains but consume substantially more dairy products, eggs, edible oils, fruit, and vegetables than rural residents. But food consumption data does not show marked differences in consumption of poultry, beef, mutton, and aquaculture products between rural and urban areas (figure 5.21).

Food consumption per capita in both rural and urban areas is generally underestimated because current data<sup>4</sup> describe only consumption patterns at home but do not reflect consumption away from home. From 2000 to 2010, consumption data indicate that per capita food grain consumption of urban residents decreased by 1 percent, from 82.3 kg to 81.5 kg. Per capita grain consumption of rural residents decreased by a much greater amount over the same period, from 250 kg to 181 kg, or by 28 percent. According to national statistics, per capita pork consumption of urban residents remained nearly constant from 2005 (20 kg) to 2011 (21 kg), whereas consumption in rural areas decreased by nearly 8 percent from 16 kg (2005) to 14 kg (NSBC 2011). Notwithstanding population growth, such decreases in consumption, however, contrast with China's continuously increasing grain (rice, wheat) output and imports over the past decade. Domestic pork production, however, grew by 11 percent, while imports grew from 295,000 tons in 2005 to 387,000 tons in 2011. When comparing consumption with supply (production plus import), China's pork consump-

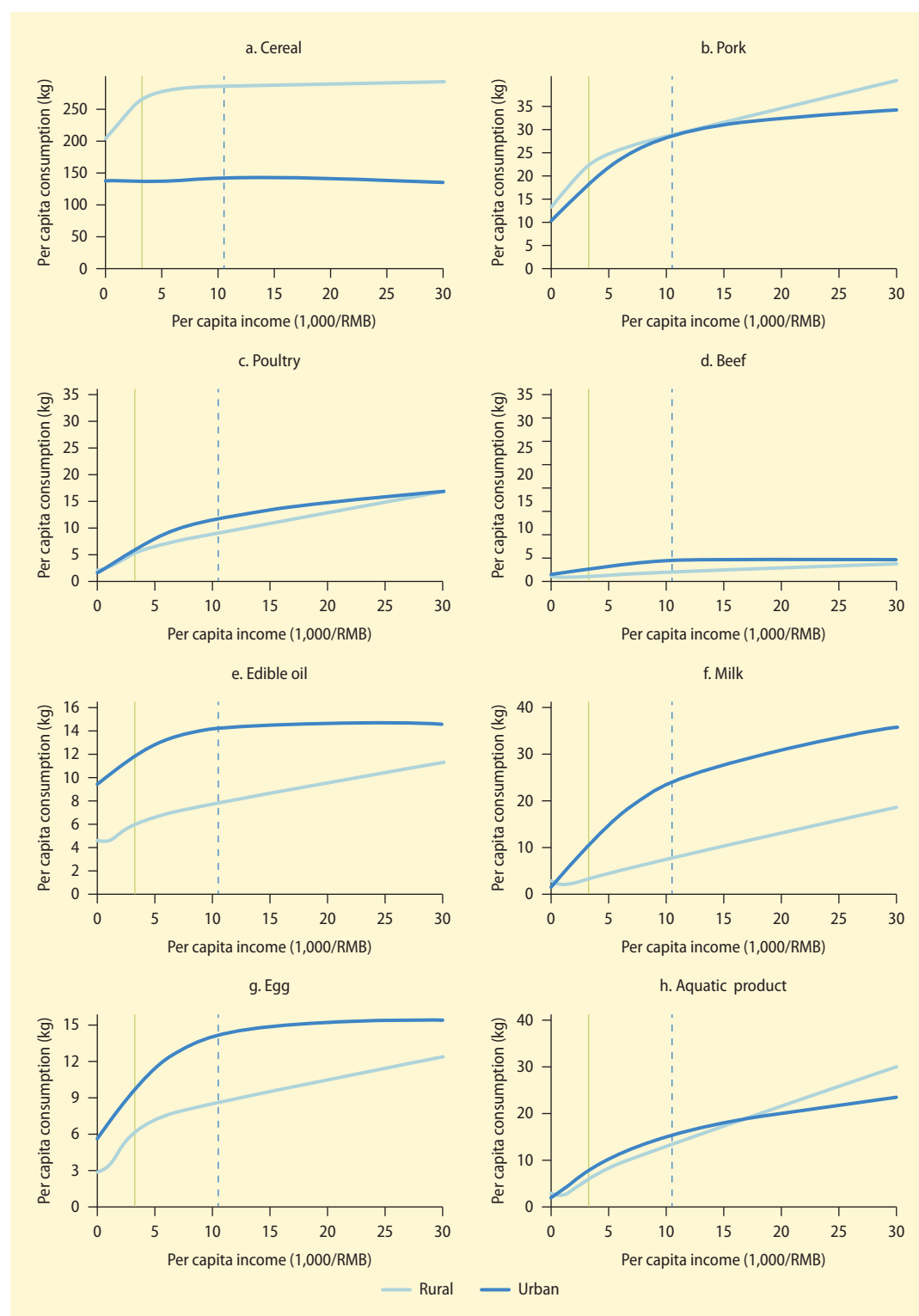
**TABLE 5.10** Impact of a 1 percentage point increase in China's urban population on China's international trade to 2020

	Export		Import		Net import (1,000 tons)
	Percent	1,000 tons	Percent	1,000 tons	
Grains	-0.93	-26.69	0.23	248.58	275.3
Rice	-2.83	-14.6	2.75	35.2	49.8
Wheat	-1.94	0.0	1.89	50.9	50.9
Corn	-0.57	-0.8	1.18	233.5	234.3
Soybean	0.12	0.4	-0.11	-95.8	-96.2
Vegetable oils	-0.87	-0.2	0.88	17.8	18.0
Sugar	-0.90	-0.6	0.87	26.3	26.9
Vegetables	-0.69	-44.5	0.70	4.5	49.1
Fruits	-0.58	-21.2	0.60	25.3	46.5
Pork	-0.46	-0.3	0.46	3.4	3.7
Beef	-1.00	0.0	0.95	1.6	1.6
Poultry	-0.48	-0.9	0.50	0.3	1.2
Dairy products	-0.23	-0.1	0.20	23.6	23.7
Fishery products	-0.30	-9.2	0.27	8.1	17.3

Source: CAPSiM results.

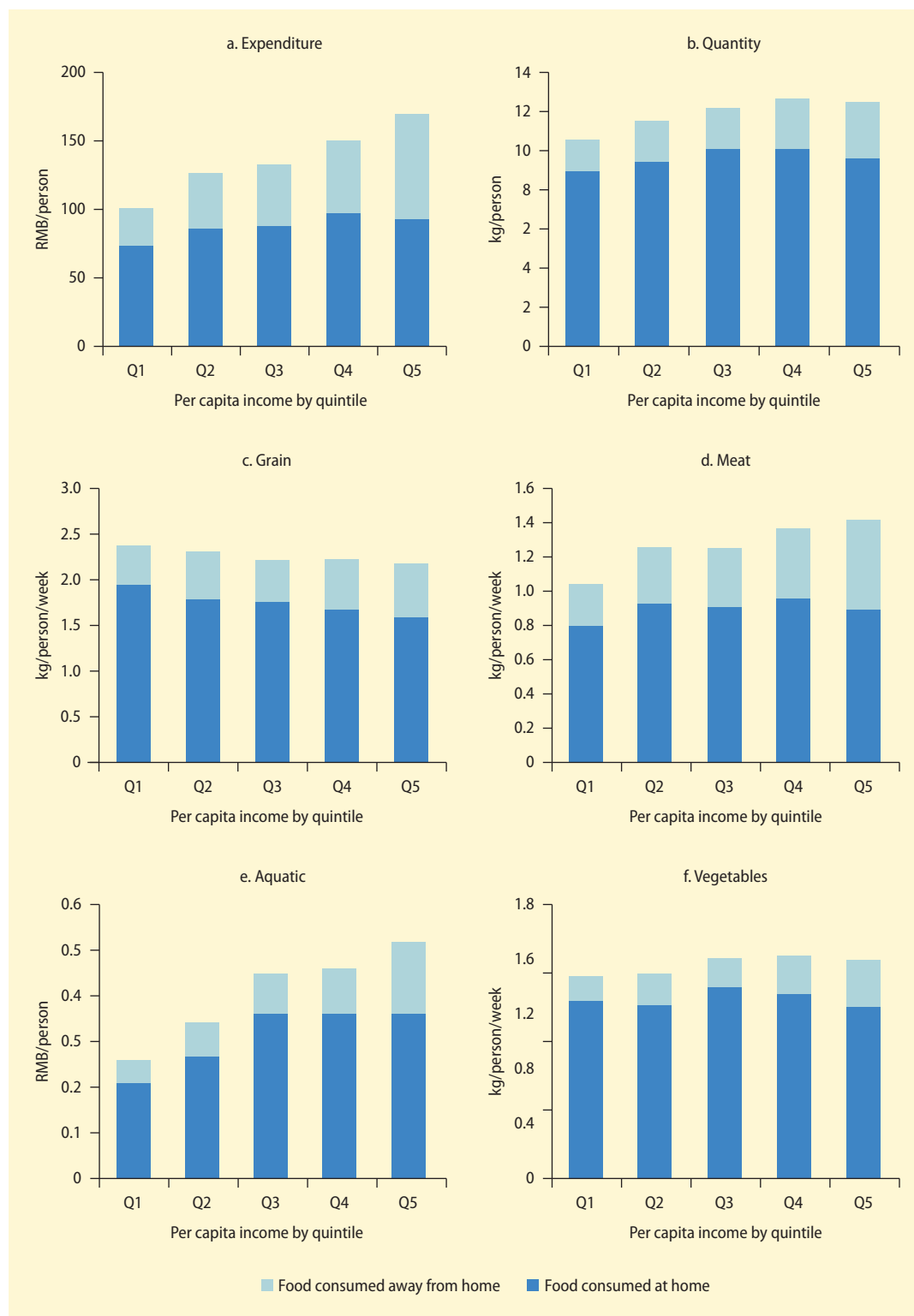
tion has increased by 12.5 percent during 2005–11. Such inconsistencies—constant or slightly increasing consumption per capita against fast output growth and imports—also exist for other agricultural commodities.

Analyzing food consumption away from home helps explain these inconsistencies. Food consumption of urban residents has increased substantially over the past 10 years, if consumption away from home is taken in account. Expenditure on consumption away from home has risen markedly with increasing urban incomes, and consumption away from home has become an important component of consumption of urban residents. According to survey data on food consumption in six large cities during 2007–11,<sup>5</sup> expenditure on urban residents' food consumption away from home accounts for 35 percent of total food expenditure, whereas consumption away from home accounts for between 20 and 30 percent of total food consumption. Food consumption also clearly differs according to whether an urban resident is at home or away from home. Urban residents consume more meat and beverages at home, but fewer fruits and vegetables when they eat out (figure 5.22). Similar shares can be expected for rural areas, possibly confirming that real consumption has been underestimated.

**FIGURE 5.21** Per capita consumption of various agricultural products in response to income growth

Source: J. Huang and others 2013.

Note: Rural family population—live more than six months.

**FIGURE 5.22** Food consumption at home and away from home for urban residents by income

Source: Bai and others 2013.

Note: The poorest quintile is Q1; the richest quintile is Q5.



### Projecting aggregate food demand and supply gaps under urbanization

China's food consumption and production are projected to stabilize after 2030 (box 5.2). By 2030, China's aggregate food self-sufficiency will remain at above 90 percent. Per capita food consumption will continue to grow rapidly over the next two decades, with relatively faster growth during the coming decade, driven by income growth. Per capita consumption of food grains such as rice and wheat will continue to decline, while consumption of edible oils, sugar, vegetables, fruit, and animal and aquaculture products will increase markedly with increasing incomes. Growing demand for higher-value meat, eggs, and dairy products present challenges for the domestic supply of animal feed, in particular feed grains. The rising demand for feed grains

will put pressure on China's aggregate food demand and supply balance. Domestic production shortages of soybeans, corn, edible oils, sugar, and dairy products will increase further because of demand growth and resource constraints in the next 20 years.

#### Grains

China's aggregate demand for grain is expected to grow significantly faster than domestic production. Total demand for grains is projected to increase from 600 million tons per year currently to 670 million tons in 2020 and 700 million tons in 2030. Annual grain production, in comparison, will grow at a much slower pace than demand, reaching 568 million tons by 2020 and 563 million tons by 2030. Per capita annual grain consumption is projected to grow from 445

### BOX 5.2 China Agricultural Policy Simulation Model (CAPSiM)

This study uses the China Agricultural Policy Simulation Model (CAPSiM), developed by the Center for Chinese Agricultural Policy of the Chinese Academy of Sciences, to analyze the effects of China's urbanization on domestic food production and food demand and forecast a supply-demand balance for major agricultural products for the next two decades, until 2030. CAPSiM covers 14 crops (rice, wheat, corn, sweet potatoes, potatoes, other coarse grains, soybeans, cotton, oil crops, sugar crops, vegetables, fruit, squash, and others); and nine categories of livestock products (pork, beef, mutton, poultry, eggs, milk, fish, shrimp, and others). The model builds on the analyses of the effects of urbanization on water for agriculture, land conversion and arable land, labor, migration and rural wages, and technological change. Model simulations are based on the following assumptions:

- **GDP.** China's economic growth is expected to slow but to maintain comparatively high rates of GDP growth. Assumptions are: 7.5 percent growth for 2012–15; 7 percent for 2016–20; 5.9 percent for 2021–25, and 5.0 percent for 2026–30.
- **Rural-urban income gap.** The rural-urban income gap will gradually narrow. Rural incomes may grow faster than urban incomes. During 2010–12, rural income grew by 11 percent annually, while

urban income grew by 8.6 percent annually. For the 2013–30 period, rural incomes are assumed to maintain an average annual growth rate of 8.3 percent while urban income will grow more slowly, at an assumed average annual rate of 6.8 percent.

- **Population.** China's population growth rate is assumed to be 0.61 percent from 2012 to 2015, 0.44 percent for 2016–20, 0.22 percent for 2021–25, and 0.06 percent for 2026–30.
- **Urbanization.** China's urban population will increase from 52 percent of the total population in 2012 to 56 percent in 2015, 60 percent in 2020, 64 percent in 2025, and 67 percent in 2030.
- **Rural labor wage and land rent.** Average annual growth of the actual wage of rural labor from 2012 to 2030 is assumed to be 6 percent, while cost of land rental will grow by 2.5 percent.
- **Technological change.** It is expected that the government will continue to invest in agricultural research and development. Rising marginal cost for increasing unit production will imply a lower contribution rate of scientific and technological progress.

The Organisation for Economic Co-operation and Development-Food and Agriculture Organisation Agricultural Outlook (2013–20) and U.S. Department of Agriculture estimates (2013–22) are the main sources for international agricultural prices.

**TABLE 5.11** China's current and projected supply and demand of livestock products in 2012, 2020, and 2030  
Thousands of tons

	Pork	Beef	Mutton	Poultry	Eggs	Dairy products	Fishery products
<i>2012</i>							
Production	46,159	5,296	3,409	17,319	19,998	38,680	33,178
Import	522	49	119	49	0	6,181	2,208
Export	66	12	0	181	61	105	3,253
Net import	456	37	119	-131	-61	6,076	-1,045
Total consumption	46,615	5,333	3,528	17,187	19,937	44,756	32,132
Food consumption	44,046	4,919	3,295	16,294	19,136	44,008	29,761
Per capita food consumption (kg/person)	32.6	3.6	2.4	12.1	14.2	32.6	22.0
Self-sufficiency rate (percent)	99.0	99.3	96.6	100.8	100.3	86.4	103.3
<i>2020</i>							
Production	56,194	7,272	4,384	22,379	23,462	56,906	43,808
Import	728	165	328	67	0	11,725	2,975
Export	65	4	0	180	47	51	3,298
Net import	664	161	328	-113	-47	11,674	-323
Total consumption	56,858	7,433	4,711	22,266	23,416	68,580	43,485
Food consumption	54,289	7,019	4,479	21,373	22,615	67,832	41,113
Per capita food consumption (kg/person)	38.6	5.0	3.2	15.2	16.1	48.2	29.2
Self-sufficiency rate (percent)	98.8	97.8	93.1	100.5	100.2	83.0	100.7
<i>2030</i>							
Production	61,794	9,046	5,133	25,477	24,803	68,889	51,618
Import	897	520	801	87	0	21,734	3,648
Export	52	1	0	139	38	25	2,705
Net import	845	518	801	-52	-38	21,709	942
Total consumption	62,638	9,564	5,934	25,425	24,765	90,598	52,560
Food consumption	60,070	9,150	5,702	24,532	23,964	89,850	50,188
Per capita food consumption (kg/person)	42.1	6.4	4.0	17.2	16.8	63.0	35.2
Self-sufficiency rate (percent)	98.7	94.6	86.5	100.2	100.2	76.0	98.2

Source: CAPSiM results.

Note: kg/person = kilograms per person.

kg in 2012 to 479 kilograms in 2020 and 491 kilograms in 2030 (table 5.11).

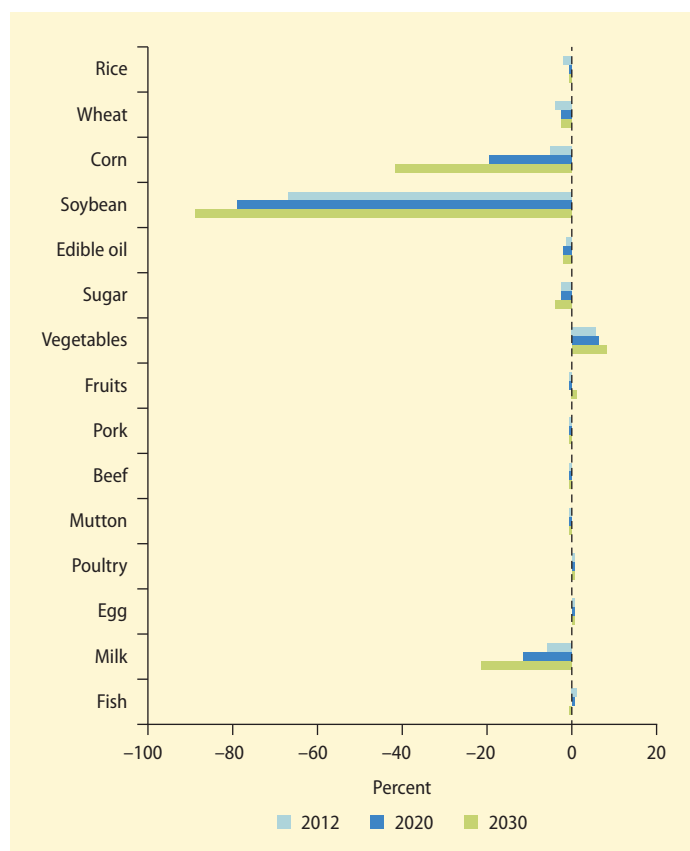
China will maintain high domestic self-sufficiency levels for rice and wheat, the most important food grains, but not for feed grains. For rice, self-sufficiency is predicted to remain above 99 percent up to 2030. For wheat, self-sufficiency will remain above 97 percent in 2030. In contrast, China's self-sufficiency in corn is projected to decrease to 85 percent by 2030 from 98 percent in 2012. Corn production is predicted to reach 220 million tons by 2020 and 243 million tons by 2030 while demand will increase to 240 million tons in 2020 and 285 million tons in 2030, opening a demand-supply gap of 20 million tons by 2020 and 42 million tons by 2030. The domestic supply gap in soybeans (including soybean oil) is projected to grow

further. Imports may reach 80 million tons in 2020 and 90 million tons in 2030, resulting in a self-sufficiency rate for soybeans of only 14 percent (figure 5.23).

#### *Livestock products and fishery products*

China will be able to balance domestic demand and supply of pork, the most important animal product. It will also remain self-sufficient in poultry and eggs. In contrast, self-sufficiency levels for beef, mutton, and dairy products will drop significantly. Dairy imports will increase rapidly and self-sufficiency will drop to 76 percent by 2030. As consumption increases, livestock production in China will also see rapid growth.

China's demand for fishery and aquaculture products is expected to surge, but will

**FIGURE 5.23** Projected supply shortages for various food items

Source: Huang and others 2014.

be largely met by increasing domestic production. Per capita annual consumption of aquaculture products, including fish, shrimp, crab and shellfish, will grow from 22 kg today to 29 kg by 2020 and 35 kg by 2030. Domestic production will grow substantially from 33.2 million tons in 2012 to 43.8 million tons in 2020 and 51.6 million tons in 2030. Since the demand for aquaculture will grow slightly faster than production, export growth for aquacultural products will remain small while imports will continue to grow. It is worth noting that low-price fish meal accounts for a significant share of China's fishery imports. While imports and exports of fish and aquaculture products are of similar quantity, China's exports have much higher value than its imports.

**Vegetables and fruit.** China has a comparative advantage in fruit and vegetable production, which has grown steadily over the past

decade. It will meet its demand for both and will even be able to increase exports. While rising labor costs will reduce its comparative advantage, China is likely to satisfy its rising domestic demand on vegetables and fruit by further adjusting and expanding domestic production. Vegetable production is projected to grow further, from currently 308 million tons in 2012 to 349 million tons by 2020 and 372 million tons by 2030. Vegetable consumption will also be on an upward trajectory, and increase from 236 million tons in 2012 to 277 million tons by 2020 and 298 million tons by 2030. China will remain a major exporter of vegetables with exports projected to increase from 6.1 million tons to 8.6 million tons by 2030.

China's production and consumption of fruit will also grow significantly, and imports and exports will both increase. Production is predicted to increase from 162 million tons in 2012 to 193 million tons by 2020 to 219 million tons by 2030. Fruit consumption will grow from 163 million tons in 2012 to 194 million tons by 2020 and 218 million tons by 2030. China's imports of fruit, mainly tropical fruits, are expected to grow from 4 million tons in 2012 to 4.3 million tons in 2020, and then decrease to 3.7 million tons by 2030. Fruit exports, mainly temperate fruits (apples, pears, and citrus fruits) are projected to grow from 3.4 million tons in 2012 to 3.5 million tons in 2020 to 5 million tons in 2030. After 2020, fruit consumption growth will slow down, while production will maintain rapid growth, making China an exporter with a net export of 1.29 million tons of fruits by 2030.

**Sugar.** China's sugar production is expected to grow slowly against a rapid consumption increase, resulting in a bigger supply shortage. Production is projected to increase from 16 million tons in 2012 to 17 million tons in 2020 and 19 million tons in 2030. Per capita sugar consumption is projected to increase significantly, resulting in a total demand of 20 million tons by 2020 and 23 million tons by 2030, up from 16 million tons in 2012. Imports of sugar are expected to increase from 2.8 million tons in 2012 to 2.9 million tons in 2020 and 4.25 million tons in 2030. By 2030, China is projected to produce 82 percent of its sugar demand domestically.

**Oil Crops.** The production of and demand for oil crops (other than soybeans) are expected to grow in parallel, although China will face some domestic supply shortage, which will need to be met by imports. Total production of oil crops is expected to rise from 8.7 million tons in 2012 to 10.2 million tons in 2020 and 10.8 million tons in 2030. Domestic demand will continue to grow at a relatively rapid speed, increasing from 10.4 million tons in 2012 to 12.2 million tons in 2020 and 13.1 million tons in 2030. Imports are predicted to increase from 1.4 million tons in 2012 to 2 million tons in 2020 and 2.4 million tons in 2030. China's self-sufficiency rate in oil crops will decline from 86 percent in 2012 to 82 percent in 2030.

**Cotton.** China's cotton demand has been growing much faster than its cotton production, with much of this demand being for production of clothing for export, and supply continues to fall short of demand. Demand for cotton will continue to grow rapidly. Total demand is expected to increase from 8 million tons in 2012 to 10 million tons in 2020 and to nearly 13 million tons in 2030. Domestic cotton production and imports in 2020 are both expected to be lower than those of 2012, mainly because of government purchase and stockpiling of cotton in 2012, which contributed to higher prices, higher domestic production, and strong import growth. These effects are expected to dissipate.

## Policy recommendations

China has established a comprehensive food policy framework with minimum grain purchasing prices at the core, supported by temporary grain reserves, direct food subsidies, grain stock adjustments, and international trade. This framework, along with China's institutional reforms and productivity growth in the agricultural sector over the past decades, has been critical to China's food grain security. But these policies have not addressed problems related to distortions in grain prices, policy inefficiencies, obsolete grain circulation and reserve systems, and weak food safety nets, and they therefore need further improvement to meet the challenges of urbanization.

## Setting China's food security objectives

Food self-sufficiency may be desirable for a country with a population of 1.3 billion people, but in view of the structural changes in agricultural production and in food consumption that have taken place over the past decades, as well as escalating environmental and resource constraints, China's current objective of food security in all food categories is neither possible nor necessary. Instead, China should redefine its food security objectives based on the principles of efficiency, openness, and sustainability. Taking environmental capacity and resource constraints into account, China should strive to unlock the potential for increased grain production by improving productivity and market efficiency, thereby projecting a clear and transparent picture of China's needs for grain imports and exports. China should moderately adapt its food security objective towards maintaining self-sufficiency in food grains while allowing for more imports of nonfood grains and other agricultural products. More emphasis should be placed on food quality and safety, agricultural sustainability, and protection policies for low-income groups. Stronger emphasis should also be placed on improving the environmental sustainability of China's domestic livestock sector through better protection and management of China's grassland resources. The fine-tuning of China's food security objectives needs to be complemented by policy reforms, investments in agricultural water resources management, and rural land and labor market reforms.

## Enhancing domestic grain production capacity

China has raised agricultural productivity successfully in the past. From 2004 to 2011, total factor productivity grew at a rate of 2 percent annually for all major grain crops and at 3 percent annually for the major vegetable crops. If China is to increase domestic grain production capacity, ensuring continuous productivity growth in agriculture is a priority. Compared to many other countries, China's potential for increasing labor and land productivity is significant. The potential of productivity growth can be captured

through promoting economies of scale in agriculture, primarily by increasing the scale of farming operations, and through continued investments in research and development.

The process through which labor and land productivity can grow and farmland can be consolidated needs to be carefully coordinated, and the pace of change needs to be carefully controlled. Specifically, the government's role will be to (a) improve policies that allow rural migrants to become urban citizens, thereby stimulating more permanent migration to urban areas, and (b) create the conditions for consolidated agricultural operations and improved labor productivity in rural areas. The government will need to rationalize the rural land rights system and develop rural land markets and create incentives for a market-based consolidation of farmland to allow modern medium- and large-scale entities, such as commercial grain producers, larger family farms, and specialized cooperatives, to emerge.

Steady productivity growth in grain production requires continued technological advancements in agriculture. The key drivers for technological progress are increased public spending on agricultural research and development, integrated programs to promote advanced yield-enhancement technologies, mechanization in grain production, capacity building of farm producers, adoption of modern biotechnology, and expedited breeding of new, improved crop varieties. Investments will also be needed for transforming low- and medium-yield farmland into land of higher productivity and for the expansion or rehabilitation of irrigation infrastructure, and for the development of water users' associations that can help improve water use efficiency in irrigation areas. Investments in improving on-farm water use efficiency through better technology are needed and should be combined with better water pricing policies.

### **Improving agricultural sustainability**

Current practices of overfertilization need to be changed to reduce environmental costs and ensure that agricultural resources and the environment are managed in more sustainable ways. Audits on heavy metal contami-

nation in major grain-producing regions can provide the necessary baseline information, while environmental risk assessments can help identify key target regions for action. The classification of key regions according to function can be used to determine potential treatments based on the severity of contamination and crop mixes can be adjusted accordingly. China should set sound, science-based criteria for tillage on land contaminated by heavy metals. For areas where contamination is severe and tillage should not continue in the future, ecological compensation schemes can be considered to support farmers' jobs and incomes. The progress that has been made on reverting farmland back to forests should be carefully managed in order to prevent the reclamation of already retired farmland. The scope of the slopeland conversion program should be further expanded to also include severely desertified areas. A special subsidy program for land quality protection should be implemented to support farmers who opt to leave their land fallow, readjust their land mix, or limit the use of pesticides and chemical fertilizers.

### **Enhancing international cooperation and trade**

Following China's WTO accession, progressive and predictable import growth has been shown to create win-win results. For example, China's growth of soybean imports has driven global soybean production, particularly in the Americas, and promoted global trade. The benefits for China include meeting growing domestic demand and saving land and water resources. Building on these experiences, China should strengthen cooperation with major grain-producing nations by signing medium- and long-term grain trade agreements with such countries, and creating stable and diversified import avenues. China should also leverage its comparative advantages and expand agricultural development aid and investments in neighboring countries and in South America and Africa, and actively participate in global and regional food security governance. China should focus on agricultural technology transfer, and investments in processing, storage, transportation, and



trade, ensuring socially responsible and sustainable investments. While such investments may not result immediately in agricultural products flowing to China, they will increase other countries' grain production capacity and improve global supply, which in turn will improve the external environment of food security for China.

### **Reforming grain price formation mechanisms**

China's grain price mechanism has resulted in market distortions and a heavy fiscal burden for the government, and requires reform. China should allow grain prices to fluctuate freely during normal periods and secure food supply for low-income groups through food subsidy programs. Only in times of natural disaster or external shocks should the government intervene and release the state's emergency grain reserves. China's grain producer price should be replaced by a target price system. Moving away from direct government buying in the market to price subsidies linked to a target price (price benchmark) should be considered. This would separate price formation from government subsidies, the benefits of which would include gains to farmers and less market distortion. Such a policy has been adopted by many countries in their transition from price support to direct subsidies. While conducting price reform, China needs to quicken the pace of building a food safety net for vulnerable income groups. Food price inflation and benchmarks for social relief and benefits need to be better linked. For specifically vulnerable groups, such as households in extreme poverty, a direct food supply system should be established.

### **Improving the efficiency of grain producer subsidies**

China's existing grain subsidy policy should be maintained to help stabilize farmer's income expectations. Subsidy levels should be adjusted regularly to counter the erosion of farmers' gains because of rising production costs. Current agricultural subsidies are still comfortably below the WTO-mandated caps, and there is room to grow further. But

China's subsidy policy also needs reform to meet the new food security objectives. Subsidies should be better linked to yields of grain crops and incremental subsidies should favor the main grain-producing regions and producers. China may also create a special subsidy program linked to environmental protection to create incentives for farmers to opt for retiring farmland or reducing input levels.

### **Reforming China's grain reserves and circulation system**

The government should carefully distinguish between strategic grain reserves and grain buffer stocks. Strategic reserves are built primarily to withstand systemic grain supply shocks, and such reserves should be modest. Buffer stocks would be used mainly to balance grain supply and demand between seasons and different regions and should be concentrated in major grain consumption regions, especially city clusters. The share of processed grains should be increased, and the role of local governments in building grain reserves should be strengthened. China may also create incentives for grain processing and circulation enterprises to contribute to grain reserves. And finally, China needs to improve its network of modern grain logistics, which runs through major interprovincial corridors and connects major grain-producing regions, distribution centers, and transportation hubs to cities and city clusters. The focus should be on consolidating existing grain logistics resources, creating a network of critical grain logistics hubs, and strengthening the connections between such hubs and railway, waterway, and highway transportation infrastructure. Warehousing services should be made more specialized and market based, and grain warehousing could be professionalized and privatized.

### **Notes**

1. To assess food consumption, production, and self-sufficiency issues for China, different food types are converted into CEs, taking into account the higher costs of producing livestock products relative to producing an equivalent weight of cereal products (K. Rask and



- N. Rask 2011). The coefficients used in this report reflect the high costs of producing livestock products relative to cereals and the sharp differences between different animal products. The coefficients used are as follows: beef, 19.8; mutton and goat meat, 19.8; offal, 12.8; other meat, 12.0; pork, 8.5; poultry, 4.7; fish and seafood, 3.3; other aquatic products, 0.1; eggs, 3.8; milk, 1.2; butter, 2.1; cream, 10; other animal fat, 12.0.
- Modeling and simulation exercises, using the CWSM, were applied to quantify the relationship between urbanization and water consumption in the agricultural sector in China. Simulations were conducted for overall water balance, intersectoral water allocation, and their impacts on agricultural production for China's 10 major river basins, including the Liao, Songhua, Hai, Huai, Yellow, Yangtze, Pearl, Southeast, Southwest and Northwest rivers (see map 5.1). For a detailed treatment of the CSWM model used for this study, see J. Wang and others (2013).
  - Hukou* is China's household registration system. It separates rural and urban citizens and imposes restrictions on rural residents' mobility to settle in urban areas and gain access to urban social security and public services.
  - The National Statistics Bureau of China calculates rural food consumption per capita as total household consumption divided by permanent household members. These members include the following: people living at home all year, people living at home at least for 6 months, and people living at home for less than 6 months per year but remitting income to the household.
  - Data are from Chinese Center for Agricultural Policy surveys on food consumption at home and away from home for 1,340 families in Beijing, Chengdu, Nanjing, Shanghai, Shenyang, Xiamen, and Xi'an during 2007–11.
- ## References
- Bai, Junfei, Huanguang Qiu, and Jikun Huang. 2013. "Changes of China's Food Consumption." Project report submitted to World Bank and Development Research Center of the State Council, Center for Chinese Agricultural Policy, Beijing.
- Bai, Junfei, Thomas I. Wahl, Bryan T. Lohmar, and Jikun Huang. 2010. "Food away from Home in Beijing: Effects of Wealth, Time, and 'Free' Meals." *China Economic Review* 21 (3): 432–41.
- Cai, Fang, and Meiyan Wang. 2010. "Growth and Structural Changes in Employment in Transition China." *Journal of Comparative Economics* 38 (1): 71–81.
- Chan, Kam Wing. 2010. "The Global Financial Crisis and Migrant Workers in China: 'There Is No Future as a Labourer; Returning to the Village Has No Meaning.'" *International Journal of Urban and Regional Research* 34 (3): 659–77.
- Chen, Feng-gui, Hong-ou Zhang, Qi-tao Wu, and others. 2010. "A Study on Coordinate Development between Population Urbanization and Land Urbanization in China." *Human Geography* 25 (5): 53–58.
- Chen, Xi-wen. 2011. "Some Issues in the Rural Development of China." *Journal of Nanjing Agricultural University* (Social Sciences Edition) 11 (1): 1–6.
- Chen, Zhigang, Fu-tian Qu, Li Han, and others. 2010. "The Rural Land Issues in the Process of the Industrialization and the Urbanization: Features, Incentives, and Resolution Path." *Reform of Economic System*, 5: 93–98.
- de Brauw, Alan, Jikun Huang, Scott Rozelle, Linxiu Zhang, and Yigang Zhang. 2002. "The Evolution of China's Rural Labor Markets during the Reforms." *Journal of Comparative Economics* 30 (2): 329–53.
- de Brauw, Alan, and Scott Rozelle. 2008. "Reconciling the Returns to Education in Off-Farm Wage Employment in Rural China." *Review of Development Economics* 12 (1): 57–71.
- de Brauw, Alan, Jikun Huang, Linxiu Zhang, and Scott Rozelle. 2013. "The Feminisation of Agriculture with Chinese Characteristics." *Journal of Development Studies* 49 (5): 689–704.
- Deng, Xiangzheng, Jikun Huang, and Scott Rozelle. 2013. "Impact of Urbanization on Land Productivity and Cultivated Land Area in China." Project report submitted to the World Bank and Development Research Center of the State Council, Center for Chinese Agricultural Policy, Beijing.
- Du, Ying, Gaihe Yang, Liping Xu, and others. 2005. "Analysis of Ecological Effects in Urbanization Process." *Journal of Northwest A&F University* (Social Science Edition) 5 (2): 97–101.
- Easter, K. William, and Yang Liu. 2005. "Cost Recovery and Water Pricing for Irrigation and Drainage: What Works?" Washington, DC: World Bank.
- Fischer, Günther, Tatiana Ermolieva, and Laixiang Sun. 2010. "Environmental Pressure from

- Intensification of Livestock and Crop Production in China: Plausible Trends towards 2030." CATSEI Project Report D22, Center for Chinese Agricultural Policy, Beijing.
- Fukase, Emiko, and Will Martin. 2013. "Who Will Feed China in the 21st Century? Income Growth and the Demand and Supply for Food in China." Draft report, Montesquieu University-Bordeaux IV, Bordeaux, France.
- Han, Jun. 2010. *Strategic Research on China's Food Production Capacity and Balancing Supply and Demand*. Beijing: Capital University of Economics & Business Press.
- Hu, Mu, and Hejin Ni. 2010. "Research on Relationship between Urbanization and the New Rural Construction Based on Dynamic Perspective." *Chinese Agricultural Science Bulletin* 26 (7): 364–69.
- Huang, Jikun. 1999. "Social Development, Urbanization and Food Consumption." *Social Sciences in China* 4: 102–16.
- Huang, Jikun and Howarth Bouis. "Structural Changes in the Demand for Food in Asia: Empirical Evidence from Taiwan." *Agricultural Economics* 26 (2001): 57–69.
- Huang, Jikun, and Cristina David. 1993. "Demand for Cereal Grains in Asia: The Effect of Urbanization." *Agricultural Economics* 8: 107–24.
- Huang, Jikun, and Scott Rozelle. 1998. "Market Development and Food Consumption in Rural China." *China Economic Review* 9 (1): 25–45.
- Huang, Jikun, Jun Yang, Zhurong Huang, Huaiju Liu, Junfei Bai. 2013. "Analysis on Impacts of Urbanization on Food Consumption and Grain Demand." Report, Center for Chinese Agricultural Policy, Beijing.
- . 2014. "Urbanization and Food Consumption." A project report submitted to the World Bank and Development Research Center of the State Council, Center for Chinese Agricultural Policy, Beijing.
- Huang, Jikun, Jun Yang, and Scott Rozelle. 2010. "China's Agriculture: Drivers of Change and Implications for China and the Rest of World." *Agricultural Economics* 41: 47–55.
- . 2014. "Urbanization and Food Security in China." A project report submitted to World Bank and Development Research Center of the State Council, Center for Chinese Agricultural Policy, Beijing.
- Huang, Jikun, Lifan Zhu, Xiangzheng Deng, and Scott Rozelle. 2005. "Cultivated Land Changes in China: The Impacts of Urbanization and Industrialization." *Society of Photo-Optical Instrumentation Engineer* 5884: 135–49.
- Huang, Ming-hua, Mo Chen, and Jing-wen Zhang. 2011. "The Linkage Plan of Urban-Rural Construction Land-Use Necessity and Must of Urbanization and Farmland Protection." *Urban Planning and Design* 1: 61–65.
- Li, Hongbin, Lei Li, Binzhen Wu, and Yanyan Xiong. 2012. "The End of Cheap Chinese Labor." *Journal of Economic Perspectives* 26 (4): 57–74.
- Li, Suqin, and Hengyi Li. 2012. "Resource Endowment Advantage Reversion and Countermeasures in the Construction of Henan Grain Core Area." *Chinese Journal of Agricultural Resources and Regional Planning* 33 (3): 3–44.
- Lohmar, Brian, and James Hansen. 2007. "Interactions Between Resource Scarcity and Trade Policy: The Potential Effects of Water Scarcity on China's Agricultural Economy under the Current TRQ Regime." Paper presented at the International Agricultural Trade Research Consortium Summer Symposium, Beijing, China, July 8–9.
- Ma, Yong-huan, and Wen-yuan Niu. 2009. "Forecasting on Grain Demand and Availability of Cultivated Land: Use Resources Based on Grain Safety in China." *China Soft Science* 3: 11–16.
- Ministry of Water Resources. 2006–10. *Water Resources Bulletin*. Beijing: China Water Power Press.
- Mu, Guangzong, Changbao Mao, Jinjing Wu, and others. 2013. "Study on the Population Vulnerability and Optimization in Rural China." *Journal of China Agricultural University* (Social Sciences Edition) 30 (3).
- Nie Fengying, Jieying Bi, and Xuebiao Zhang. "Study on China's Food Security Status." *Proceedings of the International Conference on Agricultural Risk and Food Security 2010* 1: 301–10.
- NSBC (National Statistical Bureau of China). 2012. *China Statistical Yearbook*. Beijing: Statistical Press.
- . 2011. *China Statistical Yearbook*. Beijing: Statistical Press.
- . 2000. *National Rural Household Survey*. Beijing: China Statistical Press.
- . 1990. *China Statistical Yearbook*. Beijing: China Statistical Press.
- Otsuka, Keijiro. 2013. "Food Insecurity, Income Inequality, and the Changing Comparative Advantage in World Agriculture." *Agricultural Economics* 44 (s1): 7–18.
- Rask, Kolleen, and Norman Rask. 2011. "Economic Development and Food Production-

- Consumption Balance: A Growing Global Challenge." *Food Policy* 36 (2): 186–96.
- Shu, Jian-ling, and Quan Chen. 2012. "Dynamic Relationship between China's Urbanization and the Food Security." *Journal of Xi'an University of Finance and Economics* 25 (3): 11–15.
- Taylor, J. Edward, Scott Rozelle, and Alan de Brauw. 2003. "Migration and Incomes in Source Communities: A New Economics of Migration Perspective from China." *Economic Development and Cultural Change* 52 (1): 75–101.
- Wang, Jinxia, Jikun Huang, and Scott Rozelle. 2013. "Urbanization, Agricultural Water Use and Crop Production in China." Project report submitted to the World Bank and Development Research Center of the State Council, Center for Chinese Agricultural Policy, Beijing.
- Wang, Jinxia, Jikun Huang, and J. Yang. 2009. "Climate Change, Water and Agricultural Development in the 3H Region and Overall China." Project report submitted to the World Bank, Center for Chinese Agricultural Policy, Beijing.
- Wang Jinxia, Zhigang Xu, Jikun Huang, and Scott Rozelle. 2005. "Incentives in Water Management Reform: Assessing Effect on Water Use, Production and Poverty in the Yellow River Basin." *Environment and Development Economics* 10: 769–99.
- Wang, Xiahui, Huiyuan Zhang, Wang, Bo, and others. 2008. "Research on Environmental Safety in Rapid Urbanization Process." *Urban Problems* 5 (3): 11–15.
- Wang, Xiaobing, Jikun Huang, and Scott Rozelle. 2013. "Wage Growth and Mechanical Operation: Evidence from Rural China." Project report submitted to the World Bank and Development Research Center of the State Council, Center for Chinese Agricultural Policy, Beijing.
- Wen, Qi, and Ding Jin-mei. 2011. "Optimal Path and Strategy of Regional Industrial Structure under Water Resources Intimidation: A Case Study of Yulin." *Research of Agricultural Modernization* 32 (1): 91–96.
- Wu, Laping. 2013. "A Study of Impacts of Urbanization on China's Demand for Grains." Report, China Agricultural University, Beijing.
- Zhang, Linxiu, Renfu Luo, Chengfang Liu, and Scott Rozelle. 2006. "Investing in Rural China-Tracking China's Commitment to Modernization." *Chinese Economy* 39 (4): 57–84.
- Zhao, Jingzhu, Qishan Luo, Hongbin Deng, and Yan Yan. 2008. "Opportunities and Challenges of Sustainable Agricultural Development in China." *Philosophical Transactions of the Royal Society* 363: 893–904.

# Financing Urbanization

## Introduction

China's current approach to financing urbanization has been reasonably successful in mobilizing the resources that cities have needed to grow their economies, build the infrastructure required by the economy, and deliver services to the expanding urban population. China has experienced a high growth of urbanization for three decades, and the way China has proceeded with urbanization has been pro-growth, with resources being effectively mobilized and geared toward industries and productive infrastructure. In turn, the high economic growth has contributed to improvements in household welfare through higher income and better public services and infrastructure. This approach has served China's interest fairly well.

As China enters a new stage of development, the downsides of this old pro-growth urbanization model have become more apparent. The existing urbanization model has relied heavily on land conversion and land financing, and on production-based derivative taxation, which has caused urban sprawl and, on occasion, ghost towns and wasteful development of industrial parks and real estate. In addition, China now faces dualism—a “new dualism” between local

*hukou* and migrant populations and the “old dualism” of urban and rural disparities. This dualism, along with its accompanying unequal access to public services between people with and without urban *hukou*, has acted as a barrier to labor mobility, which has kept China's urbanization rate too low. At the same time, the large influx of migrants puts pressures on urban services, and urban citizens perceive an erosion of service quality. Further, despite progress in environmental standards and policies, the cost of pollution to the nation's health is rising as China's population is increasingly concentrated in cities. At the same time, land-intensive urbanization has reduced availability of farm land, increasing competition for scarce water resources and adding to pollution that undermines agricultural productivity.

China's shift to a new urbanization path—one that is efficient, inclusive, and sustainable—to support its transformation into an innovative, modern, and harmonious economy in the next decades will require adjustments in the financing system. Given the expected economic and social trends, as well as the policy goals pursued by the political leadership, maintaining past financing policies without change is neither feasible nor desirable. First, the cities—now hosting

more than 700 million people—can expect up to 300 million more migrants over the next two decades. Second, the disparities between original and new urban residents, and the backlogs in the quantity and quality of public services in rural regions, must be addressed. Third, economic growth will slow as the economy matures. These changes will have significant impacts on the demand for public services, on the cost and ways of delivering them, and on revenue mobilization. Many are concerned about the budget implications of such changes and wonder which public finance reforms are needed to ensure that China can afford urbanization in the next decades.

This report first reviews the main features of the new urbanization, measures the costs of urbanization, and evaluates its affordability. It then explores how well suited the existing urbanization finance system is to the challenges posed by the new urbanization. The diagnosis is focused on three sectors—public social services, infrastructure investment, and affordable housing. It concludes that the existing finance system that has worked well in leading an investment-driven economic growth strategy will work less well in a new, more urban China. In fact, some fundamental weaknesses in the existing system have already emerged, causing significant efficiency, equity, and environmental costs and threatening financial sustainability. The challenges for financing urbanization are, therefore, more about addressing these underlying weaknesses than filling the financing gap for public services and infrastructure spending.

As the main part of the report discusses, the centerpiece of the reforms in urban finances will be a move toward a system that more clearly separates the traditional function of government—the provision of equitable and efficient levels of basic public services—from commercial investment and production functions. The emphasis of subnational governments will be on the delivery of local public services, and the rewards for local leaders should depend on how well they perform this responsibility. The fiscal system will need to encourage people and enterprises to move to the places where they are most productive, not to where they get the best tax or land deal from a local government. Revenues from land

conversion are likely to taper off, so new local revenue sources are needed to replace lost revenue, whereas properly regulated access to borrowing will be needed to finance infrastructure investment. The financial sector will need to intermediate capital efficiently to meet local governments' needs for infrastructure finance, while at the same time imposing financial discipline on local governments and avoiding financial sector disruption. The private sector will need to play a larger role in financing and delivering infrastructure investment and other public services.

To move in this direction, government will need to make important decisions about numerous key features of the financing system, including the following:

*Aligning public finance with functions.*

Functions need to be appropriately assigned to either the central government or local governments; functions with strong externalities such as funding social security could be centralized; the tax base could be shifted from production based to consumption based; revenue responsibilities between the central and local governments could be reassigned to follow the functions; local governments need to be given revenue-raising powers; and the budget system needs to be reformed in a way that will give subnational governments the ability to effectively plan and control the allocation of fiscal resources. Also, a stronger interprovincial and intraprovincial equalization program needs to be put in place to ensure sufficient funding for basic public service packages, and the transparency and accountability of local governments should be strengthened. This would be no small reform.

*Abandoning the monopoly on land leases.*

The increments in land value that emanate from better infrastructure services must be captured in a less distorted way (through property taxes, for example), and these funds must be used to subsidize investment in infrastructure. Government should also develop regulatory rules to mitigate the fiscal risks emanating from land market volatility while obtaining the best economic value of land assets that local governments have already acquired.



***Developing stable and sustainable debt finance.*** Local government financing vehicles (LGFVs) should be either absorbed by government or converted to special purpose vehicles (SPVs); local governments should be allowed to borrow on budget; a rigorous regulatory framework needs to be developed to better manage the debt risks; the sources of long-term financing for local governments and SPVs need to be diversified; and the incentives for local governments, SPVs, and their lenders should be aligned so that all of them pursue creditworthy financing.

***Promoting the involvement of the private sector in broader urban development.*** China may consider shifting the focus of PPP contracts from capital financing toward service provision by bundling investments for asset creation with operation and maintenance requirements over a long period of time. This requires improving policies and incentives for the private provision of public services. And careful risk assessment and proper risk sharing are needed to manage contingent liabilities related to PPP contracts. To strengthen institutional capacity, special PPP units may be established at the local level.

***Clarifying the role of housing provident funds (HPFs) in the affordable housing program.*** Alternative means of financing the program need to be explored, including direct subsidies from government revenues, contributions from employers, and partnerships with the private sector.

## Urbanization in transition and its implication for financing

Can China afford the new urbanization path? Provided a major structural reform of its financial model is implemented, the answer is an emphatic yes. Managing the government sector, especially the urban local governments, will present a serious public policy challenge. The government will need to decide whether public financing policy in the next two decades is dictated by finding quick fixes for the problems, or whether a major structural reform should be undertaken to get ahead of the problems.

## Financing challenges from the new urbanization path

Urbanization will challenge government expenditures and the capacity to deliver social services. The next two decades will see 300 million more people living in urban areas. The urban population will increase to about two-thirds of the total population by 2030, from slightly more than half currently.<sup>1</sup> Along with the expected rebalancing of the growth pattern and increasing income levels, new demands from urban households and business will have to be met. Families living in metropolitan areas, especially the hoped-for emerging middle class, will be looking to upgrade their housing and access better urban amenities and social services. New service industries will be asking for locations closer to population centers and for a different package of infrastructure and social services from that sought by manufacturing industries (Yusuf 2013). Compliance with the environmental protection standards set by the central government also will be an issue (see supporting report 7: Green Urbanization). Against this backdrop, significant additions to the existing urban infrastructure and improvements in service delivery will be required to ensure that cities can accommodate new residents and meet new demands. Local governments in particular will feel the budget pressures associated with capital and operation and maintenance expenditures.

For urbanization to be inclusive and to avoid social fragmentation, cities must provide equal access to public services to both original and new urban residents. For most public services such as compulsory education and health, a national residence-based system is now in effect.<sup>2</sup> In practice, however, some cities offer better entitlements to public services and easier access to resident worker permits than do others. Disparities in access to affordable housing are already a concern, with only 10 percent of migrants owning their urban residence compared with 84 percent of hukou residents. Equalization policies, therefore, will have to address the existing duality between urban residents with hukou and those without. In addition, equalization policies will have to manage the additional economic and social pressures that further



migration to cities potentially could bring. Only 20 percent of migrants now move to cities with their entire family, but this pattern will change in the future as adequate education, health services, and affordable housing become available to them (Wang, Shen, and Li 2008). Because of the large gaps in the quantity and quality of public services across provinces and between rural and urban areas, any policy change facilitating the access of migrant workers to urban services should go hand in hand with improvements in rural services, lest rural residents be encouraged to migrate to cities solely to access better social services.<sup>3</sup> Finally, local resentment toward the migrant worker community may arise from the fear that larger demands will cause overall service levels to deteriorate or that migrants will receive preferential treatment without paying their fair share of the costs. China will have to manage integration challenges of this kind, which the United States and Europe also have experienced.

Expenditure management needs to be adapted to the new urbanization path. Annual economic growth in China is projected to remain at around 7 percent for the next few years, gradually declining to about 6 percent by 2020 and to 5.5 percent by 2030. Even though that is healthy economic growth by world standards, it will not generate the fast-growing fiscal revenues of the past two decades. If government officials in charge of expenditure programs were to make budget plans based on a growth rate extrapolated from the past trend, they would risk planned expenditures growing much faster than actual revenues, which ultimately would raise public financing concerns. In addition, government officials should plan for new spending pressures, notably an aging population demanding higher pension and health outlays and a society more concerned with environmental sustainability, which requires actions to cope with congestion and pollution. As revenue growth slows and new spending pressures arise, the expansion of some government spending programs will have to be contained and more emphasis given to cost rationalization and control.

Structural reform is necessary to manage the expenditure pressures from the new

urbanization path, particularly as the hukou system is removed and urban-rural disparities are narrowed. The immediate financing problem is to absorb and service the new residents and workers in cities without harming the quality of life of the existing urban population.<sup>4</sup> New financing policies that address resource constraints and insufficient service delivery capacity, especially among local governments, must be formulated to ensure that expenditures and revenues grow hand in hand, thus avoiding a buildup of unsustainable fiscal pressures. Incentives for government officials to implement these policies effectively will have to be in place as well. In this regard, urbanization in China is less efficient, inclusive, and sustainable than the central government would like it to be. Local governments have not fully complied with many goodwill policies that have been issued by the central government, suggesting that incentive is a major issue to consider in designing a reform.

Structural reform is also indispensable to mobilizing additional resources to finance increasing urbanization costs, especially at the local government level. Urbanization potentially can generate sufficient fiscal resources to cope with the increasing expenditures. Migrant workers can reduce the labor shortage that constrains the expansion of private sector output and thus help attract more capital and exploit economies of scale and agglomeration effects. That should lead to an increase in value added and incomes, therefore also raising revenue from major tax sources. Migrant workers also can add to the government revenues with their taxable consumption and their contributions to social security schemes.<sup>5</sup> Yet the potential revenues from urbanization will materialize only to the extent that the right incentives to local officials are in place. Incentives to promote manufacturing and generate land revenues in sprawling cities must be replaced by incentives to promote services and mobilize new revenue sources in dense cities (see supporting report 1 on Urbanization and Economic Growth). In addition, incentives facing the local cadre system should include a longer-time horizon and place more weight on providing the particular bundle of services that

the local economy needs to support an efficient, inclusive, and sustainable urbanization (Zhou 2007; Li and Zhou 2005).

Structural reform will have to deal with heterogeneity of urbanization across China. The budgetary impacts of urbanization will be anything but uniform across cities. Needs, resources, goals, and social values differ widely throughout China. Residents and businesses in some cities will demand higher levels of service, the cost of service provision will be greater in others, and the backlog of infrastructure needs will be larger in yet others. Even if the additional fiscal revenues from urbanization turns out to be large enough at the aggregate level to cover the incremental cost of providing basic services in all urban areas, they will not be large enough for every individual urban area. To accommodate these differences in preferences and expenditure needs, local governments should be given more control over the amount of revenues that they can raise to meet their responsibilities. In addition, the net cost to the government budget would be significantly reduced if fiscal resources were distributed based on serviced population; for example, transfers and subsidies for education, pensions, and health insurance benefiting the rural population can be reallocated to cities if and when workers migrate to there.<sup>6</sup>

### **Can China afford the new urbanization path?**

*How much will urbanization cost the Chinese economy?* A quantitative model developed by World Bank staff estimates the total costs of all urban public services, infrastructure, and social housing. Significant investments would be necessary to meet demands arising from the current pattern of urbanization and the government policies in place. Consistent with the macroeconomic and demographic projections obtained from China's Development Research Center (DRC) model for the period 2013–30, the model projects capital, operation, and maintenance expenditures required to erect urban infrastructure (including roads, subways, draining, sewage, landscaping, garbage treatment,

water, and heating) and to supply social housing, education, and health to urbanites, covering both the capital expenditure (CAPEX) and the current expenditures such as the operation and maintenance expenditure (OM), as well as the labor cost of urban education). Simulations focus on the gross cost of delivering infrastructure and social services to migrants at urban standards, without deducting savings (if any) that may be attained by eased spending pressures in the rural areas from which the migrants originate. Annex 6A provides a technical annotation to the modeling methodology.

In the costing model, the volume of physical investment in the selected sectors that is required to support urbanization responds to fundamentals (such as the size and density of the population living in cities, the number of students, the number of households benefiting from social housing) as well as to public policies determining coverage of social services and eligibility criteria to access them. The *unit cost* of investing in physical capital is calibrated using historical data and projections that follow trends in urban incomes and prices. Public policies regulating quality and generosity of social services also affect unit costs.

Simulations from the model suggest that overall costs of urbanization will gradually decline as a share of gross domestic product (GDP). The total annual costs of all urban public services, infrastructure and social housing would average 6.1 percent of GDP in 2013–30, with a peak of 7.3 percent in the early period (2013–17) due to migrant integration and the government's ambitious social housing program (table 6.1; figure 6.1). As a consequence of the policy stimulus pursued in 2009–12 to cope with the global crisis, the projected investment bulge in the next few years reflects the ongoing construction plans to extend social housing programs. Long-term cost estimates phase out these temporary phenomena and acknowledge that the urbanization process will persist, but at a slower pace than in the past. For 2013–30, the annual capital, operation, and maintenance expenditures related to urban infrastructure would reach 2.5 percent of GDP, on average; those costs associated with education and health

**TABLE 6.1 Urbanization costs and fiscal space: Baseline scenario***Share of GDP*

	2008–12	2013–17	2018–30	2013–30
<b>Urbanization costs (CAPEX and OM)</b>	<b>8.6</b>	<b>7.3</b>	<b>5.6</b>	<b>6.1</b>
<b>Infrastructure investment</b>	<b>3.5</b>	<b>2.7</b>	<b>2.5</b>	<b>2.5</b>
Roads	1.9	1.4	1.2	1.3
Subways	0.5	0.6	0.6	0.6
Draining	0.1	0.1	0.1	0.1
Sewage	0.2	0.1	0.1	0.1
Landscaping	0.4	0.3	0.2	0.2
Garbage treatment	0.1	0.1	0.1	0.1
Water	0.2	0.1	0.1	0.1
Heating	0.1	0.1	0.1	0.1
<b>Social services</b>	<b>5.1</b>	<b>4.6</b>	<b>3.1</b>	<b>3.6</b>
Social housing	2.0	1.4	0.5	0.7
Education (includes labor costs)	3.1	3.2	2.6	2.8
Health	0.0	0.0	0.0	0.0

**Central and local governments***Unchanged land and debt financing policies*

<b>Fiscal space</b>	<b>33.3</b>	<b>31.8</b>	<b>30.4</b>	<b>30.8</b>
Fiscal revenues	25.0	26.5	25.9	26.0
Net borrowings	8.3	5.3	4.5	4.7
<b>Total expenditure</b>	<b>31.9</b>	<b>31.1</b>	<b>29.6</b>	<b>30.0</b>
Recurrent primary expenditures	23.6	23.6	23.3	23.4
Capital expenditures	6.0	4.7	3.4	3.8
Interests	2.3	2.9	2.9	2.9

**Central and local governments***Abandoning land and debt financing policies*

<b>Fiscal space</b>	<b>33.3</b>	<b>29.5</b>	<b>27.3</b>	<b>27.9</b>
Fiscal revenues	25.0	25.8	25.2	25.4
Net borrowings	8.3	3.7	2.1	2.5
<b>Total expenditure</b>	<b>31.9</b>	<b>30.9</b>	<b>28.7</b>	<b>29.3</b>
Recurrent primary expenditures	23.6	23.6	23.3	23.4
Capital expenditures	6.0	4.7	3.4	3.8
Interests	2.3	2.7	2.0	2.2

Source: Staff estimation.

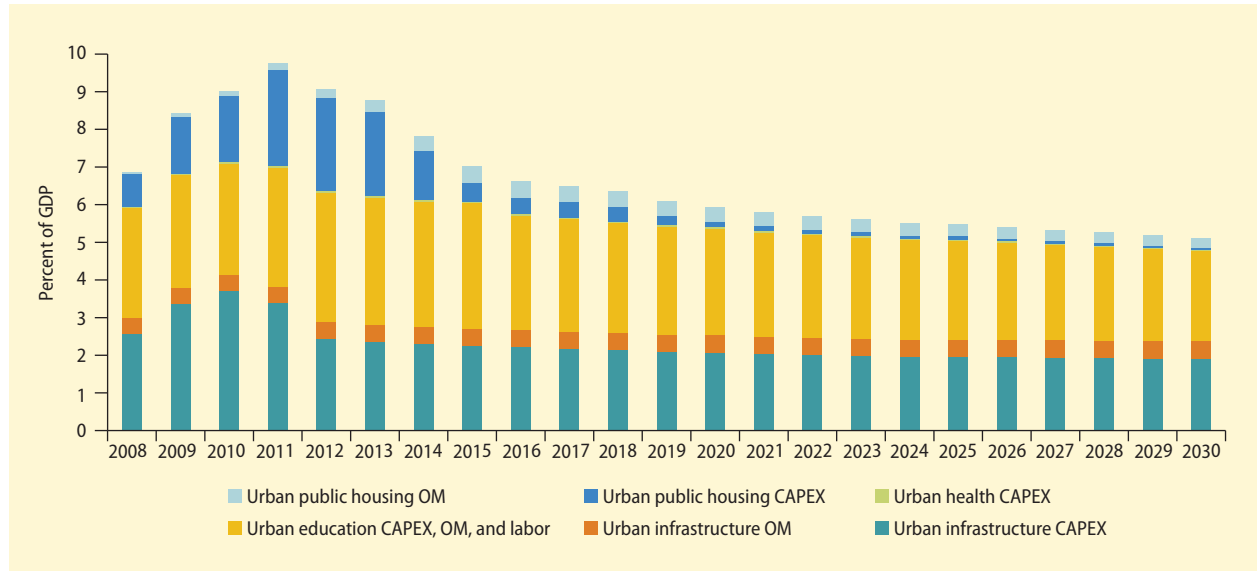
Note: Figures are annual averages for selected periods. CAPEX = capital expenditure; OM = operation maintenance expenditure.

would be 2.8 percent of GDP; and social housing would amount to 0.7 percent of GDP.

*How much of the estimated capital, operation, and maintenance expenditures would central and local governments bear?* Public and private sectors will share these increased costs of urbanization. The model assumes that the proportion taken by the public sector remains at the historic level, around three-fourths. For instance, the public sector finances 62 percent of all urban infrastructure; 100 percent of social housing, health (hospitals), and compulsory education (primary and junior-middle schools); and 29 percent of noncompulsory education (vocational and senior high schools). Operation and maintenance expenditures are fully funded

by the government in all urban infrastructure sectors, social housing, and health. The government also funds all of these costs for compulsory education, but only about 75 percent of the recurrent costs of noncompulsory education, with tuitions and donations covering the remaining amount.<sup>7</sup>

*Will the fiscal space be sufficient to finance the investments required by urbanization in its current form, under the existing public policies?* The resource envelope available to fund expenditures, also referred to as the fiscal space, comprises two financing sources: government revenues resulting from fiscal policies, and government borrowings (both on- and off-budget), whose level is consistent with preserving debt sustain-

**FIGURE 6.1** Cost of urbanization as a share of GDP

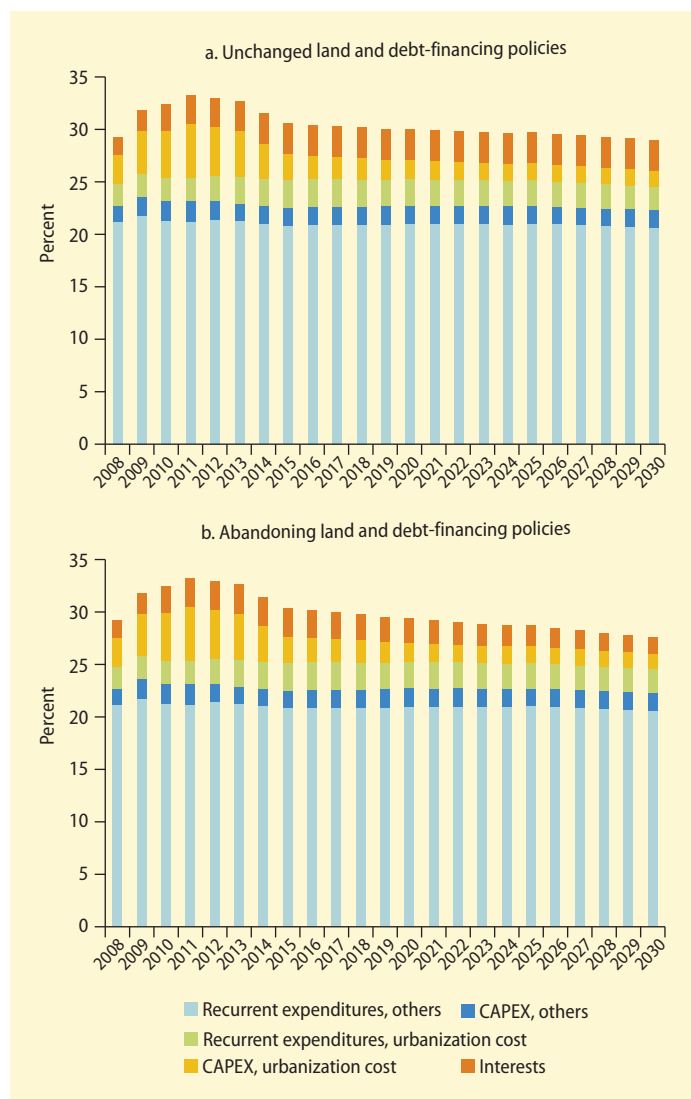
Data source: Staff estimation.

Note: CAPEX = capital expenditure; OM = operation maintenance expenditure.

ability and financial stability. Whether the prospective fiscal space would be enough to accommodate urbanization costs and other public expenditures responsibilities is a key question.

The costing model assesses the affordability of urbanization costs (or lack thereof) by confronting estimates of fiscal space and total expenditure, for which it projects fiscal revenues, government net borrowings, and public expenditures other than urbanization costs. Fiscal revenues include taxes, nontax receipts, and land-leasing receipts (net of land acquisition and relocation compensation costs). They are driven by the DRC macroeconomic projections and assumptions on land financing policies. Borrowings include all direct government debts and the indirect debts of local governments contracted through their financial vehicles. Net borrowings are projected assuming a target level of public debt relative to GDP, with the target summarizing outcomes pursued by debt-financing policies. Expenditures other than urbanization costs are projected consistently with the DRC model and the prospective nominal GDP rate. These expenditures are added to the estimated urbanization costs to obtain the projection of total expenditure.

If the current policies concerning land and debt financing were continued into the future, the fiscal space would just cover the total inclusive expenditures of urbanization costs. With unchanged policies, the annual net land-leasing receipts would be 0.8 percent of GDP in 2013–30, whereas the annual net borrowings would amount to 4.7 percent of GDP, maintaining the public debt-to-GDP ratio at 53 percent (which was the level reached in 2012, after large borrowings by local governments to fund fiscal stimulus and cope with the global crisis). Model simulations suggest that fiscal space could afford the costs of urbanization borne by the government: in 2013–30, on average, the estimated annual fiscal space is 30.8 percent of GDP and the total expenditure is 30 percent of GDP (figures 6.2a, 6.3a). Even the expected investment bulge in the next few years would be affordable within the projected fiscal revenues and net borrowings. But the fiscal space leaves very little margin to cope with unforeseen, unfavorable events, and thus public finances would be in a fragile position and lack flexibility. More important, a continuation of the current policies governing land and debt financing would mean that inefficiencies would persist in the urbanization process, including excessive urban sprawl,

**FIGURE 6.2 Government expenditures as a share of GDP**

Source: Staff estimation.

Note: CAPEX = capital expenditure.

social problems related to land conversion and compensation to displaced farmers, and risks associated with off-budget borrowing.

Abandoning the current policies concerning land and debt financing altogether, rather than reforming them properly, would significantly reduce the fiscal space and risk derailment of the new urbanization path. Alternative model simulations assume that farmers are given full compensation, which causes net land-leasing receipts to drop in 2015–30 (yet continuing with land leases and urban sprawl), and that the local governments' net borrowings (most notably the

off-budget debts) are severely restricted to reduce the public debt-to-GDP ratio from 53 percent in 2012 to 30 percent in 2030. With these radical policy changes, the annual net land-leasing receipts are zero after 2015 and the annual net borrowings would amount to 2.5 percent of GDP on average. Costs of urbanization would no longer be affordable: in 2013–30, on average, the estimated annual fiscal space is 27.9 percent of GDP and the total expenditure is 29.3 percent of GDP (figures 6.2b, 6.3b). Proper structural reform, therefore, should guide the revision of financing policies.

*Would structural reform leading to a more efficient, inclusive, and sustainable urbanization path ensure that such an urbanization path is also affordable?* The high-quality urbanization scenario envisions an ambitious (yet feasible) structural reform package to achieve a higher urbanization rate, a faster real GDP growth, a rebalanced economy with more consumption expenditure and service output, and smaller urban-rural income disparities compared with the baseline scenario. In addition, policies concerning land and debt financing are properly reformed in two directions. First, land policy reform aims at transforming local government revenues from a land-transaction basis to a real estate-property basis, creating incentives to rationalize the use of land resources and to redirect the urbanization pattern from a horizontal expansion of cities toward a vertical expansion with higher population density. Second, debt policy reform seeks to establish a sound legal and operational framework for local governments to borrow on-budget and in a sustainable manner, as well as to significantly slow down the rapid pace of indebtedness incurred by local governments.

Given fewer incentives to seek a horizontal urban expansion (that is, sprawling cities), the built-up urban area is assumed under the model to stabilize at the current level, and thus urban population density increases going forward. Higher density reduces the required capital, operation, and maintenance expenditures related to urban infrastructure by 0.7 percentage points of GDP vis-à-vis the baseline scenario (table 6.2; figure 6.4).

Most savings result from the need to invest less in building roads when urban population is more concentrated. Infrastructure expenditures financed by the government, in turn, decrease by 0.4 percentage point of GDP. The property tax could raise revenues by 1.6 percent of GDP annually in 2015–30, more than offsetting the loss of land-leasing receipts that would happen if and when land leases and urban sprawl are discontinued. Net borrowings are assumed to reduce the public debt-to-GDP ratio from 53 percent in 2012 to 40 percent in 2030, and thus the average annual amount borrowed would be 3.2 percent of GDP in 2013–30.

Model simulations suggest that in the reform scenario the more efficient, inclusive, and sustainable urbanization path is affordable. In 2013–30, on average, the estimated annual fiscal space is 29.9 percent of GDP and the total expenditure is 29 percent of GDP (figure 6.5; figure 6.6). Compared with the baseline scenario with unchanged land and debt-financing policies, the reform scenario delivers a slightly higher margin to cope with unforeseen, unfavorable events, and corrects distortions induced by the current policies.

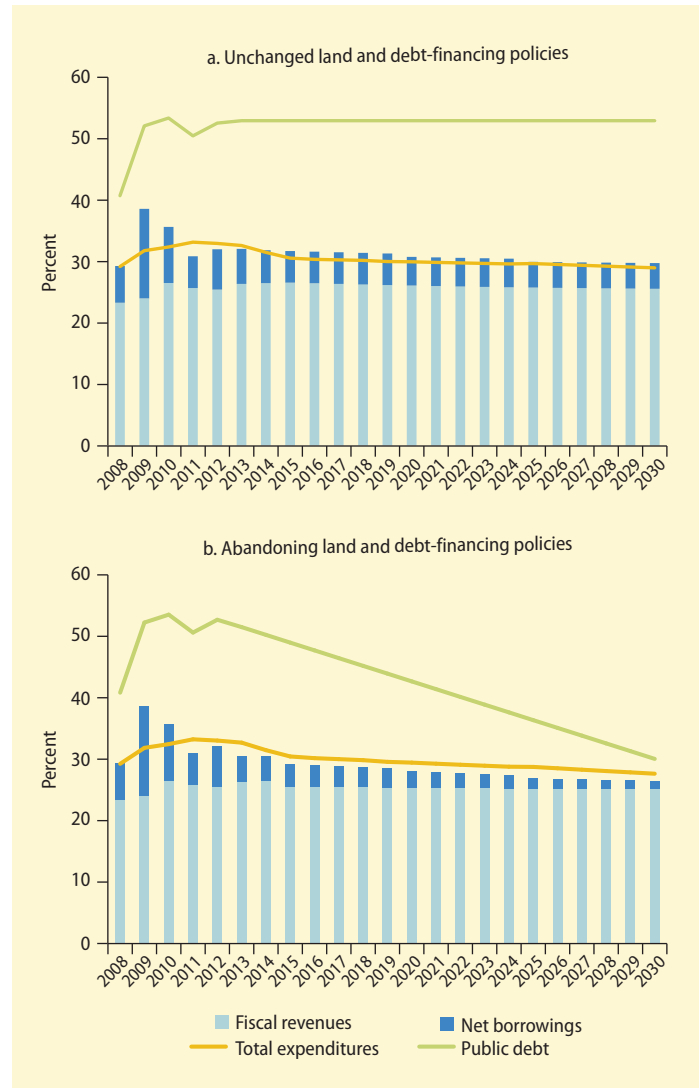
### Financing urbanization in 2013: Key issues

The urban finance challenges of China today are less the result of unwise policy decisions than of China simply outgrowing its system. The structure and growth of the economy changed dramatically in the past three decades since the major 1994 reforms; the economy draws on market principles to fuel its growth, but the financing system has lagged and even held on to some of the features of the pre-reform system. The harm caused by many of these outgrown features has been made more apparent by China's urbanization. This section analyzes China's current approach to urban finance with a focus on three sectors: public social services, infrastructure investment, and public housing.

#### Social services and public finance

Economic growth and urbanization have increased demands for government services.

**FIGURE 6.3** Fiscal space, government expenditures, and public debt as shares of GDP



Source: Staff estimation.

Over the past two decades, the public finance system has been very successful in mobilizing revenues to finance the increasing demand for public social services. The results have been good: public services have been significantly expanded. Nine years of education are now provided free. The number of licensed (assistant) doctors increased from 1.56 to 1.94 per 1,000 population, and the number of hospital beds increased from 2.3 to 3.9 per 1,000 populations. In addition, more people are covered by the social security net. By 2012, 484 million people participated in the urban

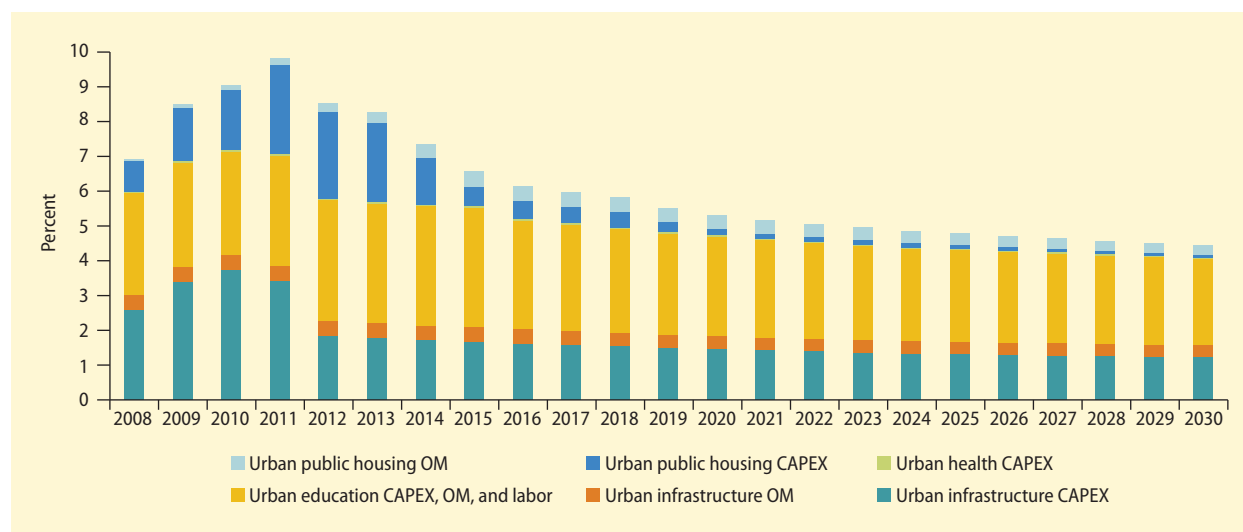


**TABLE 6.2 Urbanization costs and fiscal space: Reform scenario***Percent of GDP*

	2008–12	2013–17	2018–30	2013–30
<b>Urbanization costs (CAPEX and OM)</b>	<b>8.5</b>	<b>6.8</b>	<b>4.9</b>	<b>5.4</b>
<b>Infrastructure investment</b>	<b>3.4</b>	<b>2.1</b>	<b>1.7</b>	<b>1.8</b>
Roads	1.8	0.9	0.7	0.7
Subways	0.5	0.6	0.6	0.6
Draining	0.1	0.1	0.0	0.0
Sewage	0.2	0.1	0.1	0.1
Landscaping	0.4	0.2	0.1	0.1
Garbage treatment	0.1	0.1	0.1	0.1
Water	0.2	0.1	0.1	0.1
Heating	0.1	0.1	0.1	0.1
<b>Social services</b>	<b>5.1</b>	<b>4.8</b>	<b>3.2</b>	<b>3.6</b>
Social housing	2.0	1.4	0.5	0.7
Education (includes labor costs)	3.1	3.3	2.7	2.8
Health	0.0	0.0	0.0	0.0
<b>Central and local governments</b>				
<i>Reform scenario</i>				
<b>Fiscal space</b>	<b>33.3</b>	<b>29.8</b>	<b>29.9</b>	<b>29.9</b>
Fiscal revenues	25.0	26.7	26.7	26.7
Net borrowings	8.3	3.1	3.3	3.2
<b>Total expenditure</b>	<b>31.8</b>	<b>30.5</b>	<b>28.3</b>	<b>28.9</b>
Recurrent primary expenditures	23.6	23.6	23.2	23.3
Capital expenditures	5.9	4.3	3.0	3.4
Interests	2.3	2.6	2.1	2.2

Source: Staff estimation.

Note: Figures are annual averages for selected periods. CAPEX = capital expenditure; GDP = gross domestic product; OM = operation maintenance expenditure.

**FIGURE 6.4 Cost of urbanization in the reform scenario, as a share of GDP**

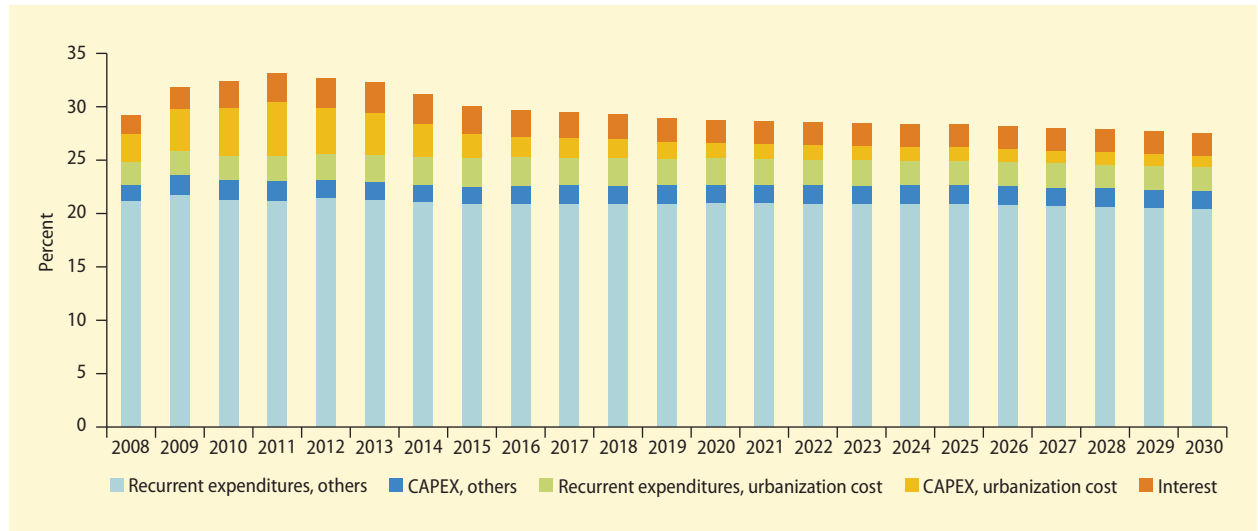
Source: Staff estimation.

Note: CAPEX = capital expenditure; GDP = gross domestic product; OM = operation maintenance expenditure.

or rural residents' pension program, 304 million were in the employee pension program, and 265 million were in the employee health insurance program. (See supporting report

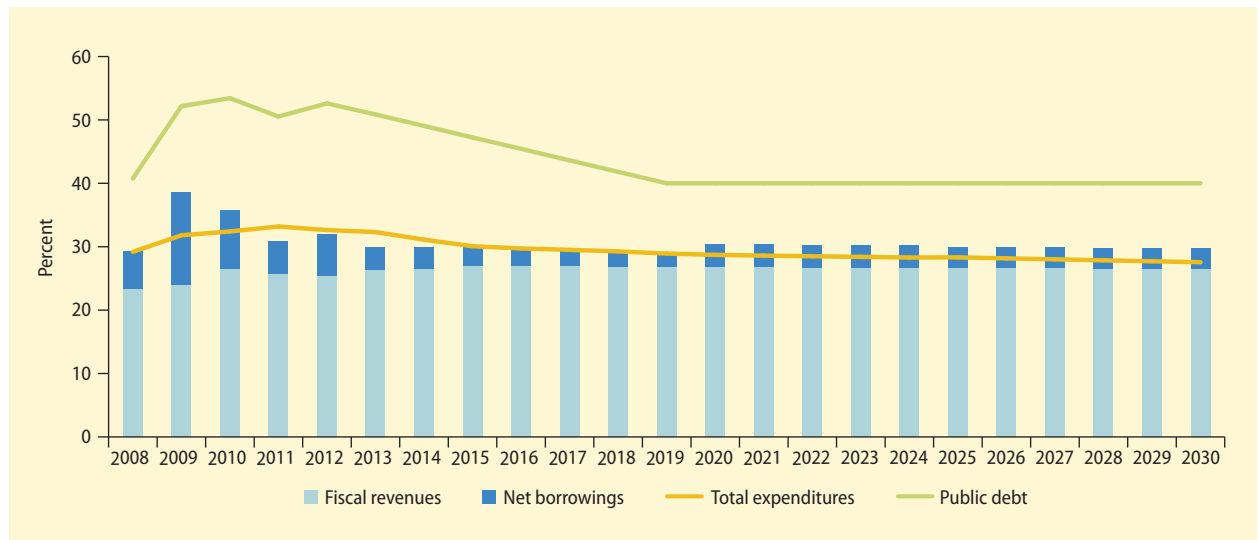
3: Inclusive Urbanization and Rural-Urban Integration for detailed discussion.)

Most of China's public services, such as education, health care, social security, envi-

**FIGURE 6.5** Government expenditures in reform scenario as a share of GDP

Source: Staff estimation.

Note: CAPEX = capital expenditure; GDP = gross domestic product.

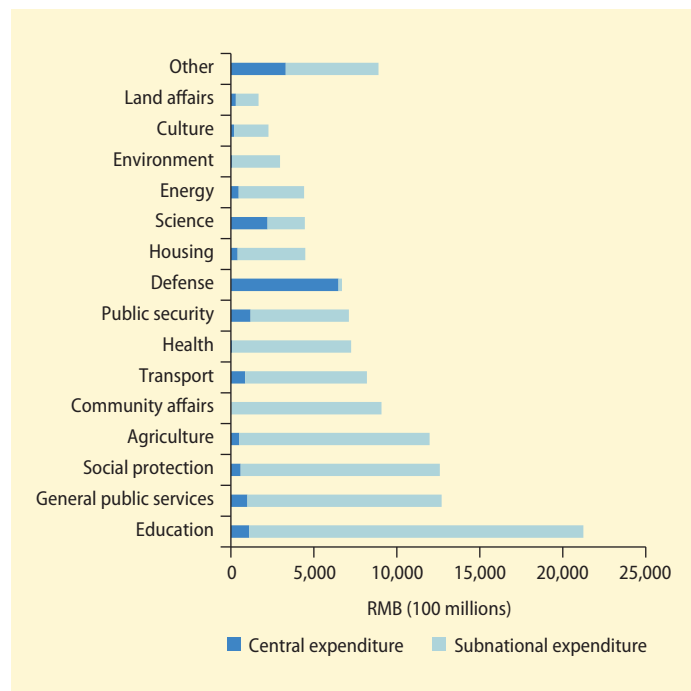
**FIGURE 6.6** Fiscal space, government expenditures, and public debt in reform scenario as shares of GDP

Source: Staff estimation.

ronmental protection, transportation, and community affairs, are provided and financed by local governments.<sup>8</sup> Education (94 percent local) and health (95 percent local) are the fastest-growing public expenditure categories. The result is that China's local governments account for more than 80 percent of all general government expenditures. This high share

does not include local government spending on social security or infrastructure (figure 6.7). As a result, China is an extreme outlier in terms of the subnational share of government expenditures. The local government share of government spending is 41 percent in such decentralized countries as Canada and Germany and 48 percent in the United States.

**FIGURE 6.7** Central and subnational expenditure, by function, 2012



Source: China Statistical Yearbook, 2013.

In stark contrast to the highly decentralized nature of spending, taxing power is highly centralized. Local governments have no ability to set the tax rate or to determine the size of the legal tax base. The central government designates some taxes as “local revenues”—taxes collected by the local governments and retained at the local level. In general, these local taxes have narrower tax bases and less stable revenue yields than the central and shared taxes. Local governments may impose user charges, but these too are usually subject to approval by higher-level governments, and full cost recovery is rare. Using the Chinese definition for “local taxation,” the subnational government share is about 30 percent. If the definition of local taxes is amended to include the ability to set the tax rate, then the subnational government share is negligible. Germany takes a similar approach in centralizing most tax rate and base decisions, as do Mexico and Indonesia among the large developing countries. On average, the share of local government taxes is about 23 percent in the industrial countries

and about 11 percent in the developing countries (Bahl and Sethi 2012).<sup>9</sup>

Intergovernmental transfers finance most subnational government expenditures in China and play an important role in shaping interregional equity. The 1994 Tax Sharing System reform established a new framework for the intergovernmental transfer system in China, replacing the ad hoc, negotiated transfers of the past with a rules-based mechanism (Bahl 1999; Qiao and Liu 2013). The current transfers between the central government and the provinces consist of two types—shared taxes, and general and conditional grants.<sup>10</sup> The first, shared taxes (a 25 percent claim on value added taxes, or VATs, collections and a 40 percent claim on income tax collections), accounted for about 15.6 percent of all local government public finance revenues in 2012. The second type, general and conditional grants, accounted for 20.1 percent and 17.7 percent of local government public finance revenues, respectively. The trend in industrial countries is toward unconditional transfers, reflecting a desire to give more budget autonomy to subnational governments (Blochliger and Vammalle 2010). But in China, general grants account for 58.5 percent of total grants, and 49 percent of general grants are earmarked for certain program activities. The supported programs range widely, from grants to compensate for the loss of the agricultural tax to compulsory education grants. The interprovincial distribution of these grants, and in many cases how they are actually used, is affected by these earmarks.

China’s general grants might be grouped into three categories. The equalization transfer, introduced in 1995, is designed to reduce fiscal disparities among provinces. The distribution is based on a formula that incorporates objective measurements of fiscal capacity and expenditure needs for the provinces. The actual amount distributed is calculated on the basis of the gap between standard current expenditures and standard current needs, adjusted for coefficients that take into account the size of the gap. The overall envelop of equalization transfer is decided on the basis of resource availability and policy considerations. Its share in general grants has been growing. The second category of

general grants is the “tax rebate,” a return of some additional share of tax collections to richer provinces to lower resistance to tax reforms. Third, the resource shortfall at the subnational level arising from vertical imbalance is addressed with gap-filling transfers to local governments (Bahl and Qiao 2013).

The conditional grants carry conditions about the purposes for which the funds will be used and in some cases about the standards of service to be provided; the grants also often require a copayment from local governments. Hundreds of specific-purpose grants are associated with a variety of programs at the central level. An example is the “compulsory education transfer,” introduced by the central government in support of the rural compulsory education program. Another example is the transfer introduced to subsidize the issuing of state bonds. Among the most important targets of specific transfers are transportation, affordable housing, and education. Many of the conditional transfers were introduced to address specific, immediate needs. Most of these transfers are monitored by a controlling central line ministry or its provincial counterpart.

With a few exceptions, the transfers from provincial governments to subprovincial governments are at the discretion of the provincial governments. Provincial governments have considerable latitude in deciding expenditure assignments to subprovincial governments, how much of the intergovernmental transfers received from the central government they will retain for their own uses, and how they will allocate transfers among their cities and counties. This “federal” financing approach preserves provincial-level autonomy and allows the use of local information advantages. The result is a good deal of variation across provinces in how the allocations are made to the lower level city and county governments. In some cases, taxes are shared on a derivation basis—with the localities from which they are collected. Formula allocations, specific grants, and mandated pass-through of the funds also are used. Provinces have the authority to issue special grants on a project-by-project basis. With respect to the public finance budget, provincial governments have more autonomy in determining

the size of their revenue envelope than do either cities or counties. On average, county governments account for about half of all subnational government spending. Counties are financed more heavily by grants than by shared taxes. For example, in 2009, grants represented 53 percent of all revenues of county-level governments and below, but just 29 percent of prefecture revenue and 23 percent of provincial revenue. The land-leasing program has changed things, shifting more revenues to the lower-level governments, particularly to cities.

China’s highly asymmetric public finance system, with its highly decentralized expenditure assignment and centralized revenues, implies that subnational governments have some control over what services they can deliver but relatively little control over the level of financing. Arguably, such an arrangement was the right approach during the past 30 years when the goal was to reward areas that were developing fast by giving them investment money to continue the growth. The strategy to “let some get rich first,” as noted by Deng Xiaoping, was an important part of the early development of the industrial economy. This approach has advantages—it allows the central government to set the size of the total resource envelope and therefore to control the level of local government expenditures (importantly, spending from land-lease revenues is not directly controlled by the central government). Revenue centralization also has the advantages of allowing central control of the distribution of tax burdens and a capturing of economies of scale in tax administration. Finally, there is an inducement for increased tax effort. Local governments can directly encourage a higher effective tax rate by improving assessment and collection rates. The shared revenues provide an incentive for these revenue mobilization efforts. (Bahl 1999; Bahl and Wallich 1992).

Equity and inclusiveness in access to public services remain major concerns, however. Newcomers to the cities have limited access to urban services because they do not have urban hukou, even though they now account for more than one-third of the urban labor force. This discrimination means

that migrants often are forced to leave their families in rural areas where access to quality public services may be limited compared with those in urban areas. These challenges to equality in the delivery of public services are intertwined. Reforms such as the elimination of the hukou constraints on access to public services and better portability of pension and health benefits will equalize access to services, encourage labor mobility, and promote household consumption by reducing the need for precautionary savings (see supporting report 3: Inclusive Urbanization and Rural-Urban Integration).

The size of general government has grown significantly since 1994 and is roughly in line with the size of government in upper-middle-income countries. China's expenditure structure differs from the industrial countries in two important aspects: the government spends a relatively larger share on economic activities including subsidies to firms, and a relatively smaller share on health and social protection services (World Bank and DRC 2013); and subnational governments deliver a very high share of services. These two observations suggest that the equity and inclusiveness problem stems less from a financing constraint and more from the incentives and capacity of local governments and from distribution of resources across China. A comprehensive analysis of the public finance system reveals that expenditure assignments, revenue structure and assignments, and intergovernmental relations all play a role in shaping the incentives and capacity of local governments in delivering equitable and sustainable public services.

### *Expenditures*

The high decentralization of expenditure responsibilities may be explained by China's size to some extent, but with the new urbanization pattern, decentralization is raising concern about allocative efficiency losses. Most of the concern centers on three areas: what government should do and what the private sector should do, which level of government should be responsible for financing social insurance programs, and whether urbanization has made the case for central-

ization of more responsibility. All three concerns have profound implications for the cost of urbanization and for its financing.

With increasing urbanization, cities are better connected, and externalities are less able to be localized, making the fallout from expenditure assignment more apparent. If subnational governments are assigned responsibility for services where they cannot internalize externalities, or where they cannot capture economies of scale, the result will be an underprovision of the service or delivery at a higher unit cost. The classic example of spatial externalities is air pollution. Dust and particulates produced in one province can easily reach cities in a neighboring province, and emissions caused by agricultural activities can worsen urban pollution problems. The same result occurs in the case of competition for the use of water. A city government with responsibility for regulating water pollution may choose not to impose costly inspection measures, and this decision could have a negative impact on the national welfare. Or a city government might offer the children of migrant workers a lower-quality primary education, which could lead to undesirable equity effects now and lower labor productivity in the future. In some cases, these interurban effects call for direct regional or central government participation in service delivery, and in other cases it requires upper-level governments to play a strong coordination role, for example, in ensuring everyone benefits from universal public health and education services, and consumer safety. (Lou 2013; Bahl, Linn, and Wetzel 2013; Rojas 2008).

Fiscal subsidies to industries have led to an inefficient pattern of industrial allocation and inefficient land use. Subnational governments frequently use tax exemptions, rebates, and subsidized land to attract industries to their provinces or cities. In the early phase of economic development when domestic savings were insufficient to finance industrial investment, competition among cities to attract foreign direct investment encouraged subnational governments to improve the business environment and infrastructure services. That is one of China's success stories. As China developed to be upper-middle-income country with abundant domestic savings and

a vibrant private sector, the downside of local governments' role in industrial promotion has become apparent. Rather than increasing investments, the subsidies merely relocate investment from one city to the next, without national gains. In the absence of a subsidy, market forces would drive the location decision of the enterprise. This type of competition among cities also favors local governments, typically in rich regions with more discretionary revenues, and this "beggar thy neighbor" approach can affect another's success. Industrial subsidies also can lead to a siphoning of funds away from mainstream government functions and to a horizontal inequality with unsubsidized firms. (Keen and Marchand 1997; Boadway and Shah 2009). Industrial subsidies may have merit when they are targeted at pioneer industries or technology development industries, but in these cases, the granting of the subsidies should be the function of central government.

Fragmented social insurance programs (pensions and health insurance) in China increasingly become a barrier to labor mobility and inclusiveness. These programs are the responsibility of the city and county governments, are managed in a separate local government fund for social security, and are financed by payroll tax contributions and government subsidies. The national guidelines for combined employer and employee contributions are equivalent to about 40 percent of wages, but there is considerable variation among the provinces. The new urbanization model will require increased labor mobility to promote economic growth. The need to support this mobility with portability of benefits, the national nature of the benefits from these programs, and the need to focus more heavily on equalizing real incomes in the population will all push in the direction of increased central financing.

China's decentralized management and financing of pensions is a significant departure from international practice. Most industrial and developing countries have centralized or largely centralized their old-age pension insurance financing programs. In general, the reasoning is that uniformity in benefits and some guaranteed minimum funding of these programs is in the national

interest. A further problem with the decentralized delivery in China is that county and some city governments cannot do the necessary risk pooling to finance these programs at mandated national levels. That has led to pooling at the prefecture or provincial level in some provinces. Although this broader base has reduced the risk, there still have been pension arrears and defaults that have forced continuing central and provincial government subsidies (Martinez-Vazquez and Qiao 2011).

The health insurance program, being managed at the county and district level of government in China, is highly fragmented. Effective reimbursement rates vary across counties and districts, due to differences in deductibles, copayments, and ceilings. These rates in turn are a function of disparities in the levels of contributions and local government subsidies. Besides the equity concerns associated with these disparities, overall risk is higher because of the small size of these insurance pools. In addition, migrants face significant challenges in accessing health care, and there is overlap in registration in the rural and urban programs (Zheng 2012). The international practice on the centralization of health care financing is mixed. The information advantages give state or provincial governments a comparative edge in program management, and there may be a demand for local tailoring of some services. A not uncommon model is to use conditional grants from the national government to finance a significant share of subnational government expenditures on health care. In the United States, the federal government finances and delivers pensions and medical care for retirees but shares the cost of financing medical care for the poor with the state governments. Provinces have exclusive responsibility for health care provision in Canada and are supported by federal grants.

The provision of public services within China's urban areas is also more interrelated and increasingly calls for more intergovernmental cooperation in planning and service delivery. The need for better coordination is most clear in the case of transportation. Each component of the public transport system is usually of good quality, but door-to-door trips by public transport are inconvenient



because of poor physical and service integration, often characterized by excessive distances between transfer points, mismatched schedules, separate ticketing systems, and lack of easily accessible transfer facilities. These problems stem mostly from institutional fragmentation at the city level, where different agencies (metros, buses, road construction, traffic management, and land use) are responsible for different aspects of urban transportation (see supporting report 2: Planning and Connecting Cities for Greater Diversity and Livability).

In addition, ambiguous assignment for expenditure responsibilities undermines the accountability of local governments. Many industrial countries assign expenditure responsibilities to their subnational governments and provide a list of who is responsible for what, although some countries do not specify these responsibilities in a central place but rather work them out in sector laws (de Mello 2010). Unlike many countries, China has no exclusive list of functions that is reserved for either the central or the subnational governments. Rather, a very general description of responsibilities in the Constitution leaves much latitude for interpreting the division of functions. Responsibility is delegated by administrative decision and varies from province to province, leading to a lack of clarity about exactly who is responsible for what. The result can be a costly duplication in service delivery, a failure to deliver some services, or an inability to identify the level of government responsible for a public service failure. More generally, lack of clear definition and assignment of responsibilities can become a hotbed for either intergovernmental turf wars or buck-passing, and accountability is in no way guaranteed (Lou 2013).

### *Revenues*

Highly centralized revenue assignment also raises some important public financing problems. First, it means that subnational governments have no way to adjust the tax rate or tax base to pursue new initiatives that require resources above what they are allocated by the transfer system. These shortcomings, and the pressing needs related to urbanization,

explain some of the appeal of land-based financing in recent years.

Second, the existing system leaves subnational governments vulnerable to discretionary tax policy or revenue-sharing changes by the central government. This set of vertical arrangements not only makes local revenue budgets vulnerable, but it also weakens the accountability of local government officials to both the local constituency and to the upper-level authority.

Third, the absence of formal local government taxing powers has encouraged subnational governments to find creative backdoor approaches to financing service delivery. The relatively unregulated sale of land leases with retention of most revenues, and local government borrowing through intermediaries such as the LGFVs are cases in point (Bahl 1999; Wong 1997; Liu and Qiao, 2013).

These problems notwithstanding, revenue centralization has worked reasonably well in China. Tax revenues and subnational government expenditures more than doubled as a share of GDP between 1994 and 2012. That explains how the central government could safely increase the income tax retention rates, and abolish some local taxes, without fear of local government budget shortfalls. But this situation may change. Increased urbanization will bring significant new expenditure pressures, and a slowdown in the economy will slow revenue growth. The land-leasing bonanza also may slow down with stronger property rights for farmers and better use of existing urban land (see supporting report 3). The absence of a way for local governments to mobilize more of their own budgetary resources may compromise their ability to deliver adequate local services and certainly will compromise their ability to deliver discretionary services of their own choosing.

In addition, several issues concerning the tax structure remain. The tax structure has been further modernized since 1994. The changes have been gradual rather than the result of a “big bang” reform, but they have been effective. The general direction has been toward a more simplified system with broader tax bases, lower tax rates, and improved collection practices, and toward a heavier use of indirect taxes. The value added

tax was converted from a production to a consumption basis beginning in 2009, the differential rates between domestic and foreign companies under the enterprise income tax were removed in 2008, the coverage of the excise tax has been expanded in recent years, resource taxes on some selected items have been shifted to an ad valorem basis, and most recently, the business tax is being absorbed into the VAT to better cover the service sector and provide relief to companies that make heavy use of service inputs.

The general structure of the individual income tax has not been changed since 1994, but the threshold for payment has been continuously increased. As a result, the number of income taxpayers decreased and the rate of coverage is relatively low as compared to Organisation for Economic Co-operation and Development (OECD) countries. With China's unequal distribution of income, one might expect a more intensive use of the tax that is designed to address this issue.

At the same time, China imposes a high tax rate on labor income, largely to help finance social insurance schemes (pensions, health, and unemployment compensation). The current level of contributions (employee and employer) is equivalent to about 40 percent of wages, which is high by international standards. There are prospects for lowering this rate by moving some noninsurance costs and pension "legacy costs" to general revenue financing (see supporting report 3). Social security contributions impose perhaps the major constraint on developing a more broadly based individual income tax.

Property taxation has been much discussed as an option for a major local government tax in China. Under the existing regime, China levies five taxes on property: the urban land use tax, which is levied on the physical area of the property, the real estate tax for business use, which is levied on original value, the land value added tax, which is levied on appreciation in property value, the farmland occupation tax, which is levied on area, and the deed tax, which is levied on the self-reported value of property at the time of transfer. Together, these taxes on real property account for more than 8 percent of national tax revenues (Man

2013). The current levies total 1.6 percent of GDP, well above the rate for developing countries (although below the average rate of 2.2 percent for industrial countries). The problem with the current structure is that it is a hodgepodge of taxes on the physical area and transaction values of properties with no provision for taxing updated values on an annual basis. As a result, the property tax is not used to help shape more efficient land use, to capture value created by public investments, or to provide significant support to local government budgets.

Chongqing and Shanghai municipalities are implementing an experimental annual tax on residential property. The pilot is in its third year in Chongqing. Some progress has been made: the compliance rate is good, and an identification system for all properties has been completed. Shanghai authorized a property tax on owner-occupied property in 2011. However, both of the pilot projects introduce property taxation with limited coverage of properties and with a very low effective rate of taxation. The pilots do not attempt to integrate the property tax with the other forms of property taxation, and the issues of valuation and revaluation have been bypassed.

The environmental levy is a "green taxation" approach (Merk and others 2012). Most resource use and pollution occurs in cities or is caused by demand from cities, which also bear some of the greatest impacts. While China has removed many environmentally harmful subsidies and other distortions in the production of energy, it has not yet fully accounted for the costs imposed on health, ecosystems, and the climate that result from resource production and use. The simplest way to impose such a charge is an energy or resource tax on water use to encourage conservation and carbon taxes that specifically place a charge on greenhouse emissions (see supporting report 7: Green Urbanization)

### *Intergovernmental transfers*

Several important problems arise with the shift of development objectives toward building a harmonious society, and the menu of issues to be addressed by intergovernmental transfers is formidable: Is the vertical alloca-

tion (between the central and local governments) of central taxes used to support local government spending still “right,” especially given the need to cope with significant urbanization costs? Has the central government achieved the right level of equalization across local governments and is it using the right instruments to achieve this? Has the transfer system become too complicated to administer effectively? Finally, are the arrangements for sub-provincial revenue sharing in step with government objectives?

**Fiscal incentives.** China’s version of inter-governmental transfers is different from the mainstream practice in other industrial and developing countries, largely because of its emphasis on derivation-based revenue sharing. The major shared taxes (VAT and the corporate and personal income taxes) are shared with the local governments based on the location of collection. This arrangement distorts the allocation of resources in two ways: it encourages local governments to hold on to enterprises that should move to new locations because the government derives taxes from them. In addition, the derivation-sharing arrangement disproportionately benefits large cities, because these are often the location of a firm’s headquarters and frequently the place where it pays taxes. This fiscal incentive reinforces the political incentive for industrial promotion and encourages local governments to place more emphasis on serving firms and industries and less on its core role of providing public services to residents. This pattern can easily be seen in the composition of the government’s expenditures as well as in land use.

**Equalization.** In more recent years, the grant component of the transfer system has grown and has done a better job of reducing fiscal disparities. Wang and Herd (2013) find that grants have generated equalization effects both within and between provinces. Persson and Eriksson (2006) report a similar finding based on an empirical study of the 1998–2003 period. Hofman and Guerra (2007) find that interprovincial disparities in the Human Development Index—indicators of service levels—are less than disparities in

per capita GDP. Nevertheless, the interprovincial fiscal disparities remain large and are only slightly less dispersed than those in per capita GDP.

These disparities are not surprising given the wide disparities in the natural advantages of some provinces. They also suggest that the public finance system could do more to reduce them. The tax rebate grants and the general tax sharing components are decidedly counterequalizing. The latter are based on where taxes are collected rather than on where expenditure needs are greatest. Currently, the tax sharing and tax rebates together account for about 60 percent of all transfers to local governments. The higher-income provinces, where most taxes are collected, are favored under the shared tax system. The simple correlation between per capita revenue sharing transfers and per capita GDP is 0.89, indicating a systematic favoring of higher-income provinces. Equalization grants have played some role in reducing fiscal disparities. The simple correlation between per capita equalization grants and per capita GDP is  $-0.41$ , suggesting that, on average, lower-income provinces receive larger equalization grants. The equalization grants represent only 19 percent of all intergovernmental transfers, however, and therefore have not been effective in significantly reducing fiscal disparities across provinces.

**Complexity.** The earmarked grants are extremely complicated, and this complication comes with cost. There are about 200 conditional grant programs, each of which should be monitored by higher-level governments to insure proper compliance. Conditional grants in essence are (partially) funded mandates, and unless they are properly designed to stimulate spending to capture a spillover benefit, they will compromise local government budget autonomy and may not enhance efficiency. These conditional grants also impose an administration cost on the central government and a compliance cost on the subnational government. Finally, conditional grants usually lead to strong bureaucratic and ministry interest in maintaining these programs, as well as a local government constituency, creating a formidable resistance to

abolishing these programs when they are no longer necessary (Blom-Hansen 2010).

**Subprovincial transfers.** Provincial governments have considerable discretion to place revenues where they are seen as most needed. A provincial government might decide to adopt equalizing distributions across local governments or choose an investment stimulation strategy. China is too large a country to govern effectively without this provincial discretion. But this hierarchical arrangement for revenue sharing also presents some problems. The provincial government may pick off too great a share for itself, at least in the eyes of the lower-level governments, or it may not make the subprovincial allocations on a needs basis. In particular, provincial governments may not adequately recognize the needs of city and county governments to deal with financing problems associated with urbanization. Yet the information advantages concerning expenditure delivery and tax collection may well be greatest at the lowest levels of government. And, more generally, the problems that come with delivering services to accommodate urbanization and financing them will fall heavily on the cities, but equalization objectives of a province might tend to redirect funding away from cities.

Another problem with this hierarchical approach is that subprovincial allocations may compromise central government policy objectives. For example, the central government might adopt a program of allocating revenues among provinces according to expenditure needs indicators. But the provincial government might decide to distribute them among cities and counties according to where revenues are collected. This possibility opens the door for a discussion about whether central grants to provinces ought to contain more mandates about how the central funds should be passed through to provincial governments.

### Financing infrastructure investment

China's infrastructure financing model is astounding, given how much revenue has been mobilized to finance infrastructure over the past 20 years. China spent around

10 percent of GDP a year on infrastructure investment, far higher than 3–4 percent average of other developing countries, or 2 percent average in developed countries. In addition, China's investments in schools, hospitals, cultural centers, and public housing have gained momentum with the shift of government development strategy toward building a harmonious society. Remarkably, the urbanization of new territories on urban-rural fringes proceeded mainly with physical infrastructure being built ahead of or in sync with demand for land from developers, through an urban "big push." China's cities not only successfully accommodated 500 million new residents between 1980 and 2010 but also achieved significant improvements in basic infrastructure and living standards. For instance, access to piped water in China urban areas doubled in three decades, the wastewater treatment rate increased from almost none in 1981 to 84 percent by 2011, and the road surface area per capita increased seven times during the same period.

Local governments in China take almost exclusive responsibility for urban infrastructure investments and financing. As table 6.3 shows, China invested RMB 5.9 trillion in fixed assets for public utilities, infrastructure, and facilities in 2011, equivalent to 12.5 percent of GDP. More than 80 percent of this investment was sponsored by local governments and their entities. The central government played a dominant role in financing railway investment (85 percent) and a relatively large role in gas supply (37 percent), but it played a negligible role in urban infrastructure. The investments in city connections (railways and expressways) are generally the responsibilities of the central and provincial governments.<sup>11</sup>

Regarding the sources of infrastructure financing, the Chinese model shows several salient features:

- User charges in China, including tolls, water tariffs, and garbage collection fees, are widely applied to finance infrastructure services. But they often achieve low rates of cost recovery, despite the central government's policies and guidance that encourage utilities to be self-financing. For

**TABLE 6.3** China's investment in public utilities, infrastructure and facilities, 2011

	Total volume (RMB, billions)	Percentage of total investment				
		By investment		By source of funding		
		Central	Local	Budget	Bank loans	Others
Public utilities	1465.9	30.5	69.5	6.3	31.3	62.4
Power	1160.3	37.2	62.8	5.5	35.9	58.6
Gas	124.4	11.3	88.7	2.0	15.5	82.5
Water	181.1	1.2	98.8	14.9	11.8	73.3
Transportation	2490.2	24.7	75.3	13.6	34.8	51.6
Railway	591.5	85.3	14.7	11.5	44.9	43.7
Roads	1385.6	3.5	96.5	17.0	30.0	53.0
City transport	222.5	1.9	98.1	8.4	52.5	39.1
Public facilities	1950.6	1.0	99.0	13.3	15.2	71.5
<i>Subtotal: utilities and infrastructure</i>	<i>5906.7</i>	<i>18.3</i>	<i>81.7</i>	<i>11.6</i>	<i>27.5</i>	<i>60.9</i>
Irrigation and environment	501.5	11.6	88.4	25.2	10.6	64.1
Education, health, cultural, and sports facilities	790.0	3.9	96.1	19.1	7.8	73.1
Public administration	564.8	5.6	94.4	23.5	4.5	72.1
Total	7763.0	15.5	84.5	14.1	22.7	63.2

Data Source: China Statistic Yearbook, 2012.

example, a recent study of approximately 600 urban water utilities showed that only 44 percent generated positive net margins, even though real tariffs had grown 3.7 percent annually over the previous five years (World Bank n.d.). Continued government subsidies provided the necessary financing in most cases.

- Only a fraction of infrastructure investment is financed directly from government budget. Government expenditures on fixed assets were equivalent to roughly 5 percent of GDP in 2009; about 1.5 percent of GDP was spent on investments in utilities and infrastructure, accounting for 11.6 percent of total investments in these sectors (see table 6.3).
- Land lease revenues have emerged as an indispensable source of capital financing for China's city infrastructure investment. During 1996–2012, a total of 50,000 square kilometers were converted from rural to urban use (and from collective to state ownership). An estimated 40 percent of these lands were for industrial use, and local governments often charge low rent for industrial land. The majority of the land for commercial and residential use is auctioned in a competitive bidding, and revenues

from the auction are used for infrastructure investment. In 2012 alone, China acquired RMB 2.85 trillion from land auctions, equivalent to 46.7 percent of total public finance revenues of local governments.<sup>12</sup> The net revenue, after deducting compensation to farmers and land development costs, is much smaller, however, only around 20 percent of gross revenues.

- China imposes strict restrictions on the borrowing powers of local governments.<sup>13</sup> To circumvent this regulation, local governments have set up around 10,000 LGFVs to borrow and finance infrastructure investments.<sup>14</sup> Local government borrowing proliferated to finance stimulus packages amid the 2008–09 global financial crisis. By end-June 2013, the explicit debts of local governments amounted to RMB 10.9 trillion; local government guaranteed debts, RMB 2.67 trillion; and other contingent debts, RMB 4.3 trillion, with the total around 33 percent of GDP.
- Private participation in infrastructure services is still limited compared with other developing countries, despite encouragement from the central government. Since 1990, while China had over 1,000 public-private partnership (PPP) transac-



tions in infrastructure (transport, water, energy) for a total value of \$166 billion (Private Participation in Infrastructure, or PPI Database), Brazil and India had much larger private investment in infrastructure during the same period, \$325 billion and \$273 billion respectively.

Notwithstanding the success, a number of important problems have arisen, ranging from concerns about poor investment choices made by some local governments to overinvestment in infrastructure compared with other urban services, urban sprawl, social and equity issues surrounding the practices in transferring farmland to urban use, and the level of land-based debt that is implicitly guaranteed by local governments.<sup>15</sup>

The first concern relates to the role of financing in shaping local governments' incentives and capacity for selecting, designing, and providing infrastructure projects. Enormous infrastructure investment in China is generally justified by the rapid rate of urbanization and high growth of income; however, some of these infrastructure investments are driven by distorted incentives of government officials. Because their tenure is short—often less than five years, local government and party officials depends largely on achieving short-term economic development targets and visible results to advance their career. Short of alternative revenues, local governments resorted to land-concession revenue and unregulated borrowing from LGFVs. While the use of land-based revenues for capital finance should reduce overall capital financing risk, overreliance on land finance, together with distorted incentives, contributes to inefficient use of land, corruption, and abuse of government power in land acquisition. Municipal governments may even act like profit-maximizing land monopolists, by acquiring as much land as possible as cheaply as possible at the urban fringe, converting it into municipally owned urban land, and selling the land use rights to developers at the highest price the market will bear, potentially contributing to a land asset bubble. Economic distortions are compounded by deliberate government policies that assign zero or low values to land as

an incentive to attract industrial investments and that then heavily invest in infrastructure to service these newly developed lands. This urban development strategy led to a pattern of urban sprawl that is costly and has channeled interest away from more compact, infilling strategies for urban growth. The strategy also can increase carbon emissions because it generates longer commutes and less use of mass transit, increases living space per person and therefore more emissions from home heating and general power consumption, and leads to less intensively used infrastructure, which in turn raises emission levels (Baeumler, Ijjasz-Vasquez, and Mehndiratta 2012; Z. Liu and Salzberg 2012).

Local governments' capacity in selecting and designing good and appropriate infrastructure is also handicapped by a fragmented budget and lack of a medium-term perspective in financial management. City governments tend to spend more on new infrastructure and less on maintenance and operation; more on above-ground infrastructure such as roads, transportation, and public gardens and less on underground infrastructure like sewage systems and flood protection. Chronic underinvestment in maintenance and repair shortens the lifetime of assets, which, in turn, increases long-term costs, which can threaten the long-term sustainability of cities. Capital finance is conducted ad hoc, on a project-by-project basis, and through multiple intertwined channels including many government bureaus, LGFVs and their subsidiaries, and many other public utilities firms. Not all investments in property and infrastructure are accounted for and reported on the government books (box 6.1). Economic classification is not introduced in budget management, and the budget is managed on an annual basis. The lack of a multiyear and integrated budget prevents local governments from more effective public investment planning. If investment plans were supplemented with a full-cost budgeting plan over the life span of the project (cost of construction plus future costs of operation and maintenance and asset renewal), some of the investments would not be justified from a cost-effectiveness basis (Mikesell and Mullins 2011; Kaganova and Windolph 2012).



### BOX 6.1 Reporting and budgeting of infrastructure finance

Government budgets have four separate components. The largest is the “public finance budget”—the general fund that is reported in most statistical compilations. The recurrent expenditures of government (other than social security) are recorded in this account, as are the ordinary revenues raised by the local government. Most expenditure on urban infrastructure facilities is made through the “Government Fund budget.” The main financing source for this budget is land revenues. The “state-owned enterprise operating fund budget” is for transfers of dividends from enterprises owned by governments to the general budget. Finally, the social security budget includes the pension, health, and worker protection programs and the payroll contributions and subsidies that finance these programs.

These four budgets are managed by many different departments, an arrangement that presents a

challenge to efficient public financial management. In particular, current and capital expenditures appear in all of the accounts, but government departments do not record or report their activities by economic classification not separating current and capital expenditures), making it difficult to track the overall budget health of the local government.

Moreover, the local government budget is intertwined with the budgets of local government financing vehicles and public utilities enterprises, and a substantial portion of capital investment made with public funding might not be reflected in the municipal budget as such. Thus, capital construction by state-owned enterprises themselves is not shown in the municipal budget, even though it is funded, at least partly, by subsidies and transfers from the municipal budget. Furthermore, the private sector’s contribution through various channels is impossible to estimate.

The second concern with China’s financing model is equity. The policy on how to pay for the infrastructure investments—from general budget revenue, user charges and connection fees, or debt finance—has direct implications about who will ultimately bear the cost of infrastructure. Subsidies to utilities of a private goods nature, such as water and electricity, not only come at the cost of lower economic efficiency but also tend to be regressive, as wealthier households, who consume disproportionately more, receive the largest share of the benefit.

When infrastructure services are financed from land-concession revenues, those who use the services benefit at the expense of the previous owners of the land use rights, who were forced to sell at a rate well below market price, or of citizens in general who are the ultimate owners of the land, depending on how one looks at it. In addition, neither the collective nor the farmers may sell land to end users, and the user rights of farmland owners are only weakly guarded. Only the local government can convert farmland to urban use. Local governments use their monopoly powers to claim farmland at a value reflecting agricultural use, which is well below the

market value of urban land. In many cases, the land is expropriated, further raising the level of unrest among those with user rights over farmland (see supporting report 4, *China’s Urbanization and Land: A Framework for Reform*).

If infrastructure investment were financed only from savings on the general budget, cities would not be able to meet the rising demand from urbanization. In addition, financing only from savings would raise intergenerational equity problems, because the infrastructure investment benefits future generations while the costs would be borne by the current generation of taxpayers. With urban migrants likely to make up a large portion of future generations, financing totally from savings further raises the social unrest between existing residents and migrants.<sup>16</sup>

The third concern is the potentially serious risk to fiscal sustainability. The absence of a strong regulatory regime governing borrowers, land finance, debt finance, and PPP entails fiscal risks.

Land-based revenues for capital finance complement borrowing by reducing the uncertainty surrounding future debt repayment capacity and the need to generate future

revenue streams to meet future debt service. Thus the use of land-based revenues for capital finance should reduce overall capital financing risk. Because, however, urban land values are highly volatile, land financing creates volatility in capital budgets and debt repayment funds. Land prices can swing as much as 50 percent in either direction, and in times of crisis even more, as demonstrated during the Asian financial crisis of the 1990s and again during the market collapse starting in 2008. Systemic risks are increased when the entire subnational sector relies heavily on land values to provide security for borrowing (L. Liu and Peterson 2013).

China's overall public debt, including sovereign and local government debt, is low by international standards. The sovereign debt remained at around 18 percent of GDP at the end of June 2013 (or 22.7 percent if all contingent debts are included). By including an estimate of the local government debt based on a report by the National Audit Office, the overall direct and contingent public debt was about 55.6 percent of GDP, far below the most conservative warning line—60 percent of GDP (table 6.4). In addition, several factors will work to improve China's debt dynamics in the future. China's large growth potential creates the foundation for further growth of real revenues and favorable debt dynamics. China's government commands a large portion of assets including shares in state-owned enterprises (SOEs) and land, which represent a source of potential revenues going forward. Large national savings coupled with investment-grade sovereign risk ratings imply a relatively low cost of borrowing (L. Liu and Pradelli 2013).

Concerns, however, remain with local government borrowing. The audit in 2013

found that local government direct debts continued to grow fast, at a yearly rate around 20 percent from 2010 to 2013, and the refinancing ratio exceeded 20 percent in 2 provinces, 31 municipals, 29 counties, and 148 townships. The overdue debt ratio was 1.01 percent on average, but it exceeded 10 percent in some cities and reached 16.36 percent in the worst local government. International experience suggests that subnational debt risk is triggered by the sheer size of the debts but also is more broadly associated with local governments' capacity in managing their debt portfolio and formulating fiscal policies in a sustainable manner.

In China, under the current system, the separation of subnational government debt from its budget undermines the accountability of local governments for debt sustainability, especially when debt is used to finance expenditures mandated by the central government such as the post-2008 stimulus package and affordable housing. The fragmented budgeting and indirect borrowing also prevent local governments from establishing proper debt management and control. To improve their access to credit and lower financing costs, some local governments have taken measures to reinforce the perception of an implicit guarantee on LGFV debt and have tapped into less regulated credit markets, known as "shadow banking." Some local governments resorted to PPPs as a source of capital financing and built up substantial risks emanating from these commitments.

Meanwhile, creditors, including bank and others, fail to impose hard budget constraints on local governments. There appears to be little market scrutiny of underlying financial conditions of LGFVs or local governments and little information upon which to base

**TABLE 6.4 China public debt, June 2013**

RMB, billions

	Direct debt	Contingent debt		Subtotal	Share of GDP
		Guaranteed debt	Other contingent debt		
Central	9,813	260	2,311	12,384	22.7%
Local	10,886	2,666	4,339	17,891	32.8%
Total	20,699	2,926	6,650	30,275	55.6%

Data Source: National Audit Office, 2013.

such judgment. Most urban infrastructure lending by banks and others is based on the reputation of the LGFV and an implied guarantee that the local government will not let the borrower fail. As a result, there is a lack of transparency and objectivity in the financing process. In the absence of credit ratings for borrowers, it is difficult to see how regulators can reasonably assess the portfolio risk profile of the banks and institutional investors. In such a situation, lenders and investors have no expectation of negative consequences for lending to poor credit risk borrowers and poor credit decisions predominate in an atmosphere of moral hazard.

Overreliance on bank loans as an instrument for local government borrowing has

intensified the debt-refinancing risk. By the end of June 2013, banks had financed about 56.6 percent of local governments' debt, and bond issuance in the capital markets had financed only 10.3 percent (box 6.2). Because the repayment period for bank loans tends to be shorter (two to five years) than that for bonds, the debt cannot be fully amortized in such short time spans and must be rolled over (refinanced) when it matures. Debt management that relies on continuous refinancing when principal payments come due is dangerous, especially in a market setting. The willingness of banks or other lenders to roll over existing debt at maturity depends on multiple factors, many of which are beyond a local government's ability to control. An inability

## BOX 6.2 Local governments' debt instruments

Local governments in China have been very innovative in exploring a variety of debt instruments:

- Medium-term loans from the China Development Bank (CDB), which derives some of its funding from the capital market using Policy Financial ("F") Bonds that have a 5- to 10-year maturity. The CDB has provided a significant volume of financing for urban infrastructure. According to an article in May 2013 by the president of the CDB, the bank has already made RMB 6 trillion in loans to finance China's urbanization process.<sup>a</sup> More than half of those loans—RMB 3.4 trillion—were outstanding at the end of 2012 and represented 71 percent of the bank's total outstanding loans.
- Commercial medium-term bank loans to local government financing vehicles (LGFVs) (mostly 3- to 5-year loans) that carry an implicit guarantee from the local government.
- Bonds issued by the Ministry of Finance on behalf of provinces (mostly 3- to 5-year bonds).
- Bonds issued by LGFVs (implicitly guaranteed by the local government). In some cases LGFVs borrow solely for the purpose of de facto relending to the local government. Expansion and diversification of the domestic bond market is already taking place in a tentative manner.

- Bonds issued directly by city governments in a very limited number of cases (mostly 3- to 5-year bonds). Since 2011, four local governments (Guangdong, Shanghai, Shenzhen, and Zhejiang) have been allowed to issue their own bonds and two more provinces (Jiangsu and Shandong) were expected to enter the bond market in 2013. So far, the market entry and volume of bond issuance has been carefully controlled by the Ministry of Finance, and that has increased in 2013 to RMB 70 billion, up from RMB 28.9 billion in 2012.
- Public-private partnerships ranging from concessions to joint ventures and build-own-operate schemes.
- Funds raised through shadow banking vehicles such as wealth management products, trust funds, and other collective investment schemes.

Despite this array of financing sources, the Chinese financial markets continue to be both bank-dominated (accounting for 56.6 percent of local government debts in June 2013) and restricted in scope, with few long-term financing instruments and a limited number of large institutional investors. The magnitude of capital market financing for urban infrastructure remains small relative to bank financing even as bonds issued by urban development investment corporations have become a growing portion of the bond market.

Source: Painter 2013.

a. As reported in "China Development Bank Says \$8.1 Trillion Needed for Urban Shift," Bloomberg News, May 20, 2013.

to roll over debt, in turn, can precipitate a local government budget crisis, or in some cases even a financial crisis such as Brazil experienced in the 1980s. Such liquidity risk is also related to the scarcity of long-term financing instruments and the underdevelopment of the Chinese capital market.

China's authorities recognize the potential risks arising from local government debt if liabilities are left hidden and uncontained. In June 2010, the State Council issued a circular (*Guo Fa* 19) on enhancing the control over LGFVs. A joint task force was established to verify and catalogue the LGFVs and their debts. The Ministry of Finance, the National Development and Reform Commission, the People's Bank of China, and the China Bank Regulation Commission have all issued a series of regulations and guidelines to regulate local government and LGFV borrowing behavior. Many local governments have also launched pilot reforms to improve their debt management framework. Much more remains to be done, however, to improve the financial intermediation process for long-term debt financing and put local government financing on a sustainable foundation.

The fourth concern relates to the impact of the existing financing model on market and private sector developments. The central government has signaled that it wants to promote greater market orientation in infrastructure finance, using market-rate debt financing where appropriate as well as encouraging private investment in infrastructure facilities. Both domestic private and foreign investment would be permitted for nearly all forms of infrastructure, particularly in water supply and wastewater treatment, through sole investment, cooperative enterprises, joint ventures, share purchase, or franchise. In particular, nonpublic capital is encouraged in building, operating, and managing public utilities.<sup>17</sup>

Local governments, however, with easy access to borrowing through LGFVs, are less keen to use PPPs. To improve their access to borrowing, some local governments even combine public investment projects that generate insufficient cash inflows with profit-making activities. Such practices blur the

division between the government and the market and create distortions that may do more harm to overall economic efficiency than is gained from the public infrastructure financed. These practices encourage LGFVs and public utility enterprises to manipulate their relationships with government to secure their monopoly power in an otherwise competitive market. They also create distorted incentives for local governments to protect their entities from competition from private firms.

Local governments generally lack the needed capacity to manage PPP contracts. These contracts require identifying the true cost of infrastructure and utilities, but, as discussed, the current reporting of and budgeting for infrastructure finance are deficient and unable to reveal the true cost of infrastructure projects. The cost of traditional publicly financed projects is often underrecorded, which may create an illusion about the efficiency of public utility firms. Managing the bidding process is another challenge. Open bidding could mitigate the information disadvantage of a local government, but it sometimes fails to reveal the true cost of infrastructure projects owing to the moral hazard of private partners; for example, a private partner may offer a low price on expectation that it will be able to renegotiate the tariff or subsidies after winning a PPP contract.

The absence of a clear legal and regulatory framework for PPP management also discourages private investors. There are 54 policy acts related to PPP in China's legal system, each dealing with different aspects of a single project such as finance, foreign investment, tendering, and bidding processes. This multiplicity of laws causes a multitude of regulations and a complex legal environment for PPP projects even within a single sector.<sup>18</sup> The disconnection between central and local policies further aggravates this fragmented approach,<sup>19</sup> leading not only to different ways of implementing PPPs in different places but also to an array of different ministries and bureaus that may be involved in PPP implementation and ultimately discouraging participation by private companies (Wu 2013).

## Financing affordable housing

China's policies have been successful in increasing the per capita housing space even as China's urban population increased to more than 50 percent of the total. Between 1985 and 2007, urban residential space per capita had risen to 28.3 square meters from 7 square meters. The larger size is greater than the averages in Europe and Japan (Man, Zheng, and Ren 2011).

Housing prices have escalated dramatically, however, making it difficult for low- and middle-income households, those moving from rural areas to urban areas, and young workers to buy a home. Housing prices in China's cities became very high in relationship to incomes. Internationally, a price-income ratio of 5:1 or more is considered unaffordable. While the average price-income average in 600 Chinese cities was 5:1, in major cities it was much higher. In Shanghai, for instance, the ratio was 28.4:1 and in Beijing, over 30.1:1.<sup>20</sup> The lack of affordable housing for low- and middle-income urban households in China, particularly in big cities, poses risks and challenges to a stable and harmonious society and impedes labor mobility. Therefore, the development of affordable housing programs became a central focus on the government reform agenda.

China is in the midst of an ambitious program of affordable housing construction. Under the 12th Five-Year Plan (2011–15), the central government mandated that 36 million units of affordable housing be built, with the objective of reaching 20 percent of the total urban population. It then developed a formula through which each municipality was required to build a certain number of units to standards set by the central government, which provided very little funding for this effort.

China's construction effort contains both rental and owned housing in five broad categories to accommodate the diverse urban population (box 6.3). Affordable rental housing is particularly needed in major cities where owning a house is out of the reach of most families. The definition of what types of housing qualify as affordable is very broad and without clear policy objectives except for growth. The target markets range from

very low income workers to young professionals with technology skills to middle-income families. The housing is variously called "low-income" housing, "affordable" or "subsidized" housing, or "social" housing, conflating the difference between social housing and more broadly based government-assisted housing. The categorization of qualifying units is so broad that providing a unit that is 10 percent below market value to a high-skilled technical employee and a low-rent unit to a migrant worker both count as affordable housing.

Housing with price caps is making a resurgence in high-cost cities, such as Beijing, but the practice raises the question of subsidy capture. The concept seems simple: auction land to developers with a pre-defined price cap on the sales price of the housing units. Unfortunately, international experience has shown that developers can build out the units to a lower-quality standard and, therefore, can capture most of the subsidies, defeating the purpose of the subsidy. A lack of a strong appraisal industry indicates that the land price could be artificially inflated over the true market price before the discount is applied.

The formula for housing construction allocation is driven by the central government, not market conditions. The central government provides the range and level of coverage, the means of allocation and administration, and access and exit mechanisms, and it also contains stipulations concerning the planning, design, size, quality and safety requirements of low-income housing projects. Market studies are not required, and municipalities are judged on their progress in meeting the quantitative goals, not on the success of the projects. (Gao and Wang 2012).

New housing construction may have a negative impact on labor mobility. Since the municipalities are responsible for the cost of construction, much of the new housing built is on the periphery of the cities where land prices are much lower, but where residents are farther from transportation and jobs. In Mexico City, commuting costs from newly constructed housing on the outskirts of the city have caused an estimated 20 percent of the housing to be abandoned.



### BOX 6.3 Basic concept and categories of affordable housing in China

*Economically affordable housing.* Economically affordable housing refers to a special category of housing sold to lower-income families at subsidized prices. Qualified purchasers must meet several requirements, including income level, hukou registration, and certain housing conditions. Units are limited to 60 square meters and are sold to qualified families at below-market price, often 25 percent to 40 percent below the price of comparable ordinary commodity housing. The government generally provides land for affordable housing construction, allowing such units to be sold at a discounted price relative to the market price. Owing to heavy subsidies by the government, homeowners are permitted to sell the unit only under certain conditions: they usually cannot sell for the first five years they own the home, and they may be required to sell the house back to the local housing authority with joint share of the increase in value.

*Price-capped commodity housing.* Housing prices are so high that even middle-income families could hardly afford to buy their own dwelling. Thus, some cities initiated a housing assistance program targeted at urban middle-income families. In this program, the housing price is higher than that in economic commodity housing but lower than that in ordinary commodity housing. Units are limited to 90 square meters. Similar to economic commodity housing, homeowners have to meet certain conditions before they are allowed to sell their units.

*Low-income rental housing.* Such housing is owned by the government and leased to very poor urban hukou residents at below-market rates. This low-rent public housing program is part of the official social security program and is primarily financed using the budget of the local government. In recent years, direct financial transfer from the central government

has increased. After several years of implementation, the program now covers most of these poor urban residents (with hukou registration), especially families with elderly or disabled members. Some low-income families can rent housing in the market with government subsidies, as part of the low-rental housing program.

*Public rental housing.* This new form of affordable housing started in 2009 to cater to the demands of households with income levels falling between the required thresholds for economic housing and low-rent housing. Public rental housing mostly serves low- and moderate-income families and has lower-than-market rent for the houses of the same quality. This scheme is the first attempt to use rental housing to solve the housing problem of families. It focuses on relieving the stress of finding housing from local young staff and migrant workers who have relatively low incomes. Unlike low-rent housing, public-rent housing in some cities can be sold to the tenants after they satisfy certain requirements, such as a residency period, income cap, and compensation to the government.

*Shanty-town resettlement.* The resettlement of shanty town residents constitutes a major component of China's affordable housing construction plan. This form of affordable housing is aimed at improving the well-being of low- and middle-income households living in areas considered shanty towns. Resettlement occurs when the government needs land for a development and plans to tear down the existing housing. Relocated families may be offered affordable housing, price-capped commodity housing, or a cash settlement. In cases where the existing property is of significant value, the current residents are sometimes given more than one housing unit.

Source: World Bank 2013b.

Housing policies may also have a negative impact on social cohesion. Those who can afford the housing prices will have housing options in the center cities. Those who do not will find their housing further away. In the United States, the model of tall towers in low-cost and often isolated locations led to such physical and safety problems that many had to be demolished.

The affordable housing construction system is a type of unfunded mandate. While the central government sets the goal for affordable housing construction, the responsibility for financing these projects rests primarily on the municipalities and on the local housing provident funds. According to a JP Morgan study, of the RMB 1.4 trillion needed to meet the policy goals for 2011, the central govern-



ment provided only RMP 170.5 billion in 2011, including RMB 28 billion carried forward from 2010.

The municipalities' provision of land at discounted prices or of net income from land transfers for the construction of affordable housing projects is both an opportunity and a challenge. On the one hand, current revenues increased. Between 1999 and 2007, the amount of land sold for development grew by 23 percent a year and fees for leasing by municipalities rose by nearly one-third annually (Ministry of Land and Resources 2008). On the other hand, land is a limited resource, so land sales cannot continue indefinitely, creating vulnerabilities for the cities, particularly if the projects ultimately fail or cost more than anticipated.

The use of housing provident funds for project finance has grown rapidly. HPFs—mandatory long-term savings funds established to help fund members finance housing—are permitted to use up to 50 percent of their “surplus funds” for social housing construction. The interest rates on the construction loans are set 10 percent higher than five-year mortgages used for individual home purchases, which is far below the development lending interest rate of commercial banks. The use of these funds has grown from a pilot project in 2009 with 29 HPFs providing project financing, to 93 HPFs that had pledged RMB 41.2 billion for affordable housing development and had used RMB 31.2 billion by the end of 2012. The calculation of the provident fund “surplus” is based on the HPF's current financial status, and is not subject to any type of stress test, creating potential vulnerabilities in the funds and in the real estate markets. The “surplus” is determined by the current surplus, deducting for loan risk reserves and administrative expenses. A project that fails will decrease the liquidity of the fund, which, in turn, will decrease the amount of funds available for mortgage loans. The amortization period for many HPF project loans is greater than 10 years, adding additional liquidity pressure.

Financing the construction of rental housing is more akin to project finance than it is to mortgage lending. A lender must evaluate the business applying for the loan, including

its management, its track record, the financial position of the owners or of the corporation, the market, the potential risks, and the competition. Evaluating the market is particularly critical because the lending institution must look at vacancy rates in the target market, local laws and regulations, and the overall economy in the areas served. It must assess potential developments that could affect the market, such as a factory closing, which would have a negative effect on the evaluation, or a new commercial and retail development, which would have a positive effect. Housing provident funds and governmental entities rarely have the training to perform these evaluations and are therefore dependent on the developer's information.

The current approach to financing affordable housing in China carries great risks, particularly to the cities and to the housing provident funds. In countries with high housing costs, it is nearly impossible for low-rent housing to be sustained without deep demand-side subsidies. Even if land and infrastructure are provided, the cash flows from the rents are highly unlikely to cover all of the costs, particularly in low-cost rentals. Cost savings on the front end can lead to faster deterioration, creating a downward spiral of lower occupancy and higher maintenance costs.

Municipalities are given little incentive to build low-rent housing that can be sustainable over time. They are responsible for all of the costs of building, managing, and maintaining housing. They can charge higher rents for slightly-below-market public rental housing than they can for low-rent housing, creating a much greater possibility for positive cash flow. Conversely, they will have to find additional sources of revenue to cover any losses on low-rent housing projects. Therefore, it is in their economic interests to build fewer low-rent units than public rental units.

Expenses for the operation of publicly supported rental housing are underestimated, as they are in many countries. While analyses have been performed on the cost of constructing subsidized rental housing, managers of rental housing interviewed for an earlier study believed that the rents would be sufficient to cover all expenses. While that might

possibly be true for units whose rent is close to market price, it is almost never true for lower-income rental housing. In either case, the only way to determine the sufficiency of rent projections is to have detailed financial statements prepared based on projected income, less an estimate for vacancies, less expenses including all maintenance, operational, and management costs and reserves for replacements of capital items. In Dalian, the rent revenue is expected to cover only loan payments, but not property management and maintenance costs. The gap will have to be filled by HPF annual supplements for low-rent housing.

While China does indeed have standards for new construction, there is no system for monitoring the physical conditions over time or for correcting any deficiencies that exist. Moreover, the pressure to keep costs down during construction can lead to faster deterioration than with market rate housing. Lessons learned in the United States are applicable here. Tall towers in isolated locations with too little capital or staff to manage and maintain them deteriorated into slum housing with unsafe and unhealthy conditions. Eventually, properties in Baltimore, Chicago, Newark, Philadelphia, San Francisco, and other cities were demolished.

## Reform considerations for China

To support the new urbanization model, urban finance needs to be reformed. The centerpiece of the reform will be moving toward a system that more clearly separates the traditional function of government—the provision of equitable and efficient levels of public services and regulation—from the investment and production functions of other sectors. The local government leadership evaluation system would need to be altered to reflect this change in the government role. And China needs to move from benign neglect of local borrowing to a rule-based system that is strictly enforced.

A modernization of the approach to financing will require changes in both financing and regulation. The public finance system will need to support the movement of people

and enterprises to the places where they are most productive, not to where they get the best tax or land deal from local government. It will also need to accommodate the integration of migrants and their families into urban areas. Revenues from land conversion are likely to taper off, requiring replacement with new sources of local revenue, whereas properly regulated access to borrowing will be needed to finance infrastructure investment. The financial sector will need to intermediate capital efficiently to meet local governments' needs for infrastructure finance, and at the same time impose financial discipline on local governments and avoid financial sector disruption. The private sector can play a larger role in financing and delivering infrastructure investment and other public services.

Aligning the urban finance system with the changing development objectives involves reforms across a variety of interrelated systems, including the public finance regime, land finance, financial intermediaries, and private sector development. For example, changing expenditure assignments is important but will call for changes in the distribution of intergovernmental transfers because local governments might end up with more or less budget responsibility. In turn, losses from the redistribution of transfers might need to be compensated by increased local taxing powers or the ability to increase user charges. Reform of the land conversion program raises the question of whether local governments should be allowed to borrow directly. Should local government be allowed to borrow, the demand for credit needs must be met by supply, which leads to question whether intermediaries can play such a role. These examples suggest that the right long-run goal is not to address a single issue but to implement a comprehensive reform agenda. Some elements of the reform—such as the reassignment of some expenditure responsibilities—might be accomplished in the short run. Others might be phased in beginning in the provincial cities and moving later to other cities, and yet others may be implemented only over the longer run. In this way, the comprehensive reform package proposed in this report could be introduced gradually and over time.

To manage the process of comprehensive reform, China needs a stronger, more transparent and streamlined public finance management and governance system. To get the best value out of public money, this improved system would need to bring a medium-term perspective to financing, link budgets with development plans, and allow government to strategically allocate resources and improve the efficiency and effectiveness of public expenditures. This transparent system could allow the government to communicate the reform agenda to citizens and gain their support; the government's credibility and trust with citizens could also be improved through linking the budget with performance. The government structure could be streamlined by removing the prefecture level as a tier of regional government.

This section elaborates on the key components of the comprehensive reform package. These components are organized by the sources of funding, namely public finance, land finance, housing provident funds, public-private partnerships, and debt finance. Financial management and governance issues are also discussed. All these components are integrated, so it is important to understand how they fit together, as well as the joint impact they might have on the economy.

### **Rationalizing public finance**

The reform agenda of public finance system should be centered on three major tasks: reassigning the expenditure responsibilities to better manage the externalities in a more urbanized economy; rationalizing revenues to correct the distortion of fiscal incentives and finance expenditure needs related to urbanization; and building a rule-based tax-sharing and transfer system to address the disparity concern.

#### *Reassign the expenditure responsibilities*

A first priority for the fiscal system is to achieve greater clarity in the division of functional responsibility among the various levels of government. In China, most of the ambiguity in expenditure assignments under the existing system derives from a "concurrent"

responsibility list, that is, functions that are the responsibility of more than one level of government. While concurrency is to some extent inevitable, because some functions do require shared responsibility, the goal of this reform will be to minimize it in service delivery. Reducing overlap in government functions could reduce costs as well as unproductive coordination efforts. More broadly, clarity on expenditure assignment is required for a better design of the intergovernmental fiscal system, to ensure that resources are available at the level of government that has the responsibility for delivering a specific service. There is wisdom in the old adage that "finance follows function." Until expenditure responsibilities are sorted out, it is not possible to put a rational financing plan in place (Bahl and Martinez-Vazquez 2006).

In getting the expenditure assignment right, China may need to weigh the gains from local control against the gains from technical efficiency, and from internalizing external costs and benefits. A task force supported by considerable staff should be charged to analyze all functions of government. Each subfunction of government function might be subjected to the same test: do the gains from decentralization—better servicing of local needs and circumstances—outweigh the advantages from centralization—the ability to capture economies of scale and internalize interjurisdictional externalities? Even with this principle to follow, the work of dividing the competencies between the levels of government will be as much art and politics as science. Factors such as preferences of individuals for services, externalities resulting from local decisions or imposed on local areas, and even economies of scale are not easily measured, if they are measureable at all. The effects on equity must be defined and weighted, administrative questions must be considered, and culture will play a role. And always, there is politics. Based on the analysis, the policy maker should rethink needed changes in the division of expenditure responsibilities between levels of government to come up with the exclusive lists. Finally, the responsibilities for each subfunction of government should be laid out in a new law, perhaps a revised budget law. That

law will specify those functions that will be the exclusive responsibility of the central government and those that will be the exclusive responsibility of the local governments.

In China, local governments perform some functions that would be better administered by the central government. Three areas are of particular concern. First, governments should continue to divest themselves of responsibilities for private sector activities, such as the management of industrial parks, the development of land for commercial purposes, and the ownership or partial ownership of enterprises that produce purely private goods. Whether local governments should maintain their role in industrial policy through tax and subsidy policies aimed at attracting industry is a more difficult issue. Many industrial countries allow this practice, even though its problems are well known.

If the central government decides against allowing local governments to subsidize industry locations, it could shift to a policy of making such competitive subsidies the exclusive responsibility of the central government. That is, every subsidy to attract economic development would require central government approval. Under this regime, local governments would continue to compete with one another without central approval, but the main instrument of their competition would be the quality of services offered. If subsidies are required, as in the case for technology advancements or pioneer industries, these are more appropriately a responsibility function of the central government. The idea of centralizing the power to grant industrial subsidies in China is raised in Lou (2013). Certainly the administration of such an approval process would be difficult and costly and would invite heavy lobbying efforts. In most countries, the problem would be finding a way to prevent local subsidies, but in China where no local government taxation powers are in place, the policing job could be much less difficult. Irrespective of the policy choice made, the central government should clarify the policy and define what is and what is not allowed by local governments in their conduct of industrial policy. The European Union rules on support for industry (see box O.11 in the overview report) could serve as a useful example.

Second, responsibility for the financing and administration of social security functions should be rethought. An especially good case can be made for more centralization on the financing side, and for a clearer sharing arrangement between the center and the provinces on the management and financing sides. Centralizing the administration of pensions would improve the mobility of labor, allow the imposition of national standards, and address important problems related to risk pooling.

Old age pensions are a national function in most industrial countries and, beyond the public pension system, a private function in many countries. China might follow this model. Provincial and local variations in benefits and contribution rates are at odds with uniform standards for all Chinese citizens. The current arrangement of city and county responsibility for pensions has forced pooling to the prefecture and provincial level in many provinces, but even that has not eliminated the financial problems. Inter- and intraprovincial disparities in per capita GDP suggest that uniform national levels could not be maintained with local government funding. These pooling issues and the need for portability suggest that both equity and the removal of impediments to labor mobility would be best served if public pensions were administered by the central government—although, of course, the administration would need to be deconcentrated—that is, central government would need to maintain local offices for administration of benefits.

Health insurance is a less clear-cut issue because local management of the program has benefits, and a case can be made for some local variation in the delivery of the service. But the case for central financing and the imposition of central rules is also a strong one. The central government would like all Chinese citizens to have access to the same health care services, and certainly to the same reimbursement benefits, irrespective of where they live. City and county governments, and even some provinces, do not have the resources to deliver on this promise. In addition, health insurance benefits need to be portable to remove impediments to labor

mobility, a goal that is consistent with centralization of the financing and management.

A third problem with expenditure assignment is that local governments have been assigned responsibilities that are characterized by significant interregional spillover effects. These functions and subfunctions are candidates for centralization. Detailed analysis by a government commission is likely to uncover many candidates for central assignment, but judicial services, food safety, river basin management, and environmental protection are examples of such functions.

### *Rationalize government revenues*

Government revenues need to be reassigned, based on the expenditure needs related to urbanization and on reassignment of expenditure responsibilities. On the one hand, the reassignment of expenditure responsibility will hold important implications for the financing side of the reform program. If, for example, the social security functions and certain other functions are shifted to the central government, then it might be necessary to shore up the revenue base of the central government to ensure that these costs could be covered.

Should central government need to mobilize more revenues to finance increased expenditure responsibilities, it has two options. One is to transfer more SOE profits to the budget. The SOEs managed by central government are generally natural monopoly corporations, and they generate more than two-thirds of total profits made by all SOEs. If those SOEs managed by central government were to transfer only half of their profits to support the central government's budget, the revenues generated would be roughly equivalent to 1.5 percent of GDP. The other choice is to increase the central government's retained share of total central tax collections, that is, the value added and corporate income taxes. This policy change would also reduce the incentive for local governments to compete for the value added tax base with industrial subsidies. To manage the potential disruption to local budgets, temporary arrangements such as the Tax Return and Tax Increment Return transfers introduced

in 1994, could be considered but would need to be phased out over time.

At the same time, a solid revenue base for local governments is important for reasons of efficiency and accountability. Such a foundation could be established by giving local governments some discretion to levy taxes, on certain bases and within a range of rates, and to claim all revenues raised from the new local taxes. That would bring many benefits to China. Revenue mobilization would be enhanced because local governments have information advantages that give them a comparative advantage in the collection of certain types of taxes, such as property and land taxes. A regional efficiency argument can also be made. Substituting local taxes for some intergovernmental transfers would lead to a higher tax price in the larger urban areas and force labor and capital to take that into account in making location decisions. China is struggling with urban sprawl. A system of property and land taxes could help rationalize land use patterns and provide incentives for more compact investments. Finally, there is an equalization argument, that is, as local governments in higher-income regions substitute their own taxes for intergovernmental transfers, funds will be freed up for distribution to lower-income regions. More broadly, local taxation might be a way to harden the local budget constraint and to strengthen the creditworthiness of subnational governments. With taxing powers, local governments would have the wherewithal to expand delivery of services that are in high demand or that would allow them to better capture their comparative advantage. It would also improve their creditworthiness by showing a stronger ability to service debt or to maintain public facilities. In general, local taxing powers would give local governments an instrument to use in shifting their competitive strategies from the back door to the front.

Useful criteria can be applied to identify good instruments for local revenue mobilization: local taxes should be administered at reasonable cost, yield significant revenue, and not result in exporting the burden of payment to residents of other jurisdictions. A number of local revenue-raising options more or less fit the criteria.



A *property tax on housing* can provide a stable revenue source that is aligned with service delivery quality and would allow local government budgets to benefit from increased land values in their jurisdiction. The property tax can fulfill two other important objectives in China: it can be both a quasi-user charge for urban services and a tax on wealth holdings in real property. Property taxes are never popular with constituents, but that is part of the rationale for those taxes: if local governments want to spend more, the burden is on them to argue their case to the taxpayers. Further, property taxes would encourage property owners to make the best possible use of their property—for instance, by renting out their apartments that are currently empty or developing unused or underused land.

China should aim to make property taxes an important part of local government revenues. Even a relatively low effective tax rate of 0.5 percent on this gross measure of the tax base would yield the equivalent of 1 percent of GDP in revenues. Property taxes will not be able to fully replace current land revenues of 1.5 percent of GDP in the near future. Industrial countries raise more than 2 percent of GDP in property taxes while low- and middle-income countries raise about 0.6 percent of GDP on average (Bahl 2009). To realize the full revenue benefits from the tax, it is important to put up a good administration system with a central decision on the basic structure of the tax. The administration system should consist of identification of all parcels and their ownership, valuation and revaluation, and collection from individual owners; it also requires extensive record-keeping and updating. A gradual introduction could start with empty apartments and unused land kept by developers. If so desired, an adjustment period could allow people that hold multiple properties to sell them to avoid future taxes.

Local government *taxes on the ownership and use of motor vehicles* could fit China's strategy for coping with urbanization. The rapid growth in motor vehicles compared with that of the road network has been instrumental in the growing congestion levels, higher pollution from transportation,

and longer commutes. Motor vehicle taxation could discourage the use of private cars, at the margin, while generating new revenues to defray some of the costs involved. Chinese cities could continue to use tax and charge policies to increase the price of owning and using a car relative to using a public transport system or choosing a different housing location.

The revenue potential from motor vehicle taxation is considerable, and local governments could use the funds to cover the general costs of urbanization. Beijing, Guangzhou, and Shanghai have introduced vehicle ownership or usage control, or both. Some cities such as Shanghai already auction car license plates, which limits car use to sustainable levels and brings in considerable revenues (RMB 7.1 billion in 2012). Higher vehicle registration fees and excise taxes on fuels also offer considerable revenue potential, and both can be implemented with special arrangements for public transport, if local governments want to limit the impact of fuel taxes on public transport prices.

A *local sales tax* could be charged in the cities where people live and consume. In principle, urban local governments in China could mobilize considerable resources from local sales taxes that are levied in the location where consumption occurs. If sales taxes on selected items of consumption could be made administratively feasible, they could be revenue productive and would pass some of the tests of a good local tax. That might be possible for specific items of consumption such as high-end jewelry and imported luxury goods. But for most consumer goods, a retail sales tax would encourage tax avoidance by providing an incentive to shift the point of consumption to informal traders that are not easily policed by the tax authorities.

A *piggyback surcharge* could help avoid the administrative problems of sales taxes, by allowing the local government to select a tax rate to be imposed on a central government tax base. The piggyback approach is used to a considerable extent in industrial countries. The primary source of revenue for Swiss cities is a piggyback personal income tax; the city of Rome levies a piggyback income tax on a base defined by the central government,



and Danish local governments tag on to an income tax base set by the central government. Local governments in many U.S. states impose a surrate on the state government retail sales tax base. At least three cities—Bangkok, Moscow, and Seoul—have their own surtax on the VAT (Martinez-Vazquez, Vulovic, and Liu 2011). Piggybacking is already done in China with the urban maintenance and construction tax (UMCT) and the education surcharge on the VAT and personal and corporate incomes taxes. The existing UMCT and education surcharge could be replaced with an “urban service tax,” and then the local government could be given the option of increasing the piggyback tax rate above its current level. The individual income tax could be added to the list of the piggyback base, but the existing individual income tax rate would need to be lowered to make a room for local piggybacking. In addition, the individual income tax, currently fragmented by different source of incomes, could be consolidated and simplified to a comprehensive individual income tax, and the location of collection could be changed from where people work to where people live.

*Increasing prices of urban services* such as mass transit, solid waste collection, water, power, and gas to full-cost-recovery levels would ration the use of resources, enhance service sustainability, and reduce government subsidies that are required to close the financing gap. Internationally, the use of charges for government services of a largely individual nature (water, electricity) is common, and in high-income countries, those charges often cover full costs—that is, the costs of operating and maintaining the service, and a capital charge to pay for depreciation and profits. Low user charges are not a good solution to address the concern of the entitlement of all citizens to basic service, such as the minimum levels of daily water necessary for good public health; all citizens are entitled to these basic services regardless of their ability to pay. The government could use vouchers or targeted subsidies through lifeline provisions to low-income households to pay for their minimum consumption levels. Targeting consumption subsidies in this manner reduces the municipal cost on public budgets.

China’s tax structure could be further improved. One important step would be to replace the business tax on services with a VAT, a step that authorities have already initiated. This move would encourage the growth of a services industry, because VAT on services can be deducted from the user’s VAT tax obligations. It would also encourage enterprises to outsource services to more specialized enterprises, because there would no longer be a tax advantage for keeping services in-house. The other important step is to introduce an environment protection levy on carbon emission. This tax would not only generate significant amount of revenues, but would also an important step toward developing environmental friendly cities.

#### *Establish rule-based tax sharing and transfer*

Even with enhanced local government revenues, a considerable gap between expenditure responsibilities and own revenues will continue to exist at the local level. To support the new model of urbanization and economic development, the intergovernmental transfer system should be recalibrated. To motivate and enable local governments to provide equal public services to all people, urban or rural, migrant or local, a formula distribution based on expenditure needs and fiscal capacity differences would be a better approach than derivation-based revenue sharing. Changing the distribution of tax sharing from a derivation basis to a formula basis would considerably alter the outcomes for individual provinces, however, even if done gradually. Some of the losers under such a reform likely would be the richer provinces, including perhaps the larger metropolitan city-provinces. The lost revenues in some of the higher-income provinces could be replaced by increased local taxes and user charges. Therefore, reforming the intergovernmental transfer system would need to be done in tandem with reforming revenue assignments. That would make possible the replacement of lost transfers in some provinces with higher local tax revenues. To better manage the budgetary and political disruption to local governments, the reform would inevitably need to be implemented

gradually, and the architecture of the reform must be worked out based on government objectives, administrative constraints, and politics. For example, local governments could be assigned a “target share” based on objective criteria of expenditure needs and revenue capacity, but they would only receive this incrementally, starting from their current share in the grant pool.

More specifically, the reform of the transfer system should take care of three dimensions: vertical sharing, horizontal sharing, and conditional grants.

The vertical sharing regime could be simplified by setting a uniform sharing rate for all central taxes. And the current collection of unconditional grants could be folded into the general revenue sharing program. By setting a uniform sharing rate against all central taxes, subnational governments would be protected from the revenue impacts of discretionary changes made by the central government. Moreover, the sharing rate in the future might be more easily reset to reflect expenditure assignments and desired incentives. In addition, this reform would enhance local spending autonomy, preserving the information advantages of provincial and local governments. So, vertical sharing would become relatively simple. Of the total amount of revenue raised (on taxes where the central government had responsibility for setting the tax rate), 73 percent would be transferred to the subnational governments on an unconditional basis. That would make the vertical sharing revenue neutral. The central government would have the discretion to adjust the general sharing rate up or down, depending on factors such as the need to protect the expenditure-revenue balance, the costs of urbanization, compensation for expenditure reassignments, and the like.

The horizontal sharing regime, the distribution of a provincial revenue sharing pool, could be based fully on a formula, rather than on the origin of collections as under the current system, or on several formulas and ad hoc distributions as in the case of unconditional grants. Such a horizontal sharing approach would force local governments to compete for tax revenue based on the provision of quality public services, rather than by

using subsidies to attract industry and thus build its tax base. This approach would offer a better possibility for equalization and for the reduction of fiscal disparities. And it also would encourage cities to develop based on their own advantages, because the revenues of a city would be neutral to any particular economic structure irrespective of whether it was a port city, an industrial city, or a city with a significant presence of non-taxed public activities.

The formula should reflect the objectives of the government, and will change how the grant pool is distributed among provinces. The formula would be defined by the choice of the variables and how they are weighed. With emphasis on equalization, the provincial population might be weighed heavily in the formula (as is done in Germany). If the goal is to provide more funding where expenditure needs are greatest, the formula elements would concentrate on measures reflecting the cost of providing a minimum service level. China can build on its own practice with formula distribution of the equalization grant but also can learn from international experience. Formula grant systems are used in many developed countries; Australia, for example, manages a sophisticated system. In contrast, some countries, such as the United States, have no system of equalization among the states and instead rely on federal earmarked grants and state government policies to provide equalization. As a result, standards of service delivery can vary considerably from state to state and from local government to local government. Box 6.4 lists the approaches to formula grants applied in other countries. In the case of China, this formula grant should ensure that local government has capacity to deliver the minimum public service package to all serviced population, which would give explicit entitlement to migrants to access the basic public service package wherever they choose to work.

The conditional transfer system should ensure local government capacity to address externalities and to more directly address high-poverty provinces. The current conditional transfer system could be simplified. China could consider consolidating many specific grants into a limited number of sec-

## BOX 6.4 Formula grants

*Formula grants* refer to methods of distributing revenue entitlements according to an objective set of indicators. This approach has appeal because it can be objective and, depending on how it is constructed, can seem fair, for example, a formula with a province's served population and/or per capita income as a key indicator. It also has the advantage to keep the grant share of each local government relatively stable, as a province's share of national population or relative level of per capita income are unlikely to change quickly. Formula grant transfers also have some undesirable features, however. While the formula itself is objective once it is determined, the process of making the determination is less so—it requires a great deal of judgment and is susceptible to favoritism. Moreover, the choice of variables to be used in the formula may be restricted by the quality of the data available.

Many approaches can be taken to constructing a formula. The great variation in the practice might be summarized under four relatively common grant categories. The first might be called the “standard needs-standard revenue gap.” The idea here is to set the amount of grants for each local government according to the gap between the amount of expenditures required to deliver a minimum level of services and the amount of local revenue that could be raised at a “normal” level of effort. Many consider this approach to be the best. It was developed in Australia and is

*Source:* Bahl and Qiao 2013.

also used in Italy and the Republic of Korea, as well as in China.

The second approach is more ad hoc, in that it develops a formula based on impressionistic reasoning about indicators of fiscal capacity and expenditure needs, and then weights each indicator in the distribution formula. These can be very complicated or very simple. Most commonly, population is used as the basic measure of expenditure needs, although its weight in the formula may differ from country to country (for example, 75 percent in Spain and 10 percent in India). Other indicators of expenditure need are also chosen in different countries, such as the percent who are elderly in Korea, population density in Germany, energy cost in Mongolia, and that share of the population with no access to health care in South Africa.

Third, some provision is made for fiscal capacity. For example, less revenue is transferred to places with greater fiscal capacity and more to places with less capacity (Switzerland, Germany, and India). Alternatively, more revenue may be transferred to places that make a greater tax effort (Spain).

Finally formal set-asides are provided in some cases where the government feels that a factor that cannot be measured is nonetheless important to include; examples are state capitals in Brazil and “backward” states in India.

toral block grants that would need to be linked to central government's broad sectoral objectives and supported by a system of performance indicators and performance review. All conditional grant programs should be subject to a sunset clause and a regular formal review, say every five years. That implies that grant financing would be stable and predictable for five years and that formula revision could take place only as a result of a formal review after five years. To overcome delay in disbursement of funds, recipient governments would receive a regular disbursement, say every month, of a specific amount, say 90 percent of the estimated grant due, with the balance disbursed upon evidence of performance. To overcome any diversion of funds by pass-through intermediary govern-

ments, all allocations could be posted on the web before the start of the fiscal year.

Subprovincial finance would need to be reformed to ensure resources get to where they are needed. Adjustments in central-provincial fiscal relations alone are not sufficient to ensure that adequate resources would be available to accommodate the budgetary impacts of urbanization. In fact, intraprovincial inequalities in fiscal resources are likely greater than interprovincial disparities. Subprovincial revenue sharing arrangements vary widely from province to province with few mandatory controls set in place by the central government—a feature that is usually observed in federal countries but not in unitary ones. Imposition of mandates by the central government on the pass-through of

central transfers to city and county governments may be prudent to ensure objectives can be achieved.

### Reform land finance

The Chinese practice of financing urban infrastructure with the proceeds of land leases is both wildly successful and problematic. The basic problem is not with the practice of converting farmland assets into productive urban facilities and higher-quality urban services, but rather with the way in which it is being done. Land finance reform needs to address three key challenges: realigning the subnational governments' incentives regarding land acquisition and development with residents' interest; getting the best economic value from the land assets the subnational governments have already acquired; and mitigating the fiscal risks emanating from land market volatility.<sup>21</sup> This reform would call for China to change the way land development is financed; explore other options for capturing land value and value increase; and establish rigorous fiscal rules for land financing. These would require important changes in the law and the administration, and these changes would need to be worked out and fit together. The following are the most difficult issues:

- *Fairness*: The fairness questions related to expropriation and compensation for farmland and village construction land must be worked out. If compensation for these lands is set at market levels for urban land, then a capital gains tax should be levied and returned to local governments. That would put government in the right place—taxing the profits at a reasonable rate rather than expropriating all of the profits.
- *Urban sprawl*: The problem of dealing with urban sprawl is related to the practice of selling land leases. At least at the margin, this problem might be addressed with a property tax that would help rationalize the land market by imposing a holding cost on land in the built-up area that is being held off the market, imposing higher motor vehicle and motor fuel taxes that would increase the cost of city sprawling, and eliminating derivation-based revenue

sharing, which would reduce the incentive for local government leaders to subsidize industry.

- *Revenue impact*. The net impact on financing of these changes in land leasing is uncertain and depends on the stock of the idle industrial land and other public land. The first change will inevitably lower the net profits of governments from land, while the second change, abolishing subsidies on industrial land, would reduce tax expenditures and therefore improve revenues. In addition, the land saved through more efficient use of industrial land could be reallocated to housing or commercial use, and that is likely to generate a significant amount of revenue. To mitigate any possible revenue shortfall, China could impose betterment taxes on those that see the value of their property rise because of infrastructure development. Box 6.5 lists several practices for capturing land value that have been applied in other countries.

This reform would have important impacts, and the debate surrounding it would be politically charged. Whether its adoption is in the best interests of China depends on how well the reform matches national goals. On the one hand, infrastructure services no longer would be free to users, industries would be deprived of some profits, and city governments might no longer enjoy the monopoly power over land transactions. On the other hand, this reform could reduce the incentives that lead to urban sprawl, improve equity, and optimize the use of existing urban land. A slowdown in land leasing and infrastructure spending could give more space for attention to maintenance and a reallocation of public expenditures to social services. In addition, this reform would encourage more efficient use of industrial land and promote more efficient allocation of industries based on market prices for land. That might narrow regional disparity because the less developed regions with cheaper land have more opportunity to attract industrial investment. Urban-rural income disparity could be narrowed as well. Farmers in city suburbs would gain directly from land conversion, and those living far away from urban areas could also

### BOX 6.5 Options for policies and tools that capture land value

Value capture allows government to capture at least part of the increase in land value emanating from better infrastructure services, and use these funds to subsidize the infrastructure investment. A prerequisite is that the infrastructure services must generate sufficient value to be captured. China has been successful in capturing increments in land value, but the key challenge is to set a rule to allow all people to share the development outcomes as well as the risks. The rule should be economically justifiable, incentive compatible and acceptable to the public. There are a number of value capture instruments and other financial mechanisms being applied across the United States, Europe and Asia (Smolka and Amborski 2007; Peterson 2008). The most prevalent and effective of these include:

**Special assessment districts.** New and special levies on properties that will benefit from the provision of new or upgraded public transit (Examples in the United States are 17 percent of the first phase of the Portland streetcar system, 50 percent of the capital costs of South Lake Union streetcar system in Seattle, and 28 percent of the cost of the new New York Avenue Metrorail station in Washington, DC). This approach involves creating new revenues as a result of an alteration to local taxation or levy settings.

**Tax increment financing.** This approach dedicates future tax increments within a certain defined district

to finance debt issued to pay for a project, which theoretically will create the conditions for future gains (used primarily in U.S. cities).

**Transit-oriented development or joint development.** Given that transit infrastructure plays a critical role in the end value of development projects, the capture of profits from activities associated with real estate development in and around transit stations may allow a transit agency to deliver an operating ratio in excess of 100 percent (as in the case of Hong Kong SAR, China's MTRC). The approach that MTRC uses is described as the "Rail + Property model." Joint development, similarly, can be described as a real estate development project that involves coordination between multiple parties to develop sites near transit, usually on publically owned land (examples are the Land Transport Authority and SMRT in Singapore, BART in San Francisco Bay Area, and the Transport for London Crossrail project).

**Developer charges or development impact fees.** The use of charges that defray the cost of expanding and extending public services in a particular area. For example, in Broward County, Florida, the local government implemented a transit-oriented concurrency system. Developer charges or impact fees are specifically targeted to fund the transit infrastructure required within the location of development from which the fee or charge is levied.

gain if they are allowed to convert their construction land to agriculture land and sell land conversion rights in the market, as is the case in Chengdu.

Under this new regime, government's exposure to property prices would be reduced but would not disappear. The sheer size of land financing for infrastructure points to the importance of setting rules for land financing. Fiscal rules would allow prudent management of land financing while ensuring that it continues to play an important role in financing urbanization. Internationally, there are no standard full-fledged regulatory rules, but an analogy can be drawn with the regulatory rules for debt financing. (Peterson and Kaganova 2010) More specifically, China could consider the following regulatory rules.

First, the priority would be establishment of uniform reporting requirements for sub-

national land ownership, land sales, contributions of land to public-private ventures, land transactions between different types of subnational institutions, and revenue generated by land sales. These are the essential building blocks needed to translate priority principles into meaningful fiscal oversight. China has taken the first important step by requiring that land transactions be placed "on budget," so that there is full upward reporting to higher-level authorities. A natural next step would be an inventory of municipally owned land and land owned by different elements and subsidiaries of government, which is basic to asset size and land management options. Similar to loan guarantees, the risks include transfer of land to or from third parties in nontransparent ways that may entangle financial relations between a municipality and its subsidiaries. All information on public



land inventories, public land valuations, land sales, and land contributions to public-private joint ventures or subsidiaries should be conducted through standardized instruments, be reflected in the budget or its annexes and financial statements, and be a matter of public record. Regulations typically identify what types of publicly owned property can and cannot be alienated, either by sale or as collateral for loans. The registration of land and property collateral for land-management purposes also involves exactly the same information required for subnational debt regulation.

Second, the “golden rule” of public finance should be applied to subnational land financing: Proceeds of land asset sales must be used only to finance investment. Exceptions could be allowed for key, one-time institutional reforms. Although urban authorities can acquire new land at the urban fringe, and under certain conditions may acquire land through condemnation or eminent domain, urban land cannot be “produced” indefinitely. Sale or leasing of public land is not a “recurring” source of revenue. Thus, revenues from the sale or other disposition of public land should be treated as one-time revenues, with proceeds used to finance urban investment or finance other one-time expenditures such as major institutional reforms. Such rules also open the opportunity to diversify and augment own-source financing of capital investment.

Recurring revenues from public land development may be appropriately allocated to subnational operating budgets. In cases where public authorities develop commercial or industrial projects on public land, for example, development costs can be recaptured through annual rental charges and used to finance debt service charges through the operating budget. For economic efficiency and fiscal prudence, it is essential in these cases that all parts of a public development project, including land, be valued at market prices, and that the decision whether to publicly develop a site, sell land to the private sector for private development, or hold land in the public domain for future development and future increases in land value be made taking into account realistic market valuations.

Third, loans and bonds backed by land collateral may require special regulation. Urban land markets are volatile and cyclical. Extreme dependence on land finance for capital investment funding will impart this volatility to subnational capital budgets. The fiscal framework should mitigate such risk. Risk mitigation may take the form of ceilings on land-finance dependence (similar to ceilings on local indebtedness) or establishment of permanent infrastructure funds that accumulate proceeds from land sales and spread out expenditures over time, according to an infrastructure investment plan. Such rules could set minimum collateral to loan ratios for land-backed loans and prescribe that land must be valued at current market value for collateral purposes.

Fourth, transfer of surplus land to other government units or enterprises, private developers, or public-private partnerships should be prohibited except on a fully disclosed contract basis. Establishing a land trust (found in some U.S. states) that could receive land sale proceeds, and ensuring that proceeds are used for infrastructure investment as prescribed by law, or as decided by appropriate authority with a metropolitan-wide perspective, is one way to overcome the incentives that bureaucratic owners have to “internalize” land sale gains for the sole benefit of the agency.

### **Develop stable and sustainable debt finance**

Stable and sustainable debt finance is critical to China’s continuing urbanization. A consensus has emerged within China that local governments should be allowed to access financial markets directly. Direct access yields several benefits. Subnational borrowing finances infrastructure more equitably because it matches infrastructure asset life with the maturity of debt instrument so that the beneficiaries of the financed services pay for them. It also exposes local governments to market disciplines and reporting requirements, hence helping strengthen fiscal transparency, sound budget and financial management, and good governance. Furthermore, expanding local government borrowing



facilitates the development of competitive financial markets, in particular the deepening of the bond market. And finally, regulated direct access to borrowing rather than unregulated indirect access through LGFVs is likely to entail lower risks for the financial sector.

Before China modifies the Budget Law to allow local governments to have direct and open access to credit, a regulatory framework must be established in line with international good practice. Even in the United States, the legal framework set up by each state regulates the borrowing of the state and its local governments (Canuto and Liu 2013). These regulatory frameworks work together with markets to discipline subnational borrowing and make it sustainable. China's capital markets are still evolving; thus it is all the more important to establish a framework to regulate subnational borrowing while promoting a competitive and diversified subnational credit market.

#### *Rigorous regulatory frameworks for subnational borrowers*

As China develops a regulatory framework for subnational borrowers, international experience is relevant. The 1990s saw widespread subnational debt crises or fiscal stress in major developing countries such as Argentina, Brazil, India, Mexico, and the Russian Federation. These crises led to reforms to develop and strengthen regulatory frameworks for local government debt financing in these countries. Some countries such as Peru established a framework in the early 2000s to preempt the fiscal risks of decentralization. Historically, the debt crises in U.S. states in the 1840s led to major constitutional reforms regulating debt in many states. In France, a regulatory framework was put in place in the 1990s after episodes of insolvency in the early 1990s as a result of uncontrolled local government borrowing in the 1980s (L. Liu and Waibel 2010).

Following international experiences, the basic structure of a regulatory framework for China in the medium term should consider the following elements: identifying which entities are eligible for borrowing, reforming

LGFVs, setting fiscal rules and debt limits, and developing approval and monitoring procedures for debt issuance.

***Eligibility of borrowing entities.*** A key question is which level of subnational governments should be allowed to borrow and whether LGFVs should continue to serve as financing platform of subnational governments. To answer this question, it is important to note that debt is intended to finance long-term asset formation and that it must be serviced. A subnational government that has revenue sources and a responsibility to finance infrastructure should be allowed to access financial markets. If and when a subnational government is legally permitted to borrow, the practice for creating LGFVs as pure financing vehicles should cease. However, LGFVs that finance and manage essential infrastructure services such as roads, water supply and solid waste treatment should be permitted to borrow, if these LGFVs have their own sources of revenues generated from infrastructure projects. These LGFVs will follow corporate governance structure and financial reporting requirements.

These two types of borrowing entities—subnational government and LGFVs—are differentiated by the underlying sources of revenues to service the debt. A subnational government as a borrower will have broader revenue sources such as transfers and tax revenues to service the debt. LGFVs in infrastructure generate revenues from user fees such as tolls and water fees that can be used to service the debt.

While fiscally strong local governments can access markets, fiscally weaker local governments, particularly in rural or economically disadvantaged regions, may have difficulty in achieving creditworthiness. For these local governments, the central or provincial government needs to finance the bare minimum of infrastructure investment through grants or direct construction by the higher-level government. To prevent local governments from not seeking to become creditworthy in order to access grant financing, the amount of funding provided should be determined by standardized rules to ensure a set of minimum standards of service delivery.

Local governments with fiscal potential but lagging in achieving creditworthiness should also be eligible only for rule-based small grants for infrastructure until they can demonstrate creditworthiness. Policy banks should focus on assisting these local governments with technical assistance and training in return for making the first new loan to the local government only after it passes the creditworthiness threshold.

**Reforming LGFVs.** Even after local governments are allowed to borrow directly, some LGFVs can still play an important role in infrastructure financing and operations. The reforms should differentiate three types of LGFVs. LGFVs that finance and implement public infrastructure projects should continue to exist but be reformed to become transparent and financially stronger. LGFVs that are pure financing vehicles for subnational governments should be dissolved, and their debts brought onto local government balance sheet, once the subnational governments have formal and open access to markets (after the Budget Law is amended). LGFVs that mix public and private commercial activities should divest their commercial activities, in line with the direction of refocusing the government on essential public services. This last is perhaps the most challenging aspect of LGFV reform.

As the three types of LGFVs are being classified and restructured, an important reform is to consolidate and restructure LGFV debt (see section on insolvency framework). After restructuring and consolidation, LGFVs that will continue to finance and manage public investments can be strengthened in three ways.

First, if they are not already, these LGFVs should be corporatized, which would strengthen their corporate governance and financial structure. China should continue reforms on cost recovery and pricing of tariffs, which will be critical to the financial sustainability of infrastructure.

Second, the fiscal relationship between the government budget and LGFV operations should become transparent. LGFVs should follow internationally acceptable accounting and reporting standards, and have their

accounts audited and their financial statements disclosed periodically to the local people's congress and the public. Some LGFVs that engage in infrastructure projects may not be financially self-sufficient and may continue to require budgetary support. In these cases, their financial statements should become part of the government budget documents and be reported to the appropriate people's congress and disclosed to the public. LGFVs that rely on budget support should also be part of the capital budgeting process and of the general government borrowing plan, as is done in Maryland in the United States, for example.

Third, financially self-sustaining LGFVs should be allowed to access markets through their own financial strength but they should also follow a rigorous regulatory framework. LGFVs that generate project revenues such as tolls and water fees should be able to use revenue bonds instruments or project financing to access financial markets for infrastructure investments.

#### *Fiscal rules and debt limits for borrowing.*

Fiscal rules and debt limits for borrowers are intended to manage the risks of systemic defaults before they occur. Many countries have adopted a basic rule, called the "golden rule," which allows government entities to borrow money only for long-term public capital investments (L. Liu and Waibel 2010). Based on international practice, short-term borrowing for working capital can be permitted. However, provisions should be established to provide a maximum amount of such short-term borrowing and to prevent the rollover of short-term borrowing into operating deficits.

In addition to the golden rule, a further set of fiscal rules and debt limits should be established. A number of issues must be considered in establishing such rules and limits (L. Liu and Pradelli 2013). First, fiscal rules and debt indicators for subnational governments must take into account the fiscal space available for the total public sector, that is, central and local governments. For any given resources available to repay the total public debt, the borrowing space is ultimately split between the central and local governments. At high debt levels, public indebtedness tends

to hamper economic growth by crowding out private investment (because of higher interest rates, debt overhang problems, and the like) and imposing heavy tax burdens that distort incentives to produce and invest. In China, the low level of sovereign debt provides comfortable space for subnational debt accumulation. However, local government borrowing limits should be established in tandem with public finance reform that aligns the tax revenues with functions and gives local government the taxing power to meet local needs. In addition, potential expenditure pressures that could constrain fiscal space for subnational entities should be carefully monitored.

Second, translating thresholds established by empirical studies into debt limits guiding borrowing policies can be challenging. China differs critically from some other developing countries. While excessive indebtedness of subnational governments has led to restrictive debt limits in other countries, China may not benefit from overly restrictive debt limits that can hamper growth. Faster economic growth, large national savings, and a lower cost of borrowing can lead to positive debt dynamics in China. The main goal in China is to develop sound regulatory frameworks so that subnational governments can mobilize resources from the capital markets to finance large-scale infrastructure investments that support growth and urbanization, while containing overall macroeconomic risks.

Third, it will be important to establish fiscal rules for LGFVs as well, because LGFVs' liabilities ultimately constitute sources of contingent liabilities for central and local governments. In the United States, SPV borrowing is subject to regulation (L. Liu 2010). For example, a typical rate covenant in the United States for a water-sewer utility is to set rates sufficient to produce net revenues equal to at least 1.25 times total annual debt service. In the United States, SPV debt financed by revenue bonds is subject to the regulatory rules and debt limits set for revenue bonds but is generally outside the debt limits imposed on debt instruments securitized by a government's general taxation power. For this to work, accounting and financial transparency of SPVs is an important prerequisite.

Without transparency, the financial problems of an SPV can become contingent liabilities of its owner. Table 6.5 provides a summary of key fiscal rules and debt limits for China to consider.

Guarantees can play a useful role in bridging financing for projects that have public policy justifications, or where markets do not fully recognize the underlying economic values. However, guarantees also create an incentive for risky borrowers to seek government guarantees, and for interrelated public entities to support one another in ways that violate arm's-length standards and obfuscate the financial risks that are being assumed. International experience shows that the risks of guarantees for debt service can be regulated while retaining the usefulness of the guarantees. The generally applied key rules include the following (L. Liu 2010):

- Private companies may be prohibited from getting such guarantees.
- The scope of guarantees for municipal enterprises may be limited. In France, for example, annual debt charges paid by the local government on its own loans and on loans it has guaranteed may not exceed 50 percent of its operating revenue; no single borrower may receive in guarantees more than 5 percent of the local government's operating revenue, and guarantees may not exceed 50 percent of the principal of the debt of the entity that is guaranteed. Poland has a stricter rule, which counts guarantees provided to a municipal enterprise by a local government as part of the government debt service, which in total (principal, interest, and guaranteed debt service) cannot exceed 15 percent of its revenues.
- Guarantees and all other direct and indirect debt liabilities should be an explicit part of local government budget and financial statements, fully disclosed to the local people's congress and the public.

***Procedures for approving and monitoring subnational debt.*** The central government, through the Ministry of Finance, should set fiscal rules and debt limits for all levels of subnational government. These rules and

**TABLE 6.5** Proposed fiscal rule and debt limit indicators

Indicators	Objective and application	Comments
Total SNG debt-to-GDP ratio	<p>To monitor <i>aggregate</i> debt of all subnational entities.</p> <p>To ensure the division of debt space between the central gov't and SNGs and the limits on the overall public debt</p>	The ratio applying to <i>individual</i> local government misses the heterogeneity—the cost of borrowing depends on local government's own solvency and risk, and local government with low risk of insolvency can service larger stock of debt than local government with high risk of insolvency. <i>Individual</i> local government's debt-to-GSDP ratio, where GSDP is the local GDP, is not advisable because GSDP and local government revenue capacity might not be correlated.
Debt service-to-own revenue ratio	To apply uniformly to each individual subnational government general budget, to ensure financial capacity to service debt and provide incentives for own revenue collection	The ratio reflects local government's repayment capacity (denominator) for servicing debt (numerator). Arrears should be included into the ratio. The denominator needs to reflect local government revenue capacity. Important considerations: own revenue vs non-own-revenue (transfers), regular flow of revenues vs one-off revenues (asset sales, land leasing).
"Golden rule"	To apply to both SPVs and SNGs general budgets	Imposed on the general budget if SNG retains responsibility for certain capital expenditures beyond those transferred to LGFVs. Imposed also on LGFVs. Important to have a sound framework for public investment project appraisal (including cost-benefit analysis) and transparent accounting (to avoid creative accounting as well as misclassifications between current and capital spending).
Infrastructure sector-specific debt-to-revenue ratio	To apply to financially viable LGFVs	Applied to financially viable LGFVs. Preferably revenue net of operating expenditures. Requiring operations to be sufficiently profitable in cash terms to repay SPVs debt obligations. The industrial sector-specific norms observed in the United States could provide a basic guideline for helping develop China-specific norms.

Source: Liu and Pradelli 2013.

Note: GDP = gross domestic product; GSDP = gross state domestic product; LGFV = local government financing vehicle; SNG = subnational government; SPV = special purpose vehicle.

limits should be monitored on a regular basis. Local governments should have autonomy to issue debts within the limits, but a debt issuance plan for each level of government should be submitted to the corresponding people's congress for approval along with its annual budget plan. The debt issuance plan should be disclosed to the public. Key fiscal and debt indicators should be disclosed on a quarterly basis, and these indicators should be standardized across local governments for benchmarking and monitoring. A chief financial officer (CFO) can be established at the subnational government level. Centralizing the accountability for local government finance in one office would clarify authority on financial management matters and would put a halt to the decentralized and uncoordinated issuance of local government debt.

Ideally, this officer should come from the department that manages the public purse or its supervisor (mayor).

Each level of government should set up a budget committee consisting of the budget department, the local Development Research Center, the Land Department, and the CFO and charge it with making a coordinated decision on the size of government expenditure, revenue and cash flow projections, and deficits and debt financing. The budget committee should be chaired by the provincial governor or mayor, or their designated executive governor or mayor. A debt management committee (chaired by the CFO) and consisting of representatives of key departments such as the treasury, budget, and land departments and the local Development Research Center, should make a coordinated

decision on a medium-term debt strategy, by taking into account the revenue streams, cash flow, procurement and expenditure plans of line departments, and the balance sheet of governments (assets and liabilities). Gradually, China should move toward a robust borrowing framework that connects with the overall framework of fiscal management and transparency.

#### *Developing an insolvency framework*

International experience shows that relying only on ex ante fiscal rules and limits, without ex post consequences, gives irresponsible borrowers and lenders an incentive to get around the ex ante rules and execute transactions that will later get bailed out (L. Liu 2010). China would need to establish a framework for insolvency and debt restructuring, in addition to ex ante borrowing framework discussed above.

International experience shows that a collective framework for debt resolution is at the core of a sound insolvency framework (L. Liu 2010; L. Liu and Waibel 2010). The tension between maintaining essential services and creditors' contractual rights implies that the pain of insolvency needs to be shared between creditors and the debtor. The insolvency mechanism needs to balance these competing interests and guide the priority structure for settling competing claims. A collective framework will take on more importance as the subnational bond market develops and grows to include thousands of creditors. A lack of clear rules for insolvency is likely to raise borrowing costs, and may limit market access for creditworthy borrowers. In the United States, Chapter 9 of the Bankruptcy Code imposes strong measures on defaulting municipalities and carries a strong stigma to offset debtor moral hazard.

A sound framework should reduce the moral hazard of subnational defaults, discourage free riders, bind all local governments to pursue sustainable fiscal policies, and extend the short-term horizon of local governments to minimize the impact of unsustainable fiscal policy on future generations (Canuto and Liu 2013). In the absence of a clearly defined framework for insolvency,

local governments may adjust debt in negotiations with creditors, repudiate their obligations, or shift the liabilities to higher levels of government. A country's legal, political, and historical context influences the choice and design of an insolvency system. However, a sound insolvency system balances the needs of borrowers (representing citizens) and the needs of creditors (representing savers), establishes a transparent and rule-based debt workout procedure, and minimizes moral hazard. Such a framework in China will serve two purposes. First, it will guide the restructuring of subnational debt. China currently is conducting a comprehensive audit of subnational debt. As the reform of LGFVs and other off-budget vehicles (such as financing vehicles for hospitals and universities) proceeds, the debt of the off-budget vehicles will need to be classified, and some may need to be restructured. Second, an insolvency framework will address future defaults of subnational units so that an insolvent local government can maintain essential services while restructuring its debts, restore its financial health, and reenter the financial market.

#### *Developing a subnational credit market*

China has large national savings. It also has large infrastructure demand resulting from rapid urbanization and the need to absorb millions of rural residents in urban areas. Financial markets can channel savings into infrastructure investments. Diversified subnational credit markets can provide more investment instruments for institutions (such as insurance companies and mutual funds) and individual investors.

***Two models of subnational credit markets.*** There are two major models of subnational credit markets: bank lending, which financed municipal investment in Western Europe throughout most of the 20th century and is still the primary source of local credit financing there, and subnational bond markets, which China has been developing as an additional source to bank lending. The United States is an example of a country that has a deep and competitive municipal bond market. Annual issuances of local govern-



ment bonds are about \$400 billion with outstanding liabilities at about \$3 trillion (or 20 percent of GDP). Individual investors are the largest holders of U.S. subnational bonds, followed by mutual funds, bank trust accounts, banks, insurance companies, and corporations (L. Liu 2010).

Developing competitive and diversified funding sources for infrastructure financing is important to help lower the financing cost. In establishing a framework for municipal finance borrowing after the fall of apartheid, South Africa clearly understood the benefits of competition in the subnational credit market. Its *Intergovernmental Fiscal Review* report states, "Active capital markets, with a variety of buyers and sellers, and a variety of financial products, can offer more efficiency than direct lending. First, competition for municipal debt instruments tends to keep borrowing costs down and create structural options for every need. Second, an active market implies liquidity for an investor who may wish to sell. Liquidity reduces risk, increases the pool of potential investors, and thus improves efficiency" (South Africa National Treasury 2001, 192).

Several European countries, including the Netherlands and Sweden, and over 50 developing countries have set up municipal development banks or municipal development funds as the sole or main channel for providing credit to subnational governments. That approach is not recommended for China. Municipal development banks and funds appear to have the advantage of a focused purpose and scope and an ability to build relationships with their borrowers. In theory, they are able to more closely monitor the borrower and provide technical assistance to weaker borrowers. If not well regulated, however, such close relationships with borrowers can be problematic, and the limited scope of their business increases the risk of failure in the case of widespread default. Most importantly, their subsidized lending is costly to the central government and impedes the development of market-based financing.

The international experience with specialized national and regional development banks and municipal funds is mixed with negative examples and consequences. Bra-

zil privatized almost all state policy banks as part of a debt restructuring agreement between those banks and the federal government in 1997. In the Philippines, government financial institutions have become an impediment to private entry into local government markets. In some Eastern Europe countries, municipal funds have become monopolies.

According to Peterson (2003), financial sector deregulation has eliminated the possibility of having quasi-monopoly municipal banks draw on specially protected government allocations of low-cost, long-term savings to finance subnational infrastructure. In a competitive world, bonds offer more ways to tap institutional and household long-term savings. Even when the ultimate credit extended to a local government continues to be a loan from a bank or other financial institution, the financial intermediary will increasingly raise its own capital for lending from bond issues.

#### *Developing a subnational bond market.*

China's infrastructure financing has been dominated by commercial banks and government policy banks (and land financing). This dominance provides too narrow a set of financing instruments for China's continuing urbanization. By broadening the range of instruments and sources to include institutional investors in the domestic bond market, and eventually even private equity, financing can better respond to the pace and scale of infrastructure development that China's rapid urbanization requires.

Engaging the domestic bond market in urban infrastructure financing creates a new class of assets for Chinese investors. Institutional investors have large resources to invest in the domestic debt market. These resources can be put to work financing urban infrastructure. Bonds issued by local governments and LGFVs are well suited to the needs of institutional investors such as pension funds, insurance companies, and mutual funds for wealthy individuals who wish to diversify their investments in long-term assets. Bonds that finance urban infrastructure can provide a secure source of fixed income for institutional investors. They can also be risk rated so that regulatory authorities can assess the



impact that they have on the riskiness of the institutional investors' portfolio, and institutional investors can be limited to investments in highly rated assets, as they are in many countries.

There is substantial room to grow and deepen the bond market to achieve a long-term investment target of 150–200 percent of GDP. In 2010, China's domestic bond market was 40 percent of GDP. In Turkey, it is over 90 percent, and in Brazil nearly 200 percent (IFC 2013). Deep, efficient domestic capital markets are a powerful source of long-term financing for infrastructure and other sectors that underpin growth. They create alternative financing tools and greater access to capital. Domestic capital markets also provide resilience against banking system shocks.

China has already started to experiment with creating a municipal bond market (table 6.6). Since 2011, four local governments—the provinces of Guangdong and Zhejiang and the cities of Shanghai and Shenzhen—have been allowed to issue a small amount of municipal bonds directly in the market. In 2013, the provinces of Jiangsu and Shandong were added to the trial program. A much larger volume of financing has also been mobilized for provincial governments through bonds issued by the Ministry of Finance on behalf of the provincial governments.

To better take advantage of the bond market, China will need to extend the yield curve. Three- and five-year bonds, which constitute 98 percent of municipal bonds issued in China since 2011, are too short to spread debt service over the life of the infrastructure. Front-loading the debt service in this way puts unnecessary strain on local

government finances and creditworthiness. China should encourage the issuance of municipal bonds with terms of 10, 15, and 20 years with the objective of moving to 25- and 30-year bonds over time. To extend the term of municipal bonds, the market will have to establish a yield curve that prices bonds of equal quality according to their term. This requires benchmark rates for those terms in the sovereign bond market. Central government AAA Treasury bonds have been issued for 10- and 20-year terms, but the volume has been relatively small, so benchmark rates have yet to become firm. The Ministry of Finance could begin issuing 15-year T-bonds and increase the volume of longer-term issues to establish benchmarks in the rates for risk-free long bonds.

The local government bond market could be promoted by clearly defining types of revenues that can securitize the bonds. Two types of revenues facilitate the development of two types of bonds: general obligations bonds and revenue bonds. General obligation bonds (GBs) are secured by a government's general faith and credit, that is, the general taxation revenue of the issuer. This type of bond provides a useful financing instrument for public services, such as local streets, street lights, and traffic signals, which do not generate revenues or sufficient revenues, from user charges. The ratings of general obligation bonds are the same as the institutional rating of the issuer unless specific credit enhancements (for example, a bond guaranty from a policy bank or other source) are added to the bond.

Revenue bonds (RBs) are secured solely by the revenues generated from the project financed by the bonds. There is a direct link between the beneficiaries of the project and their obligations to pay debt services. Investors have no claim on other local government revenue sources for repayment of these bonds. For this reason, RBs are suited only for financing projects that can produce revenue from user charges, such as projects for water supply, toll roads, airports, and public transport. Revenue bonds reinforce self-sustaining finance, because the repayment of principal and interest is made entirely from the revenues generated from the project financed by the bonds. These bonds allow

**TABLE 6.6** Local government bonds by issuers

RMB, 100 millions

	2009	2010	2011	2012	Total
Ministry of Finance	2,000	2,000	1,771	2,211	5,982
Shanghai	0	0	71	89	160
Guangdong	0	0	69	86	155
Shenzhen	0	0	22	27	49
Zhejiang	0	0	67	87	154
Total	2,000	2,000	2,000	2,500	6,500

Source: Painter 2013.

the market to play a central role in enforcing debt limitation, pricing risks, and matching the maturities of liabilities with the economic lives of assets. More importantly, RBs affirm that sustainability is about the ability of the borrower to service the debt. No financing structure has been of greater importance to the growth of the U.S. municipal bond market than RBs, which account for about two-thirds of subnational debt in the United States (L. Liu and Waibel 2008). In the United States, revenues bonds of SPVs are outside the debt limits set by the states, but revenue bonds follow strict rules and have a low rate of debt default.

Hybrid bonds (HBs) are a third type of municipal bond that combines characteristics of both general obligation and revenue bonds. Like a GB, debt service payments are not linked to revenues produced by the project being financed. Like an RB, the local government does not have to pledge the use of all of its revenue sources to debt service. Hybrid bonds offer investors repayment from one or more specific revenue sources only. Local governments can pledge a highly reliable source of revenue to the HB and arrange for that revenue to be directed into a trust account dedicated solely to repayment of the HB. This allows local governments to finance projects that do not produce revenue with a reliable alternative revenue source, while not encumbering their overall balance sheet. Carefully structured HBs can achieve bond ratings that are better than the issuer's institutional credit rating. Compared to GBs and RBs, HBs have proven to be the preferred type of infrastructure bonds in the emerging debt markets of India, Mexico, South Africa, and elsewhere.

Local governments in general should refrain from speculative debt instruments such as structured products. These instruments should be regulated and in most cases prohibited for use by local governments. The risky debt profiles of some local governments in France stemming from the use of structured products in the 2000s provide a cautionary tale (Canuto and Liu 2013).

***Regulating the subnational credit market.***  
Development of a subnational bond market

requires a coherent set of securities regulations. In many ways, securities regulations for subnational bonds are similar to those for sovereign and corporate bonds. The institutional infrastructure for bond issuance and trading, such as regulations on credit rating agencies, broker-dealers, underwriters, and auditors, are also similar. In addition, China also needs to build a reliable government bond market yield curve, standardize the accounting standards of public sectors, impose municipal bond documentation and disclosure requirements, and develop professional services.

Security laws cannot prevent defaults and financial deterioration of local governments. Securities laws also cannot replace rules for prudent fiscal management of local governments and for corporate governance for public entities and special purpose vehicles that are owned by local governments. What they can do is mandate disclosure to investors of all material information that would affect an investor's decision to buy, sell, or hold a security. Securities regulations may also cover the offer and sales of securities and the regulation of issuers, trading systems, and the professionals who work in these areas (box 6.6).

The introduction of an insolvency framework that disciplines both lenders and borrowers, together with a law that makes financing offered to unrated local governments unenforceable, creates strong incentives for more responsible financing of urban infrastructure. Vigilant regulation of banks and institutional investors creates an important incentive for prudent lending behavior. Putting regulation of all financial institutions on an equal footing will open the door to greater use of long-term financing in the Chinese capital market.

Over the long term, the development of subnational credit markets would also benefit from self-regulation and a "buyer beware" approach. Many U.S. regulations were developed by the market players themselves or through market practice. For example, the Government Finance Officers Association developed many municipal bond disclosure rules and practices that were adopted in the industry. The U.S. market has also benefited from 200 years of operation, during which

## BOX 6.6 U.S. securities laws applicable to municipal securities

### *Securities laws*

- The Securities Act of 1933 established a regulatory scheme for offerings of corporate securities but exempted offerings of municipal securities. It also included the first antifraud provision, which applies to both corporate and municipal securities.<sup>a</sup>
- The Securities Exchange Act of 1934 established the Securities and Exchange Commission (SEC) to enforce civil antifraud laws and regulate brokers, dealers, and certain other market organizations and professionals. Like the Securities Act of 1933, its antifraud provisions apply to all securities, including municipal securities.
- There are also criminal securities fraud laws, enforced by the U.S. Department of Justice, private securities litigation, and enforcement actions under state securities laws.

### *Basic principles*

- **Disclosure.** Organizations that publicly offer securities must tell investors the whole truth about their businesses, financial condition, the securities they are selling, and the risks involved in investing. Investors make their own investment decisions.

- **Honest markets.** People and firms who sell and trade securities—brokers, dealers, and exchanges—must treat investors fairly and honestly, putting investors' interests first.

### *Regulation of municipal securities trading*

- Brokers and dealers who participate in transactions of municipal securities are required to follow the rules of both the SEC and the Municipal Securities Rulemaking Board (MSRB).
- The MSRB, which was established in 1975, issues regulations for brokers and dealers who engage in municipal securities transactions.
- MSRB rules cover many areas including customer protection, record keeping, clearance and settlement, trade reporting, broker-dealer conduct (including political contributions by broker-dealers and employees who deal with municipal securities), and the submission of information to an electronic system known as EMMA (Electronic Municipal Market Access system), which makes it immediately available to the public on the MSRB's website (<http://www.emma.msrb.org>).
- Disclosed information includes annual audited financial statements from issuers.
- The law emphasizes transparency.

Source: Haines 2009; Canuto and Liu 2013.

a. Municipal securities in the United States include securities issued by states, local governments, and their agencies and instrumentalities, including municipalities, districts (such as school districts), special purpose government entities (such as housing authorities), and a variety of other government entities (such as airport authorities). Municipal securities include all debt instruments issued by states and local governments, including bonds, notes, financing leases, and variable rate obligations.

investors learned the hard way about the consequences of defaults, especially in the absence of guarantees that higher levels of government will bail out defaulting subsidiaries. While allowing subnationals to default may have adverse impacts on bank assets and on investors' appetite, these considerations must be balanced against the negative consequences of moral hazard and bailouts on market development.

The regulatory and institutional frameworks for commercial and policy banks and bond markets need to be harmonized to create a level playing field and avoid regulation arbitrage. The credit rating requirement for bond issuance is a particular concern.

Because institutional investors provide their financing through the bond market, the risk rating of their investment portfolios is determined by the ratings of the bonds they buy and is easily overseen by regulators. If bank loans are not subjected to rating, some banks will continue to make risky loans that undercut the entry of more prudent lenders into the market. The borrowers may also opt for easy money that can be gotten through shadow banking, for example.

China might consider imposing a mandatory requirement for local government borrowers to have an institutional credit rating irrespective of the instrument used (bank loan, bond, or wealth management product).

That would have many merits in addition to helping level the playing field. Not only would credit ratings encourage local governments and LGFVs to improve their financial management, but they are an excellent way for borrowers to learn about their own financial strengths and weaknesses before seeking financing for their urban infrastructure project. In addition, ratings can help them determine whether to pursue a bank loan, a syndicated loan, or a bond issue. Local governments and LGFVs with strong credit ratings may be in a good position to seek the best terms on loans from competing banks or syndicates. Governments and LGFVs with weaker credit ratings will find that well-structured HBs can achieve much higher credit ratings than their institutional rating and thereby enable them to access financing at lower cost on better terms than would be the case using bank loans. By helping borrowers to better target their lenders and by getting lenders to compete, institutional credit ratings can help reduce the cost of intermediation and thereby the cost of financing urban infrastructure.

Mandatory ratings also improve the financial intermediation process. The most efficient way for lenders (whether commercial banks or institutional investors) to get objective information about borrowers' credit risk is to review their credit rating report. That is as true for lending by policy banks and commercial banks as it is for investors in municipal bonds. Ratings are not intended to substitute for financial due diligence, but they provide an efficient way for lenders and investors to determine if potential borrowers warrant additional credit analysis or should be passed over until they are more highly rated. By sorting out the potential borrowers quickly, credit ratings improve the efficiency of the intermediation process and make credit analysis more focused.

Mandatory ratings also make it easier for the regulators of banks and institutional investors to assess the risk profile of banks' loan portfolios and institutional investors' securities portfolios. In particular, more transparency about the risk of loans to specific local governments and LGFVs improves the calculation of a bank's capital adequacy,

and banks will become more sensitive to local government and LGFV credit risk in their lending operations.

Bank lending to local governments should be regulated in a way that reinforces local governments' budget discipline and fiscal transparency. Commercial bank lending is normally bound by general prudential rules, which, if applied to local governments, would restrict the governments' opportunity to borrow from such vehicles. Such rules include exposure limits, which limit a bank's loan exposure to a single client; concentration limits, which limit a bank's exposure to a certain type of client such as all local governments taken together; and insider lending limits, which limit lending to the owners or co-owners of the bank. China might review whether these rules are effectively enforced. In addition to these norms, many countries have innovated other measures to reinforce discipline. For instance, after experiencing widespread subnational defaults, several countries, including Brazil, banned subnational ownership of financial institutions altogether. In Mexico, competitive lender selection and transaction ratings were required for large-scale long-term financing. Although these requirements are not mandatory, banks lending to unrated subnational governments would need to have a high capital adequacy ratio.

Shadow banking would need to be regularized to limit easy money for local governments. All asset management products should be subject to the same fundamental regulatory standards. Regulatory policy for all collective investment products should be coordinated among authorized bank, insurance, and security regulators. A plan for reforming the legal and regulatory framework of shadow banking should include short-term amendments of regulations and long-term amendments of primary legislation. Investments in wealth management products, trust funds, or other collective investment schemes should not be protected by implicit guarantees.

The role of policy banks in the provision of long-term finance should be reoriented. The policy banks should be reformed to address market failures for long-term mar-

ket based financing through various instruments such as co-investment, guarantees, and credit enhancements. Policy banks could reduce their excessive dependence on government guaranteed bonds and leverage their resources by exploring new ways to finance their new operations on a sustainable basis, such as well constructed securitizations of their loan portfolios, loan syndications, and cofinancing schemes with other state-owned and private financial institutions. In addition, policy banks could play a catalytic role in supporting the use of long-term capital markets instruments. The bank could issue innovative financial instruments that would support the growth of fixed-income markets; provide bond guarantees (on a fee basis as a credit enhancement) for municipal bonds; and purchase a limited portion of new municipal bond issues, serving as a market-maker by buying or selling bonds as needed by other investors. Promoting market competition and preventing moral hazard in government lending is important. The performance of policy banks should be evaluated regularly on these two grounds.

### **Clarify the role of housing provident funds**

The steps China's government is taking in the housing area require great care. International experience shows that a key to the provision of affordable housing is an overall well-functioning housing system, one that is efficient and responsive to the needs of all segments of the population, including the poor who are able to access housing at reasonable prices. Housing needs to be understood as an interlocking ecosystem where consumers of different income segments, the construction industry, financiers, and local and central government bodies interact dynamically. Governments that have successfully made housing affordable are those that have played an enabling role, intervening to overcome market failures while also ensuring that their actions do not distort housing markets. Their actions have systematically and simultaneously addressed the causes of market failures by, first, focusing on demand and supply side constraints and, second, putting in place poli-

cies that improve management of the housing sector as a whole. Governments can use various policies that enable them to carefully balance and coordinate the fluid interaction of those within the ecosystem and thereby support housing affordability. Without such an integrated intervention, a patchwork of "affordable housing" programs will only be dealing with the symptoms of the housing problem rather than its causes.

China's housing policies should encourage transparency and the targeting of its subsidies to match its policy goals. The country has achieved great success in meeting its low-income housing construction targets, yet great vulnerabilities remain in how the policies are being implemented. These include financial risks to the municipalities and the housing provident funds, challenges in housing workers migrating to urban areas, social segregation, and risks to the economy overall.

Local governments should carry out a careful analysis of housing demand (demographic and socioeconomic conditions) and supply (types of housing available for different income groups, at what cost), and then use the findings to determine the housing needs of the locality. This approach will enable local governments to define the nature, scope, and policy interventions required to effectively align housing demand and supply. A "National Housing Observatory" could be established to collect systematic information on housing supply and on demographic and socioeconomic conditions and thus capture trends in housing affordability and finance. Such an institute would facilitate monitoring of the sector's performance by policy makers. A good example of an institute that independently collects and analyzes such information is the Canadian Housing and Mortgage Corporation.

China would benefit from giving municipalities more flexibility in achieving their low-income housing construction goals. Rather than mandating a specific number of a particular type of units, broad goals could be set for each municipality, which could then be required to develop a specific plan on how to achieve these targets. The overall plan would include a market study, a market plan, a financial plan, an analysis of job growth



and infrastructure needs, and a long-term management plan including contingencies.

The role of housing provident funds should be clarified in the context of a broader clarification of government's role in housing. These long-term savings funds are established for the purpose of housing the employees who contribute to them, and the cumulative funds in the accounts belong to the employees. Great care must be taken not to conflate the purpose of HPFs with that of serving national or local housing goals such as affordable housing. Moreover, providing mortgage loans and project loans in the same institution without clear lines of delineation is a potential conflict of interest. Using HPFs to pay for operational costs of public rental housing projects should be prohibited unless it is clearly specified in the loan agreement.

Actuarial analyses with stress tests of the HPFs should be performed. Given the high housing prices, the large-scale, long-term HPF investments in projects, and mortgage finance for members, the funds are potentially in a financially precarious position. Understanding the risks under different scenarios would enable them to adjust their policies. It would also enable the Government of China to adjust its own policies if it sees negative trends in the HPFs.

The Regulatory and Supervisory Framework for mortgage lenders and housing financiers should be strengthened, particularly with respect to housing provident funds. The Ministry of Housing and Urban and Rural Development should establish standards of lending and operational procedures closely in line with China Banking Regulatory Commission's model and best international practices. The risk analysis recommended for the HPF portfolios would provide important information for improving regulations.

China should explore means other than HPFs for financing an affordable housing program, such as direct subsidies from the government budget, mobilization of assistance from employers to their employees, and partnership with the private sector. Additional subsidies will be necessary to ensure sustainability, particularly for low-income renters. Since the central government provides little funding for subsidies, the municipali-

ties will need to generate their own revenue sources. One option is property taxes. That could certainly generate revenue, but Chinese municipalities might consider tax abatements for properties that have received public subsidies, especially low-income rental properties. Rental income from low-rent housing is currently exempted from business tax, real estate tax, and from the urban land tax. Higher rates could be applied to vacant properties, those properties that have been under construction or unfinished for a predetermined period of time (two to three years) and for other properties owned by the same family.

Demand-side subsidies can be an effective tool both in providing housing and in increasing the housing supply. Developed countries almost universally have moved away from the model where the government finances, builds, manages, and maintains public housing. Rather, the trend has been toward demand-side subsidies, such as down-payment assistance for homeownership and vouchers or conditional cash assistance for rental housing. This type of aid gives the consumer a greater role in the selection of his housing unit. Moreover, the supply of money going to consumers has been shown to increase the supply of affordable housing. Examples of subsidies to households include capital grants towards home purchase (such as assistance for a down payment) or rental vouchers. Successful examples include a rental assistance program to low-income households under the Section 8 Program in the United States enacted in 1974, which provides housing vouchers or direct payments to private landlords. Under the program, tenants choose where to live and pay about 30 percent of their gross income for rent, with the remainder of the market rate rent subsidized by the program.

Unleashing the constraint of land supply for housing could improve the supply of low-income housing. Land sales should be conducted through a competitive bidding process without regard to its use for industrial, commercial or residential purposes. The government could allow for rural collective construction land to enter urban land markets, improve the inventory of public land, identify underused parcels that could be put toward



affordable housing development, and authorize collectives in urban villages to redevelop their land for housing and allow them to invest in formal rental housing. These steps could help increase the supply of affordable rental units and improve housing conditions for migrants and low-income households while also offering collectives new and significant income sources. Bangkok offers a good example of formalizing informal settlements by allowing communities to upgrade their housing in situ and gaining security of tenure with the support of Community Organizations Development Institute.

Employers could play a role in supporting affordable owned and rented housing for their employees. Because they benefit from workers and professionals coming into urban areas, this can take a number of forms: matching funds for down payments for owned housing that employees can access after a predetermined period of employment or assistance with mortgage payments for an initial period. For rentals, a company could agree to rent a block of apartments from a public entity at market rates and then provide a discounted rent to its employees. It could also provide monthly support for rental housing that declines over time.

### **Promote public-private partnerships**

A public-private partnership, at its core, is a contractual agreement between a public agency and a private sector entity resulting in greater private sector participation in the financing and delivery of infrastructure projects. Using PPPs as a form of delivery of public goods represents a step away from the traditional procurement of infrastructure toward a more sophisticated engagement with the private sector, with the expectation of capturing value for money through efficiency gains and lowering of the life-cycle costs of projects. China should consider developing uniform and credible standards, regulations, and a legal framework to encourage public-private partnerships to engage in urban development, including the construction of urban infrastructure, the delivery of urban services, and the construction and sale or rental of affordable housing.

The potential advantages of moving to PPP arrangements and attracting private investment for cities in China would be substantial. First, PPPs could improve the operational performance of the infrastructure facilities by tapping into the technical expertise in the private sector. The efficiency gains, with a well-designed PPP contract and full competition, could be captured by the government, thus reducing the fiscal burden of cities, and the need to borrow more or increase taxes.<sup>22</sup> The freed-up fiscal space could then be used for social services. Second, because the private sector would be paid largely from the revenues generated from users of the facility, the infrastructure capacity would be designed to fit the projected demand, rather than the current practice of building infrastructure assets beyond the projected demand requirements. PPPs would thus optimize the scale of infrastructure assets being developed. Having the right scale of infrastructure would contribute to the sustainability of the cities by reducing resource use requirements. Finally, PPPs could facilitate the transformation of the role of government. In the 1980s, in an attempt to reduce public spending and reduce inefficiencies, countries led by the United Kingdom (under Margaret Thatcher) and the United States (under Ronald Reagan) pushed on reform of public enterprises and greater private participation in all economic sectors. The infrastructure industry gradually started to change, marked by a shift from public to private financing and provision of infrastructure and the introduction of the principles of competition and commercialization. The role of the public sector changed from direct and active actor in the provision of public goods and services to one of regulator, facilitator, and user of such goods and services. By the 1990s, PPPs, as currently defined, were introduced and provided with models of private sector involvement more attuned to public services provision.

For the duration of the contract, the concessionaire (or private partner) typically will build (or rehabilitate), manage, maintain, operate, and control the assets in exchange for some combination of user fees and government transfer or payment, which is its compensation for the investment and other

costs. The corresponding government commits to make in-kind or financial contributions to the project, whether through subsidies, guarantees, shadow fees, or availability payments. Therefore, to capture value for money through efficiency gains, the Chinese government needs to consider carefully the following issues. First, attracting private investment may require higher user charges to make the investment profitable for private investors. If government is not prepared to accept cost recovery tariffs for the service, it would have to provide for subsidies from the budget. Second, PPPs can create direct or contingent liabilities on the government, which should be carefully managed. If the private operator fails, the government will likely have to take on its obligations to prevent the service from collapsing. Third, providing public services through PPPs adds a layer of complexity in operations and requires considerably more detailed legal agreements and more complex bidding processes than those needed for government-built and operated facilities. All of these issues can be managed, and there is ample international experience in all of these, but government should be aware

of these issues as it further develops its PPP framework (box 6.7).

A PPP framework should be tailored to existing laws but may also require changes to laws or policies that are not compatible with PPPs. At the national level, a single PPP law should guide approval processes across sectors and regions.<sup>23</sup> That can both simplify the project approval system and facilitate prudent decision making at the local level. Local governments need to make policies to create the incentive for participation from the private sector, and establish a regulatory system for guiding regulating PPPs. Of great importance in a PPP framework is its provision for resolution of contractual disputes. To attract private investors, PPP contracts may need to include contract-specific dispute resolution mechanisms that may be based on national or international arbitration and other administrative processes before moving the dispute into the courts. Other legal safeguards also need to be present in the form of effective application of the rule of law and effective regulatory oversight.

Local governments need to introduce a competitive mechanism along with innova-

### **BOX 6.7 Australia: A leading model in implementing public-private partnerships**

Australia is a model example of public-private partnership (PPP) development from the creation of upstream policy frameworks through downstream implementation. Several reviews of the existing Australian PPP portfolio express confidence in this model of public service delivery and are optimistic on the performance of PPP projects in comparison with traditional procurement. Furthermore, project outcomes from PPP projects in Australia, as measured by cost savings and delivery performance, outstrip their public sector comparators.

Australia has entered into the third decade of PPP contracts and has developed a set of unique skills and strong policy frameworks to meet the challenges of implementing an effective and output-based PPP program. In 2008, the Infrastructure Australia Act came into effect with a new integrated approach to planning, funding, and implementing public infrastructure projects. Some contributing factors to

the success of Australia's PPP program include the following:

- A PPP policy framework underpins the principles of when to use PPP and how to assess projects and appropriate implementation processes.
- The PPP policy guidelines set out the guiding principles within which the public sector should operate.
- The PPP Unit in Victoria plays a critical role in regulating the PPP process by providing guidance to the government, as well as providing governance structure in its early days when new PPPs take shape.
- The auditor general's review of the procurement process of the PPP contracts led to subsequent improvements in PPP procurement practices, such as the bid submission process, competitiveness during the bidding period, and optimization of risk allocations.

tive modes of operation to promote openness, transparency, and efficiency for PPPs. To open up competition, public agencies should be restructured with transparent financial reporting on their costs, subsidies received from the budget, and the quantity and quality of delivered services. Open bidding should be set as a norm to create more opportunities for the entry of private players.

To fully capture the benefits of these partnerships, China might shift the focus of PPP contracts from capital financing toward service provision. Service focus could be achieved by bundling investment for asset creation with operation and maintenance requirements over a long period of time (such as 20 years). PPPs for most types of urban infrastructure and service and affordable housing delivery will depend on local government payments over the lifetime of the PPP contract. In these cases, local governments should be allowed to make multiyear financial commitments. Future financial contributions to PPPs need to be kept to a fiscally sustainable level, and the best way to do that is to ensure they are kept within the expected, future level of recurrent revenue. These observations reinforce the case for fiscal reform. If, for example, the system of fiscal decentralization provided local governments with a stronger revenue base than they currently have, they would be in a better position to engage private partners through PPPs.

Expanding PPPs in the future will inevitably increase governments' contingent liabilities, and a careful risk assessment and proper risk-sharing system is needed. PPP contract arrangements need to clarify the risk-sharing arrangements. Governments should bear only those risks that they can best manage, which generally are those that they can control or at least influence. The rules governing PPPs should ensure that the officials and ministers in charge have incentives, information, and the capability to take account of the costs and risks of contingent liabilities. More specifically, PPPs should be approved by the cabinet, the Ministry of Finance, or some other body with an interest in future spending. The Ministry of Finance or the finance departments of local governments, or both, should review proposed PPPs. Cost-

benefit analysis should be used to select projects, and value-for-money analysis should be used to choose between PPPs and traditional public procurement. The costs and risks of contingent liabilities should be quantified, and budgetary systems should be modified to capture the costs of contingent liabilities. A guarantee fund should be used to encourage recognition of the cost of guarantees when they are given or to help with payments when guarantees are called. Governments should charge fees for guarantees. PPP contracts should be published, along with other information on the costs and risks of the financial obligations they impose on the government. Modern accrual accounting standards should be adopted for financial reporting, to reduce the temptation to use PPPs to disguise fiscal obligations (World Bank Institute and PPIAF 2012).

China could improve the institutional capacity of governments to lead and promote PPP at the local level by creating a special PPP unit. Experience from more than 20 developed and developing countries shows that such a unit is more likely to have the necessary expertise to oversee projects with standardized processes and achieve scale economies in management, ultimately maximizing public benefits. For China, such special PPP units might be established at the provincial level, given the scale and regional variation of development. Potential conflicts among their promotional, advisory, and evaluation roles could be avoided by having the fiscal risk assessment carried out by an impartial entity; as noted, the finance departments might be given the task of deciding whether to use public procurement or PPPs on a comprehensive value-for-money assessment.

### **Improve financial management and governance**

These reforms in urban finance—public finance, land finance, debt finance, and partnerships with the private sector—will empower city governments with more control over taxing, revenues, and borrowing, and more autonomy in locating resources to finance expenditures on local needs. City governments would then have a better chance

of capturing the opportunities and managing the risks brought about by city development. At the same time, however, the power of city governments has to be balanced with strong governance to maintain a proper balance between efficiency and equity; only with this balance between authority and accountability will China's urbanization be efficient, inclusive, and sustainable. Top priority should go to building capacities for financial management, by bringing a medium-term perspective to public finance management and by promoting accountability through transparency and a streamlined hierarchy government structure.

*Strengthen public finance management through a medium-term perspective*

The government's urbanization plan will have far-reaching fiscal implications across numerous sectors regarding revenue, expenditure, and debt over the medium term. Many fiscal policies undertaken today may have broad intertemporal effects. Examples include the effects of current public investment on future operation and maintenance spending, the impact of current land development spending on future land leasing revenue, and the effects of current spending on education and health on future productivity. Similarly, a medium- and long-term horizon is required to assess the financial sustainability of current debt policies and the effect on liquidity risks of the financing terms applicable to LGFV liabilities. Formulating and implementing such a plan in a fiscally sound manner would be difficult without using a medium-term budget perspective. Moreover, government anticipates a slowing of growth even as it works to address the significant imbalances between the needs of local governments and their fiscal capacity, while maintaining a healthy debt-to-GDP ratio; that combination makes the need for medium-term fiscal planning all the more important.

Conceptually, medium-term expenditure frameworks (MTEFs) promise numerous benefits: strengthening the links between planning and budgeting, including by sharpening the strategic allocation of resources over the medium term; strengthening the abil-

ity of fiscal policy to address structural challenges, such as demographic change and business cycles; strengthening the efficiency and effectiveness of spending, including through programming multiyear projects and their recurrent cost implications; and providing greater reliability to subnational governments dependent on transfers from the central government. Among these, a core advantage of MTEFs is the bringing together of planning and budgeting, which is especially important in countries with five-year plans but annual budgets. A recent, comprehensive analysis by the World Bank shows that MTEFs are indeed associated with many of the hypothesized benefits (World Bank 2013a).

The term *medium-term expenditure framework* covers a range of approaches, from more basic ones to more sophisticated ones. The first stage can be considered a medium-term fiscal framework, which is essentially the determination of the total amount of resources available (macroeconomic-fiscal framework) during the medium term and their allocation across broad spending categories (sectors or agencies). The fiscal framework is thus based on a "top-down" approach. The second stage, the medium-term budget framework, incorporates multiyear budget requests prepared by spending agencies, which must be reconciled with the sectoral ceilings and the overall resource envelope. The budget framework thus brings in the "bottom-up" dimension. The third and most sophisticated stage is the medium-term performance framework, which moves the budget's focus from inputs to outputs and outcomes, thus encouraging the allocation of funds based on results. By 2008, 132 countries had adopted MTEFs. To be sure, MTEFs are not panaceas, and their success depends on initial conditions including the institutional context, appropriate design, and sound implementation. The key challenge for China is the robustness of annual budgeting, including budget credibility, measured by the divergence between budget documents and actual spending; and approval of the budget after the start of the fiscal year; budget comprehensiveness that is, whether there are extrabudgetary funds and the use of multiple budgets (such as a public finance budget, a

state funds budget, and so on); complexity, or the number of budgetary entities; and budget reporting, in terms of analyzing the on-going execution of the budget and the impact of spending in light of the five-year plans and their targets (Deng and Peng 2011).

A medium-term expenditure framework with Chinese characteristics is likely to provide benefits that a limited and simple annual budgeting approach cannot offer. To successfully adopt a medium-term budget perspective, China might consider three steps:

***Harmonizing the MTEF with on-going and planned public financial management (PFM) reforms.*** With the aim of making the annual budget sufficiently robust to enable construction of a multiannual budget process, China might consider using the MTEF reform to drive the next phase of overall PFM reform. That is, to implement an MTEF, some existing challenges in PFM would need to be addressed simultaneously. Using the MTEF as the driver, or key reform concept, would enable the Ministry of Finance to identify and sequence the priorities for reform over time, ensuring design of a comprehensive and prioritized reform plan.

***Identifying challenges that the MTEF should focus on addressing.*** The specific challenges that China might want to address in introducing an MTEF will play an important role in how it is designed. For example, if China wants to shift from a “bottom-up” orientation to a more “top-down” budget allocation process, the MTEF can play a key role by focusing on sound aggregate and departmental expenditure ceilings and limiting policy decisions outside of the annual budget process. Or if China wishes to focus on more robust efficiency and effectiveness in spending, the MTEF would play a key role in bringing together the recurrent and capital budgets. It would be important for the government to articulate a rationale for the MTEF to help motivate and design it.

***Appropriately designing an MTEF that could fit China's existing public financial management system.*** Implementing a full medium-term budget outlook would, of

course, take a number of years and would need to be phased in. But immediate steps could be taken to gradually develop a multiannual perspective in budgeting. Toward that end, careful consideration should be given to the immediate steps needed to strengthen key supporting fiscal capabilities and pilot building blocks of a medium-term budget outlook.

Given the existing challenges in China, it would seem to make the most sense to start with the fiscal framework. In doing so, attention should be given to building several core capacities: macroeconomic forecasting; revenue forecasting; the capacity for using a medium-term fiscal framework model; the development of multiyear ceilings; and the piloting an improved methodology for program costing.

In addition, a number of design, institutional, and technical issues would need to be considered: coverage (categories and levels of government spending, such as recurrent and capital spending, to be included); level of detail (disaggregation of spending by economic type and agency); time period covered and frequency of updating; dealing with uncertainty (setting up a contingency reserve fund, for example); and institutional roles and responsibilities for implementation. Additional analytical and technical inputs might be needed to prepare an adequate design proposal and an MTEF implementation roadmap. It might also be useful to develop a pilot MTEF model at a subnational government level (where there is limited reliance on transfers, for example) and also pilot a medium-term budget framework in selected sectoral budget agencies.

#### *Enhance transparency*

China experienced relatively rapid expansion in public service provision coupled with deepening decentralization to provincial and subprovincial governments over the past 10 years. With continued but slower growth expected in the coming years, along with an aging population and rapid urbanization, the demand for equal access to better public services will continue to increase. These developments are likely to place a strain on services and outcomes for citizens. Transparent performance management will track results dur-



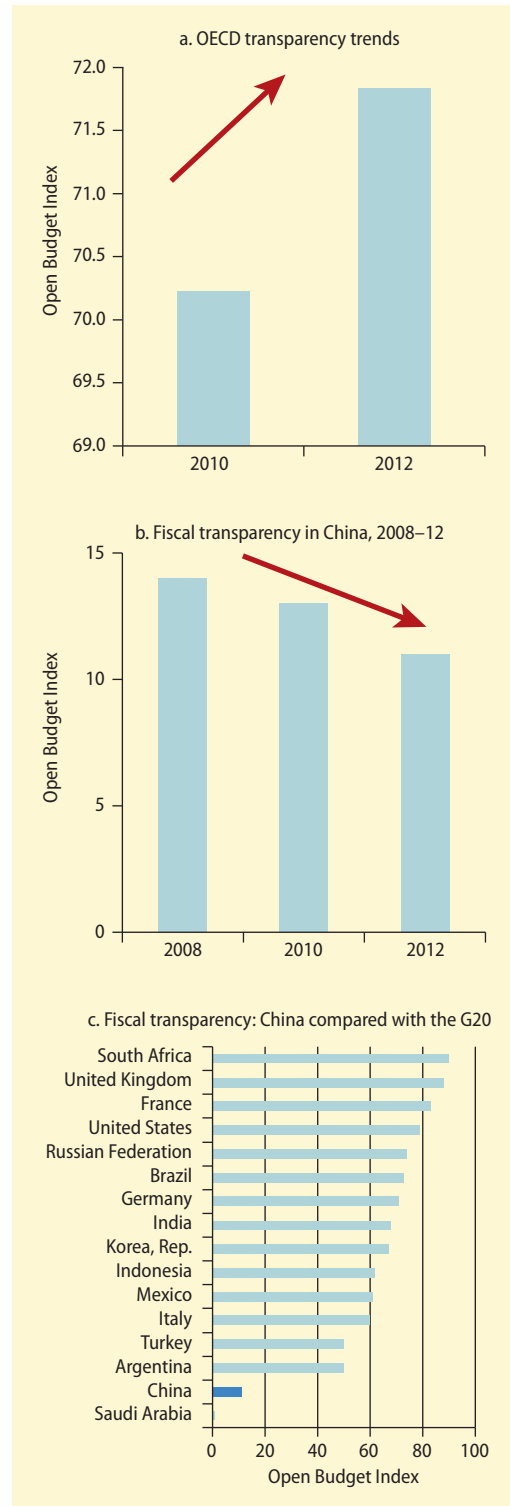
ing this time of transition and establish a basis for government and citizen engagement to increase access to and the quality of services.

Transparency is increasingly at the heart of accountable, representative, and well-performing government. As Premier Li Keqiang recently said, “It is imperative to build an innovative and clean government under the rule of law. Clean governance is the cornerstone for the credibility of a government, and is expected by the people. Open and transparent use of power is the key to building a clean government.”<sup>24</sup> Indeed, international literature provides robust evidence that openness and transparency assist in strengthening accountability and building citizen trust and engagement. Transparency could bring numerous benefits to the country: transparency is often associated with better socioeconomic and human development indicators, higher competitiveness, and reduced corruption. More transparent countries tend to have better credit ratings, better fiscal discipline, and less corruption. In addition, reforms that enhance openness and accountability can lead to increased responsiveness from service providers and less corruption and can empower the poor (Kaufmann and Bellver 2005; Hameed 2005). Moreover, greater transparency in procurement (through public access to information on government contracts, and fair opportunities for contractors and suppliers) can also have a significant impact on the efficiency of public expenditure and the attainment of value for money.

China has taken steps toward greater transparency in public spending in recent years. The new leadership has promised to make more rapid progress in this regard, and some specific types of expenditure, over which the public had voiced concerns, have been addressed recently. However, the level of fiscal transparency is still low compared to member countries of the Organization for Economic Co-operation and Development (OECD) and the Group of 20 (G-20)—and may be declining. China still has one of the least transparent fiscal and budget processes in the world (figure 6.8).

The most recent estimates show that China’s fiscal transparency score has been

**FIGURE 6.8 Budget transparency trends in the OECD and China, 2008–12**



Source: Open Budget Survey: China 2012.

Note: OECD = Organisation for Economic Co-operation and Development.



declining over the past five years. China does relatively well on publishing in-year, year-end budget and audit reports; however, after more than a decade of budget reform and increasing transparency at the central level, a large gap remains at the subnational level, especially given the size of extrabudgetary funds. These areas are in need of reform. Relatively easy gains could be made by also publishing the executive's budget proposal as well as the enacted budget, both of which are currently produced but used for internal purposes only. The in-year and end-year budget reports could also be strengthened by increasing the comprehensiveness of information provided, including explanatory notes on the differences between the budget and actual spending and greater disclosure of assets and liabilities.

The level of fiscal transparency varies across jurisdictions, and on average China lags behind most others in government transparency. Information about actual expenditures, off-budget transactions, and actual government performance, is patchy and limited in most jurisdictions. Some pockets of innovation are emerging in some jurisdictions, such as the district of Minhang in Shanghai, which is piloting performance-linked budgeting and is pursuing transparency through the Internet (box 6.8).

Lack of transparency is particularly costly for China. On the one hand, it limits the

central government's capacity for monitoring budget implementation and results at the subprovincial level. Hence, the accountability chain from central government to citizens is weakened when local governments are unable to provide timely information about the coverage and quality of services delivered. On the other hand, the quality of administrative data provided by local governments to higher levels is also limited. In some cases, subnational governments find it difficult to generate sufficiently high-quality performance data to meet the needs of the national government; in other cases subnational governments have been known to manipulate data to attain certain ends, such as qualifying for more transfers. This problem has led the national government to provide more and more transfers in the form of narrowly earmarked programs that require compliance with national government objectives but that limit discretion of subnational governments to adjust programs and allocate resources to meet local needs. This negative cycle of decreasing trust, increasing control, and increasing strategic local government behavior may be contributing to reduced spending efficiency and greater administrative and transaction costs.

Making more of the subnational government data public and opening it to the scrutiny of citizens would increase the credibility of the data and make it more useful. Indeed, the central government could enlist the help of citizens in holding local governments more accountable. At its foundation, this step would represent a change in political and bureaucratic culture, moving away from practices of confidentiality toward more open communication, not only with the public but within governments themselves in the discharge of their duties.

A modern approach to government transparency is fast becoming the norm as governments establish initiatives and agencies charged with making information available to management and to the public. China could draw from international good practices.

*Collecting and publishing fiscal, assets, and liabilities information.* Transparency includes having an independent audit of

#### **BOX 6.8 Performance-informed budgeting in the Minhang district, Shanghai**

Minhang is piloting a performance-oriented budget reform that covers key social spending programs, for which objectives and performance indicators and targets are incorporated into the annual budget documentation and submitted to the district people's congress for review. Evaluations of these programs, some by third parties, are also undertaken, provided to the people's congress, and posted on the web. Reviewing and strengthening the pilot, and then rolling it out to other subnational governments, could help improve transparency.

Source: <http://www.shmh.gov.cn/>.

national and subnational financial accounts, making periodic public disclosures of key fiscal data, exposing hidden liabilities, and moving off-budget liabilities on budget. China will need a comprehensive budget reporting that covers four government budgets and other public activities carried out by public utilities or SPVs but mainly funded by governments. The classification of budgetary expenditures should distinguish between recurrent and capital expenditures. The debt reporting should cover government direct borrowing, guarantees, and contingent liabilities. The financing of deficits of large public sector undertakings, which implicitly are government liabilities, should be reported as an annex to the main financial statement. Changing the accounting method from cash-based to accrual accounting for all level of the governments could eliminate an important source of hidden liabilities: arrears.

*Linking with performance information.*

China could compile and publish a citizens' budget. These have been increasingly used as a way to make information about fiscal and service delivery outcomes accessible to the public. A citizens' budget for China, which would present basic revenue, expenditure, and fiscal data in an accessible format, could be a useful way to communicate about these issues directly with the public.

Transparency—the public availability of fiscal and performance information—is needed to make performance budgeting work. It can help increase public trust in government as part of an open budgeting and performance management framework. Performance budgeting focuses on the results that are being delivered for the resources provided, rather than just on how much money is being spent or transferred to subnational governments. It is an approach that is increasingly being adopted around the world. Over two-thirds of OECD countries now include non-financial performance information in their budget documents.

To a large extent, China is already performance driven. The national performance framework is transitioning from being output focused and is increasingly linked to forward-looking policy targets. China's 12th Five-Year

Plan sets out clear performance targets that cut across the priority areas of government. Similarly, regional and special plans set out targets for key initiatives, while provincial plans set out policies and targets at the subnational level. The Ministry of Finance is in a unique position to lead a government wide initiative to link fiscal and performance transparency. Performance-linked budgeting can be a useful approach for pursuing this goal.

Publishing performance data in national and subnational budgets is an initiative that would anchor China's performance-driven plans in open government, and that would encourage greater focus, efficiency, and effectiveness in expenditure. To achieve these goals, the main task is to systematically distill and publish a salient set of performance benchmarks tied to budgets and outcomes as experienced by local citizens across the whole of government.

To be effective, performance information needs to be meaningful to both service providers and citizens. This balance is often a challenging one to strike, because it is based on an iterative and coordinated process between levels of government and service providers. Often, government information is too broad or vague in meaning to have any substantial public impact. Indeed, there are calls for subnational governments to release more meaningful data to citizens.

Two examples for providing performance information to the public come from the United Kingdom and Canada. The United Kingdom's official open data portal (<http://data.gov.uk>) is the home of its transparency efforts. The website contains a substantial and growing amount of information, including central and local government spending data, government contracts, and titles and pay rates for senior civil servants. This initiative has been transformative and has quickly helped the government demonstrate its commitment to transparency and open data.

The Canadian province of British Columbia launched an open data portal (<http://data.gov.bc.ca>) offering access to more than 2,500 local government datasets to the public. The initiative showed that a high demand for financial data, and remarkably, there was also demand from civil servants themselves

who benefited from better access to data for management.

**E-government.** Innovations in the use of technology, an area of strength for China, can make it easier to adopt a big-push approach to transparency, particularly as the use of Internet and e-government facilities has been growing in recent years. Such innovations have underpinned a modern approach to transparency in many countries. Transparency is most effective when the government enables citizen participation. The Korean government, for example, has set up a web-based participatory budgeting system. Besides providing public access to real-time fiscal data, D-Brain (<http://digitalbrain.go.kr>) enables citizen participation throughout the budget process with Internet surveys, cyber forums, and a budget waste report center for citizen reporting of misappropriation or misbehavior. The Minhang District of Shanghai's experiment with performance-based budgeting is another example of innovative use of information technology (see box 6.8)

#### *Completing province-managing-county reform*

The hierarchical governance structure is of critical importance in dealing with the effects

of past rapid urbanization, improving access to rural services, and facilitating a more orderly next wave of urbanization. China is a unitary state with one government administratively organized into a hierarchical five-tier governance structure with the central government at the apex followed by provinces, prefectures, counties, and towns and townships. China has the highest number of tiers among large countries (table 6.7). It is worth reexamining how many tiers are needed.

Enhanced focus on expanding access to rural services led the Chinese authorities to take a second look at this hierarchical governance structure. In 2002, the national government adopted a policy of developing a harmonious society with special emphasis on rural development and expanding access to rural services. In the context of this policy, it was recognized that the existing local government structure especially prefecture-county relationships were not conducive to giving rural residents equal access to services. Prefecture governments were perceived to have an urban bias in their incentives and accountabilities and a relative neglect of the concerns of rural residents or even for the food security of the nation. This prompted the central government to encourage reforms of province-managing-county and county-

**TABLE 6.7** Local government fiscal tiers in the world

	Number of tiers		Average population (1,000 people)		Average area (1,000 km <sup>2</sup> )	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Total	2.03	0.80	101.1	175.5	2.13	6.95
<b>By region:</b>						
South Asia	2.43	0.98	79.8	75.5	0.32	0.58
Europe and Central Asia	2.00	0.74	29.5	56.3	0.29	0.40
Middle East and North Africa	2.00	0.86	111.8	116.4	5.14	15.68
Sub-Saharan Africa	2.02	0.76	171.6	178.6	4.09	8.00
Latin America and the Caribbean	1.74	0.63	63.2	51.9	1.12	1.73
East Asia and Pacific	2.50	1.00	171.4	379.8	1.22	2.53
North America	2.00	0.00	11.6	6.8	1.32	1.72
<b>By income:</b>						
High income	1.69	0.67	72.5	119.4	1.13	2.71
Middle upper income	1.76	0.72	67.3	78.8	4.09	13.25
Middle lower income	2.35	0.76	93.9	246.4	1.12	2.32
Low income	2.26	0.82	162.3	178.0	2.58	5.45

Source: Ivanyina and Shah 2014.

managing-township finances in 2002 on a pilot basis. Subsequently, these reforms were recommended for nationwide adoption jointly by the Communist Party of China (CPC) Central Committee and the State Council in 2009 (*Zong Fa*, 2009, no. 1) and were highlighted as an important priority in the 12th Five-Year Plan. In 2012, the Ministry of Finance advised all provinces to implement these reforms with suitable adaptation to local context.

Several provinces including Hubei have now almost a decade of experience with these reforms. The reforms delayed local fiscal governance by allowing direct flow of funds from the province to counties and in the process bypassing the prefecture governments. A careful review of progress with these reforms suggests that they have had a positive impact (Zhao, Ma, and Li 2013).

The case for abolishing prefecture as an intermediate tier between province and county can be made on conventional constitutional and economic grounds. First, abolition in itself could be considered a welcome move because China has four tiers of local governance, twice as many as the average in the rest of the world and the highest number among large countries. Second, China's Constitution does not acknowledge prefecture governments as oversight tiers for county governments. Third, the greater the number of tiers, the more costly local governance is and the greater the perils of coordination failures. Further there is likely to be greater potential for confusion about division of powers and, as a result, duplication as well as neglect in delivery of public services. A lack of clarity in responsibilities is further likely to manifest itself in a lack of government accountability to local residents.

Although monitoring and oversight by the higher level could be adversely affected with layering, that is not likely to be of much concern in this information age with instantaneous communications. The information age diminishes the economic relevance of an intermediate tier in countries with advanced communication and transportation networks and makes larger population sizes in a compact area more economical for local service delivery. Agglomeration economies associ-

ated with compactness of the area (population density) further weakens the relevance of an intermediate tier for service delivery. In addition, the regional functions could be performed by inter local partnerships or agreements and the oversight function of the prefectures could be made the responsibility of the provinces. One also needs to examine local governments, especially intermediate tiers, for jurisdictional design. Any jurisdiction not aligned with the economic service area should have its boundaries redrawn.

The province-managing-county reforms moved decision making closer to the people by shifting the power locus from prefectures to counties. The empowerment of counties has led to greater clarity in division of powers and has thereby limited potential for blame shifting for service delivery failures. Local residents now have a much better perspective about who does what and therefore have a greater clarity about who should be held to account. These management reforms have also resulted in greater focus on rural areas and improved access for rural services. Several factors have contributed to this positive result. First, rural counties were given greater funding consistent with enhanced responsibilities. Second, potential for divergence of funds intended for rural areas to urban areas as happened under the prefecture-managing-county regime have been eliminated. Third, land grabs by prefectures of productive agricultural land from rural counties have been restrained, which should have a positive impact on food security for the nation.

The reforms also offer potential for a positive impact on investment climate and urbanization. The location advantages for rural migrants of county-level cities offer great potential for orderly urbanization. Because of their geographic closeness to rural areas, county cities are better placed to absorb rural migrants. These cities have the potential to offer more affordable housing, education, and health care services, and they also typically have less rigid policies in granting residence permits to rural migrant labor compared with metropolitan or prefectural cities. County cities view the influx of rural migrant labor as a positive "demographic dividend" by increasing the size of the productive labor

force and a larger population to reap economies of scale and scope for city services. The abundant supply of labor and lower wages in turn may improve the competitiveness of counties against prefectural cities in attracting potential investors. In addition, the reforms in the long run are also expected to contribute to more orderly development of urban centers, by constraining the expansion of boundaries of prefectural cities.

Moving forward, prefectures as a regional tier providing administrative oversight of counties could be a good candidate for abolition. With the abolition of prefecture government as a regional tier, regional functions could be performed by interlocal partnerships or agreements, and the oversight function of the prefectures could be moved upward to the province. This will enhance provincial oversight and coordination responsibilities which could be exercised by absorbing redundant prefecture technical staff into provincial cadres.

### The reform agenda and expected payoffs

The proposal here is for a comprehensive structural reform rather than a piecemeal fix of the system. Because the Chinese approach to urbanization finance makes it difficult to separate public finance reform, land finance, debt finance, and housing finance, it may be reasonable to consider how the various elements of the reform fit together and the joint impact they might have on the economy. The elements of the reform can be introduced gradually and over time, but developing and making clear the long-run plan to modernize the entire urbanization finance system should be done at the outset. One such comprehensive reform program, discussed above, contains the following elements:

- Shift responsibility for financing social insurance programs, including legacy costs, to the central government level.
- Authorize subnational governments to adopt specified taxes and to set rates within limits. The tax sources to be used are property taxation, motor vehicle taxes, and the

urban construction and management tax/education surcharge tax.

- Revamp the revenue sharing system to one that features a single sharing rate for the vertical pool, a formula-based system for distributing the transfers, and a simplified earmarked grant system.
- Clarify the role of HPFs in the affordable housing program, and explore alternative means to finance the program including direct subsidies from the government budget, contributions from employers, and partnership with the private sector.
- Regulate the land lease system and change its structure toward higher rates of compensation for farmers, restriction to public purpose activities, and implementation of property taxation to encourage a more efficient use of land.
- Promote private-public partnerships in broad urban development.
- Reform LGFVs, and allow local governments and SPVs to borrow within a rigorous regulatory framework.
- Diversify stable long-term financing for local government and SPVs and align the incentives for them and their lenders.
- Bring medium-term perspective and transparency into public expenditure management, and streamline the government hierarchy structure by removing the prefecture as a regional government.

This proposed reform package will significantly change the Chinese economic system in many ways (see table 6.8). Among these, the most important payoff will be a stronger market institution. The reforms would allow the market to play a larger role in resource allocation and let the government focus on its core role of delivery of public services, planning, coordination, and regulation. Moving from a derivation-based revenue sharing to a formula system would reduce the incentives for local governments to compete for a tax base. The amount of intergovernmental transfers received would now depend on expenditure needs, such as population size or the concentration of low-income families or the state of urban infrastructure or urbanization, rather than on the amount of new VAT or company income tax generated. The

**TABLE 6.8 Comprehensive reform program**

Subject	Reform	Comments
Expenditure assignment	Transfer responsibility for social security to the central level	Full assumption of responsibility and the cost of leveling up benefit differences among provinces, and funding the system including legacy costs would probably bring additional expenditures.
	Transfer unfunded liabilities in the pension and health areas to the central level	Central expenditures would increase, but amounts are unknown
	Transfer selected subnational functions to the central level	Central expenditures would increase, but amounts are unknown
Revenue assignment	Eliminate the 25 percent value added tax (VAT) share to subnational governments	This step would shift revenues from the subnational governments to the central government.
	Adopt local government taxes	Options include property taxes, surcharges on central taxes, motor vehicle taxes, and retail taxes on selected products.
Intergovernmental transfers	Restate the vertical share for intergovernmental transfers in terms of all tax collections. Replace derivation sharing with formula sharing	This reform would shift the distribution of transfers away from the higher-income provinces.
	Consolidate conditional and unconditional grants into a single program	This reform would reduce compliance costs but remove targeting of specific areas for spending. Allocation could be shifted to a formula and possibly merged with general revenue sharing above.
Tariff Policies	Set tariffs to recover the full costs of infrastructure service provision, including the costs of capital, for: <ul style="list-style-type: none"> <li>• Solid waste collection and disposal</li> <li>• Water supply and distribution</li> <li>• Natural gas distribution</li> <li>• Wastewater treatment plants</li> <li>• Roads and bridges constructed as toll facilities</li> </ul> Set tariffs to cover the full costs of operation and maintenance and to make partial contributions to the cost of capital for wastewater collection systems.	A regulatory authority will review tariffs to ensure that they meet the prescribed standards
Debt	Give local governments the power to directly borrow long-term for capital investments once they are credit rated.	Allowing local governments to access debt market would impose fiscal discipline. Local government financing vehicles (LGFV) would no longer be the only way for local governments to access financing.
	Make credit rating mandatory before any local government can borrow from any source for any purpose.	Ratings promote financial transparency, encourage lenders and investors to price credit on a risk basis, and enable authorities to monitor local government finances based on objective information.
	Develop the municipal bond market to provide long-term financing for urban infrastructure.	This step increases the sources of financing for local governments and SPVs; engages investors that are seeking long-term securities; and strengthens China's financial sector.
	Resolve existing local government bad debts, sharing negative consequences among borrowers and lenders, and simultaneously establish a credible local government insolvency framework	This reform eliminates the need for future central government bailouts of local governments, makes the default risk credible to lenders and investors, and thereby reduces moral hazard in local government financing.
Land finance	Pay a higher rate of compensation to farmers but tax the difference between the buying price and the agriculture price.	This reform would slow the increase in land lease sales, reduce public investment in infrastructure, and make debt more affordable.
	Revenue generated from long-term leasing of municipally owned land will be earmarked for capital expenditures only. Land leasing revenues will be dedicated to specific capital projects, when these projects raise land values. All land leasing will take place at market values, subject to competitive bidding.	
Budgeting	Adopt a new budget format that separates current from capital spending and revenues. Adopt accrual-based government accounting rules. Require that all revenues, expenditures, assets and liabilities be fully reported. Phase in medium-term budgeting.	The reform would permit development of a capital budget, and could lead to transparency, enhanced efficiency and better measures of creditworthiness.



choice between investments in education and investments in industrial development would now be on a more level playing field. That should result in more rational decisions about strategies and subsidies for attracting industry. Moving industrial subsidies to the central government would further limit the role of local governments. Moving the LGFVs into the formal local government structure, or to commercial entities, and more generally laying a play field for the private sector would make space for the market to play a role.

Central-local government relations will be rationalized. The reform package proposed here would shift some expenditure responsibilities from local governments to the central level. The central government has long been called upon to take over financing responsibility for social insurance (pension and health), which would lead to cost increases for the central government. Other expenditure programs are candidates for shifting to the central government, which would add to the improvement in vertical balance. These include functions where there are significant spatial externalities (environmental protection and natural resource management) and where regional and national coordination is necessary (urban transportation). Expenditure reassignments would be accompanied by revenue reassignments. The central government revenue share would be increased. All tax revenues where the central government sets the tax rate would form the new revenue sharing pool, and a single sharing rate would be applied. The new general rate would reflect the new central government responsibilities. The distribution of revenue sharing among provinces would be done by a formula and by earmarked grants. If serviced population is factored heavily in the formula, metropolitan cities are likely to lose revenues. They then could recapture revenue losses with new local taxes that would be assigned. These would include a revamped set of property taxes, surcharges on central taxes, and motor vehicle taxes.

The financing system will be more conducive to the development of an efficient, inclusive, and sustainable urbanization.

In addition to efficiency brought by greater role of market in resource allocation, greater

efficiency will be achieved from three other changes proposed here. First, local taxing powers would allow (force) those urban governments that provide better services to charge a higher tax rate to their residents, which would bring about a number of changes in choices made. In cities that provided better (higher cost) services, residents would be asked to pay the higher marginal cost, which would be factored into the location decisions of both companies and migrants and, at least at the margin, contribute to a more efficient mix and layout of cities of various size. This change, together with greater transparency, will stimulate resident groups and business groups to pressure local governments for more cost effective service delivery.

Second, a proper rejiggering of expenditure assignments would lead to a better accounting of the external costs and benefits in spending decisions. In cases where the reforms led to more centralization, externalities would be internalized and more efficient levels of service would follow. Examples are natural resource management, environmental protection, food safety, and regional transportation.

Third, the increased level of compensation to farmers (and reduced profits to local governments and developers) could reduce land transfer revenues and slow down the rate of increase in peri-urban infrastructure investment. Some excess capacity could be used up, and budget allocations could be focused more on social services and on infrastructure maintenance. Urban fringe development might also be slowed by taxes on property and motor vehicles. That could limit urban sprawl and at the margin lead to more compact development that would better capture agglomeration economies. Whether any of these changes in relative prices will matter, however, depends on the price elasticity of demand for suburban land.

This reform package would also have positive impacts on equity. The shift to a formula-based system of intergovernmental transfers would, at least, hold out the possibility of more equalization among provinces by comparison with the current derivation-based system. The transfer formula could be structured to take expenditure needs more

directly into account and no longer would reward those provinces with a stronger tax base. The degree of equalization that resulted would depend on the formula chosen.

A second area where equity gains would be made is with the shifting of responsibility for the financing of social insurance programs to the central government. Lower-income local governments would no longer be required to cope with fiscal capacity constraints and a heavy concentration of resident low-income workers. Social security would be a national program where benefits and contributions would no longer depend on place of residence. That would also generate efficiency gains by removing an important barrier to labor mobility.

Third, equity might be served by revisiting the expropriation and compensation policies now followed in converting farmland into urban land uses. That could happen in one of several ways. Farmers could be given stronger property rights over farmland or homesteads, or both, or the central government could mandate a compensation rate that more closely approximates market value and impose a capital gains tax on the profit.

Overall stability could be improved. A property tax levied at a reasonable level, and with the right structure, could help curb speculation in the housing market. Heavier taxes on motor fuels would be consistent with lower-carbon urbanization. Bringing a medium-term perspective into budgeting would enable the government to manage the fiscal implications of urbanization more effectively and mitigate the shocks accordingly.

Local government budget discipline is promoted. Forcing local governments to raise some of their own revenue and borrow on budget would move local officials a step closer to accountability and fiscal discipline. Adequate budget provisioning is required for contingent liabilities resulting from local gov-

ernment guarantees on debt undertaken by SPVs delivering local services and on the commitments made by PPPs. Adherence to budget discipline is monitored through annual institutional credit ratings for all local governments and SPVs that want access to financing from any source. Any failure to maintain budget discipline is revealed through downgraded credit ratings that are public information, easily monitored by central government authorities and financial institutions.

Financing for local governments is put on a stable foundation. The reform program broadens the sources of long-term financing available to local governments while addressing the problem of moral hazard that undermines the stability of China's financial sector. Scaling up the use of municipal bonds issued by local government from its experimental phase creates a mechanism for institutional investors to play a much larger role in financing urban infrastructure. Shifting some of this financing burden from policy banks and commercial banks to China's developing debt market enables banks to diversify and strengthen their loan portfolios with more lending to small and medium-size businesses. It also strengthens and deepens the debt market, thereby contributing to a more flexible and responsive financial sector for China.

Gradually resolving the existing bad debts of LGFVs in a manner that shares responsibility among the central government, local governments, and banks is combined with establishing a formal and pragmatic local government insolvency framework. These reforms put financial institutions on notice that an assumption that local government SPV debt is implicitly guaranteed is unwarranted. That forces moral hazard out of the financing process and creates strong incentives for lenders and borrowers to pursue objectively creditworthy financing for urban infrastructure.

## Annex 6A A technical note on the urbanization finance model

The World Bank developed a model to estimate the total costs of urban infrastructure, social services, and affordable housing, covering both the capital expenditure (CAPEX) and the current expenditures such as the operation and maintenance expenditure (OMEX) in a wide range of key sectors. Urban infrastructure sectors include roads, subways, drainage, sewage, landscaping, garbage, water, and heating; while social service sectors include social housing, education, and health. Arguably, by considering all these sectors, the model provides a fairly comprehensive account of the major amenities urbanites would expect from a livable city in China or elsewhere.

Acknowledging the prominence of the public sector in undertaking and financing expenditure programs related to urban infrastructure and social services is quite pertinent to assess the fiscal affordability of the urbanization process. To do so, the model considers the total expenditures to be borne by the public sector (including those related to urbanization as well as many other spending responsibilities) against the resource envelope it commands. The model is then structured in two modules. First, the urbanization cost module quantifies the required expenditures stemming from the urbanization process, projecting these expenditures sector by sector over the period 2013–30 to capture long-term economic and demographic trends. Second, the fiscal space module estimates the total expenditures to be financed by the central and local governments, together with their prospective resource envelope comprising fiscal revenues and borrowings. Financing policies play a key role in linking the two modules because they ultimately determine the share of required urbanization-related expenditures (identified in the investment needs module) that the public sector would finance as part of its total expenditures (ascertained in the fiscal space module).

The World Bank model's projections are predicated on stylized scenarios built upon reasonable assumptions concerning the future pattern of economic growth and urbanization (such as growth of real GDP

and incomes, expansion of urban population, built-up area, and density) and the institutions and policies shaping public-finance outcomes (such as financing policies, taxes, spending programs). The Development Research Center (DRC) macro model provides many of the long-term economic and demographic projections that are used as exogenous inputs in the World Bank model, thus ensuring consistency between results obtained from both models. In the World Bank model, the baseline scenario reflects the continuation of the current pattern of urbanization and the perpetuation of existing institutions and policies without drastic reforms. It is characterized by a growing urban population and significant city sprawl. The reform scenario captures the high-quality urbanization pattern that structural reforms might bring about, together with changes in tax, land, and debt-financing policies. Reforms thus lead to even faster growth of the urban population and city densification.

### The urbanization cost module

Salient economic and demographic fundamentals of the urbanization process affect the expenditures required to build urban infrastructure and deliver social services. Three fundamentals are considered in determining the expenditure needs: urban population, the built-up area, and density. These variables are projected for three categories of urban area (namely, city, county, and town) and for both the baseline scenario and the reform scenario. The urban population results from the total population projected by the National Population and Family Planning Commission, and the urbanization rate estimated in the DRC macro model for the baseline and reform scenarios. The distribution of urban population among the categories of city, county, and town follows the trends observed in recent years, where the relative importance of cities is increasing slightly at the expense of towns. The urban built-up area is projected linearly in the baseline scenario, starting with the 2011 figures for the three categories and subsequently adding a category-specific fixed

amount each year. The fixed annual increase in built-up area equals the average expansion observed in 2001–11.<sup>25</sup> In the reform scenario, the urban built-up area is kept constant at the 2012 figure for each category, thus reflecting policy reforms that discourage urban sprawl. Finally, the urban density is defined as the ratio of urban population to built-up area and is projected accordingly.<sup>26</sup>

### Urban infrastructure sectors

The urbanization process characterized by the fundamentals described above requires investment in physical capital, most notably for urban infrastructure sectors. Thus, the model postulates that the growth of urban population and density determines the required growth of physical capital stock in these sectors (with the exception of subways). Formally, the required physical capital stock  $K_{i,j,t}$  in category  $i$  (that is, city, county, or town), urban infrastructure sector  $j$ , and year

$t$ , is given by  $\ln \frac{K_{i,j,t}}{K_{i,j,t-1}} = \varepsilon_{i,j}^{UP} \times \ln \frac{UP_{i,t}}{UP_{i,j,t-1}} + \varepsilon_{i,j}^{UD} \times$

$\ln \frac{UD_{i,t}}{UD_{i,t-1}}$  where  $UP_{i,t}$  is urban population,

population,  $UD_{i,t}$  is urban density, and the elasticities  $\varepsilon_{UP}$  and  $\varepsilon_{UD}$  are estimated econometrically. For each category and sector, the initial physical capital stock  $K_{i,j,2011}$  is taken from 2011 data.<sup>27</sup>

The basic growth specification outlined above projects  $K_{i,j,t}$  for roads, drainage, landscaping, and heating. For sewage treatment, garbage treatment, and water, a sector-specific policy target is added to the fundamentals-driven growth: namely, 100 percent of discharged sewage and collected garbage must be treated by 2030, and the water coverage rate must also be 100 percent by 2030. The target accelerates the projected  $K_{i,j,t}$  by adding a third term to the basic growth specification:

$\varepsilon_{i,j}^{Rate} \times \ln \frac{Rate_{i,j,t}}{Rate_{i,j,t-1}}$  where  $Rate_{i,j,t}$  is

the sectoral rate (that is, sewage treatment, garbage treatment, or water penetration), which increases linearly until reaching 100 percent by 2030, and the elasticity  $\varepsilon_{Rate}$ , which is estimated econometrically.<sup>28</sup>

In contrast to the other sectors, subways are driven solely by a policy target implicit in the development plans of 34 Chinese cities: the subway lines must reach 14,187 kilometers by 2040, starting from 1,672 kilometers in 2011. Therefore, an average of 432 kilometers of subway lines must be built every year until 2040 to meet the target. Thus, the model assumes the required physical capital stock  $K_{i,j,t}$  in this sector increases in proportion to the average expansion of subway lines.

The physical investment requirement in a given urban infrastructure sector is, by definition, the required growth of physical capital stock plus the depreciation of the existing stock. For simplicity, the depreciation is assumed to be a constant proportion of the existing physical capital stock, which is uniform across sectors and varies only across categories: 5 percent if the capital is built in a city, 6.7 percent if built in a county, and 10 percent if built in a town. The physical investment requirement  $IR_{i,j,t}$  is then given by  $K_{i,j,t} - (1 - \delta_i)K_{i,j,t-1}$  where  $\delta_i$  is the category-specific depreciation rate.

A monetary cost is incurred if and when the accumulation of physical capital takes place. The cost reflects all the expenses incurred in purchasing real assets outright or in building them, and so depends on market prices of real assets, goods, and services, as well as on the overall efficiency of the investment process. A cost per unit of physical capital invested is postulated in the model as a summary indicator of all costs related to real investment. For each category and sector, the initial unit cost  $P_{i,j,2011}^K$  is calibrated using historical data up to 2011 on the investment expenditures at current prices and the concomitant gross accumulation of physical capital. Next, to project the unit cost  $P_{i,j,t}^K$ , the model assumes a time-invariant sector-specific inflation rate  $\pi_j^K$ , which captures the expected trends in market prices and investment efficiency. For the baseline and reform scenarios, the sector-specific unit-cost inflation is 6 percent annually. This figure is below the historical average estimated for most urban infrastructure sectors and thus reflects investment efficiency gains vis-à-vis past performance (for example, the estimated unit-cost inflation in roads and landscap-

ing was 13 percent a year in 2001–10). On the other hand, because the cost structure in these sectors is tilted toward inputs (like labor) whose relative prices would increase along with the rebalancing of China's growth pattern, the projected 6 percent unit-cost inflation exceeds the projected 3.5 percent GDP deflator inflation.

The required capital expenditure (CAPEX) in a given urban infrastructure sector is, by definition, the physical investment requirement (the quantity of real assets to be invested) times the unit cost (the expenses incurred per unit of real assets to be invested). At current prices, CAPEXs are projected as  $IR_{i,j,t} \times P_{i,j,t}^K$ , whereas CAPEXs at constant prices use  $P_{i,j,2011}^K$  to value the physical investment requirement. The CAPEXs are monetary magnitudes and can be aggregated across categories and sectors. Thus, total CAPEX at current prices in year  $t$  is  $\sum_{i,j} IR_{i,j,t} \times P_{i,j,t}^K$ .

The required operation and maintenance expenditure (OMEX) in a given urban infrastructure sector is assumed to be proportional to the replacement value of the physical capital stock. For all categories and sectors, the proportion is 2 percent, and the unit cost proxies the replacement value. The OMEXs at current prices are projected as  $\theta \times P_{i,j,t}^K \times K_{i,j,t}$  where  $\theta$  is the proportional factor (2 percent). OMEXs at constant prices use  $P_{i,j,2011}^K$  to value the physical capital stock. The total OMEX at current prices in year  $t$  is  $\sum_{i,j} \theta \times P_{i,j,t}^K \times K_{i,j,t}$ .

### Education

Providing education in urban areas requires building schools and hiring teachers. A remarkable policy goal is that mandatory education in urban schools be provided to students whose households hold urban residence, as well as to students currently attending rural schools whose parents are living and working in cities (the migrant population without hukou). Thus, the model postulates that the required urban-education coverage of students to be served is driven by two factors. The first is the number of students living in cities and attending five types of urban schools: primary school, middle-junior

school, high school, high vocational school, and other schools. Starting from the 2011 figures corresponding to the first four urban-school types, the number of these students is assumed to increase over time following the growth of the urban population underlying the baseline and reform scenarios.<sup>29</sup> The second factor is the gradual absorption of the migrant workers' children currently receiving mandatory education in rural areas that would move to cities and enroll in urban schools. Nearly 19 million students in rural primary schools and 6.5 million students in rural middle-junior school are estimated to join their parents living in cities.<sup>30</sup> Thus, the model assumes that these students will gradually enroll in urban schools, with the transition completed by 2015. For each of the four urban-school types indicated above, indexed by  $s$ , the total number of urban students  $ST_{s,t}$  resulting from both factors is the required urban-education coverage.

Monetary costs incurred in providing primary, middle-junior, high, and vocational education in urban areas include labor, OMEX, and CAPEX. The model formulates a cost per unit of student served for labor and OMEX, and a cost per marginal student served for CAPEX. The unit costs summarize expenses to deliver education services, which depend on market prices of real assets, goods, and services, as well as on the overall efficiency of the service delivery process. This approach assumes that each urban student has a fixed endowment of physical capital, so that the (observed) number of urban students  $ST_{s,t}$  is one-to-one proportional to the (unobserved) stock of physical capital in urban schools. For each urban-school type  $s$ , the initial unit costs of labor  $P_{s,2011}^L$  and OMEX  $P_{s,2011}^O$  are calibrated using 2011 data on these expenditures. The initial CAPEX unit cost  $P_{s,2011}^K$  is estimated using historical data up to 2011 on the investment expenditures at current prices and the increase in the number of students attending urban schools of type  $s$ . To project costs into the future, it is assumed that the labor unit cost  $P_{s,t}^L$  increases over time in line with the growth of per-capita nominal income of urban households, which averages 9.3 percent a year in 2013–30, according to the DRC macro model. The



OMEX unit cost  $P_{s,t}^O$  grows at 3.5 percent a year, in line with the GDP deflator inflation. The CAPEX unit cost  $P_{s,t}^K$  increases 6 percent a year, in line with the unit-cost inflation in urban infrastructure sectors. Putting together the required coverage and unit costs at current prices projected for the four types of urban schools, the provision of education in year  $t$  requires a total labor expenditure of  $\sum_s ST_{s,t} \times P_{s,t}^L$ , OMEX of  $\sum_s ST_{s,t} \times P_{s,t}^O$ , and CAPEX of  $\sum_s [ST_{s,t} - (1 - \delta_s)ST_{s,t-1}] \times P_{s,t}^K$ . Total expenditures at constant prices use the 2011 initial unit costs.

Costs incurred in other types of schools cannot be addressed by identifying required coverage and unit costs separately because of a lack of reliable information on the number of students currently enrolled. Thus, to project the required total labor expenditure, OMEX, and CAPEX, it is assumed that the expenditures observed in 2011 would grow at annual rates identical to those postulated for the unit costs of the four main types of urban schools. Note that the model does not deduct the savings in the rural education system arising from the migration of students.

### Public health

Delivering health services in urban areas requires building hospitals and hiring medical staff. The model focuses only on capital expenditure, however, because government subsidizes the recurrent cost to both rural and urban residents on a capitation basis, thus the net increment of recurrent cost is expected to be negligible. Since there is no homogeneous physical capital good for providing health services but rather a heterogeneous collection of goods (including facilities and medical equipment), the model relies on the number of beds in urban hospitals as a proxy for the requirements of physical capital (or, more broadly, hospital capacity). This approach implicitly assumes that each bed is associated with a fixed endowment of physical capital, so that the (observed) number of urban hospital beds  $B_t$  is one-to-one proportional to the (unobserved) physical capital stock. The required urban-health coverage is then expressed in terms of beds to be endowed with supportive physical-capital goods.

Urban hospital beds and related CAPEX are driven by an assumed policy concerning the capacity of health facilities to serve urbanites: to make available 6.4 beds per 1,000 urbanites by 2030, which is the average figure observed in high-income OECD countries, starting from the current availability of 3.6 beds per 1,000 urbanites. Thus, the urban population growth and a gradual increase in the beds ratio toward the 2030 target jointly determine the required urban-health coverage measured by  $B_t$ .

The model postulates a cost per marginal bed to be endowed, which reflects investments to be made in the health sector and depends on market prices of real assets, goods, and services, as well as on the overall efficiency of the investment process. The initial CAPEX unit cost  $P_{2011}^K$  is calibrated using 2011 data on the investment expenditures at current prices and the increase in the number of beds in urban hospitals. The estimated value is RMB 80,453 for a bed. The CAPEX unit cost  $P_t^K$  is assumed to grow at 6 percent a year, as in the urban infrastructure sectors. Providing health services in year  $t$  then requires CAPEX of  $[B_t - (1 - \delta_b)B_{t-1}] \times P_t^K$ . CAPEX at constant prices use the 2011 initial unit cost.

### Social housing

Social housing implies construction, operation, and maintenance of buildings. Current policy aims at building 36 million units in the period 2011–15, and raising social-housing coverage to 20 percent of urban households by 2020. In the model, it is postulated that a typical social-housing unit has 60 square meters of floor space, and a typical urban household living there has three people. The required physical capital stock  $K_{sh,t}$  in the social housing sector is then defined in terms of the floor space to be built. It is driven by the current policy until 2015 and afterward by the urban population growth and coverage target.

Building social housing takes time, and some major monetary costs are incurred before the physical capital built becomes available. In this regard, the model postulates that the physical investment requirement  $IR_{sh,t}$  in year  $t$  (the quantity of real assets



to be invested) equals the average increase in the physical capital stock available in the next two years,  $0.5 \times (K_{sh,t+2} - K_{sh,t})$ .<sup>31</sup> A cost per unit of physical capital invested (which will be available over the next two years) is used to summarize all costs related to real investment in the sector. The initial unit cost  $P_{sh,2011}^K$  is RMB 2,373 for a square meter of space floor.<sup>32</sup> The unit cost  $P_{sh,t}^K$  is assumed to grow in line with GDP deflator inflation. Finally, the required capital expenditure (CAPEX) at current prices is projected as  $IR_{sh,t} \times P_{sh,t}^K$ , whereas the required CAPEX at constant prices uses  $P_{sh,2011}^K$  instead. Of the total capital expenditure on social housing, 70 percent is expected to finance through debt.

The required operation and maintenance expenditure (OMEX) in social housing is assumed to be proportional to the market value of the physical capital stock. The OMEX proportion  $\theta$  is 2 percent. The market value  $P_{sh,t}^{KM}$  is proxied with the average selling price of residential buildings, which was RMB 4,993 for a square meter of space floor in 2011 and which is assumed to grow following unit-cost inflation. OMEX at current prices is projected as  $\theta \times P_{sh,t}^{KM} \times K_{sh,t}$  and OMEX at constant prices use  $P_{sh,2011}^{KM}$ .

### Fiscal space module

Expenditure requirements identified in the urbanization cost module are to be undertaken and financed by the private and public sector, often using borrowing to initially put assets in place and setting tariffs, user charges, and budget resources (subsidies and transfers) to repay debts and operate and maintain these assets. Financing policy options will then determine how much of the urbanization costs will be borne by the central and local governments. These costs will compete with other spending responsibilities, thus posing policy trade-offs and the need to prioritize expenditure programs. In the model, the expenditure share in each urban infrastructure and social service sector is calibrated by looking at the historical ratio between public and total spending.<sup>33</sup> Estimated shares are used in both baseline and reform scenarios, thus implicitly assum-

ing that the current financing policies will be upheld going forward.

As for all the other primary expenditures (those not related to urbanization, excluding interest), it is assumed that the corresponding spending programs will be adapted to China's new growth pattern and thus will expand in line with either the nominal GDP or the nominal per capita income of urban households. Interest payments depend on the borrowing policies pursued, which are discussed below.

The resource envelope available to fund all expenditures, referred to as the *fiscal space*, consists of government revenues and borrowings. While revenues result from the interaction of economic performance and fiscal policies, borrowings (both on- and off-budget) depend on the objectives of debt financing policies as well as on market opportunities.

Government revenues include taxes, non-tax receipts, and net land-leasing receipts (after deducting the cost of land acquisition and relocation compensation), which are recorded in the Public Finance Budget and the Government Funds. The macroeconomic projections of the DRC macro model provide reasonable proxies for the relevant tax bases of the major tax and nontax revenues. Assuming the tax rates remain unchanged, the revenue projections are consistent with their underlying economic determinants, so that, for example, income taxes grow in line with nominal GDP and consumption tax trails aggregate consumption expenditure. Nontax receipts include rentals from social housing. The rental is expected to be high enough to cover operating and maintenance cost, interest and amortization of construction cost in 30 years. Land financing policies drive the net land leasing receipts. In the baseline scenario, the gross receipts result from leasing 4.4 million *mu* of state-owned land a year, at a market price of RMB 660,000 a *mu* in 2012, which subsequently increases 3 percent a year, in line with GDP deflator inflation. Three-quarters of the gross receipts are assumed to cover the costs of land acquisition and relocation compensation. In the reform scenario, instead, land leases are dropped in 2015 and replaced with

a property tax that likely generates revenues equivalent to 1.6 percent of GDP a year.

Borrowings include all direct government debts and the indirect debts of local governments contracted through their financial vehicles. Debt-financing policies determine the net borrowings (after deducting principal amortizations) by setting a target level of public debt relative to GDP. In the base-line scenario, it is assumed that net borrowings seek to maintain the public debt-to-GDP ratio at 53 percent, which was the level observed in 2012. In the reform scenario, policies aim to slow the rapid pace of indebtedness incurred by local governments since 2008, when the global crisis erupted. Thus, the target is to attain a debt-to-GDP ratio of 40 percent by 2030. The model assumes that the annual interest rate on outstanding debts is 3.5 percent for the central government and 7 percent for the local governments.

## Notes

1. Much of this growth will come from migrant workers, who have less human capital than the existing urban population, and to a lesser extent the conversion of rural areas into urban areas with the concomitant reclassification of the resident population.
2. Official policy requires residence-based, compulsory education for all children. In general, local governments are in compliance with this policy. A recent survey shows that about 80 percent of migrant worker children are now enrolled in public schools.
3. Lall, Timmins, and Yu (2009) evaluated the relative importance of wage differences and public services in migrants' decisions to move in Brazil. Their findings showed a distinction in preferences according to income level: for relatively well-off people, basic public services were not important in the decision to move, but for the poor, differences in access to basic public services did matter.
4. Woetzel and others (2009) estimated that the increased expenditure of the public sector will accumulate continually, reaching RMB 1.5 trillion, or 2.5 percent of projected urban GDP in 2025.
5. For example, 1 million of 4 million migrant workers in Liaoning province reportedly made social security contributions.
6. Migrants from rural regions receive subsidies on education, pension, and health insurance in regions of origin, with the central government funding most of these subsidies in the lagging regions. With respect to pension and health insurance schemes, rural residents are charged lower premiums for pension and health insurance schemes, and receive deeper benefits, than are urban residents.
7. Social housing financing is modeled in such a way that the government finances the full investment, of which 70 percent is from debt finance. The government later collects rentals from users, and the rental is set to cover the full operating and maintenance cost and interest and to amortize 70 percent of capital expenditure in 30 years. For simplicity, the rental revenue, estimated at 0.7 percent of GDP in 2012–30, is included in the fiscal space.
8. In China, “local” is used for all subnational governments.
9. There are two important qualifiers to this discussion of revenue centralization in China. First, the payroll contributions to social security are in the subnational government budgets, and the rates of charge vary across provinces. These contributions are collected by the state tax bureau as an agent for subnational government. Second, local governments are responsible for administering the sale of land leases, including setting the purchase price of the farmland and the price of the land lease. Gross land sales revenues were equivalent to about 7 percent of GDP in 2012, almost 30 percent of general government revenues, and exceeded the revenue yield of social security contributions.
10. General transfers in this report include *yi ban xing zhuan yi zhi fu* and *shui shou fan huan* in Chinese official documents.
11. “The State Council’s Decision on Reforming Investment Regime,” No. 20 of *Guo fa* 2004, stipulates that the central government is responsible for investing in project across jurisdictions and river basins.
12. Finance Minister’s Report to National People’s Congress, March 2013, and staff calculation.
13. Article 28 of the Budget Law of the People’s Republic of China (1994) stipulates that “the local budgets at various levels should be compiled according to the principles of keeping expenditures within the limits of revenues and maintaining a balance between revenues and expenditures, and should not have deficits. The local government may not issue local government bonds except as prescribed by laws or the State Council.”

14. The LGFVs were capitalized by local governments, mostly with free or subsidized user rights to land, and in some cases with a dedicated revenue stream from the local government budget, and in some cases by ad hoc transfers from the local government budget. A typical form of LGFV is an urban development investment corporation (UDIC). Public utilities enterprises and even schools and hospitals could also serve as an LGFV. Some LGFVs may have no other function except for financing.
15. For a comprehensive analysis of the issues, see supporting report 1: Urbanization and Economic Growth.
16. However, when infrastructure is badly planned and managed, borrowing to finance it can burden future generations with debt without corresponding benefits.
17. This is from the Administrative Rules for PPP Urban Public Utilities Projects, by the Ministry of Construction, March 19, 2004.
18. Take the road sector as an example. A PPP project must follow the Road Law (2004), Tendering and Bidding Law (1999), Land Management Law (2004), Contract Law (1999), and the Regulation on the administration of toll roads (2004) if it is toll road, and the Decision on Reforming Investment Scheme (2004) if it involves domestic private investment.
19. For example, the central government forbids government guarantees of fixed returns, but in some local areas, government guarantees are used to attract private funding. Private sector tax exemption by local governments also has been forbidden by the central government since the late 1990s; however, tax exemption is still an important promise in local policy (Chen and Zhang 2009).
20. See <http://www.numbeo.com>.
21. Broader issues relating to land management—spatial planning, urban development, governance, and resettlement and safeguards—are discussed in supporting report 4, China's Urbanization and Land: A Framework for Reform.
22. It should be noted that the overall financing costs of investment through PPPs might not be lower. In fact, private operators would likely face higher financing costs than government. This disadvantage can be outweighed by efficiency gains in construction and operation.
23. The newly released rule on government procurement (Rule No. 74 by the Chinese Ministry of Finance, on December 19, 2013) is a good start in this direction.
24. "Li Defines Criteria for Fighting Corruption," *China Daily*, March 27, 2013, p. 1.
25. Calculated using data from the *China Statistics Yearbook of Urban and Rural Construction* and the *China Statistics Yearbook of City Construction*.
26. Density is often defined using the urban area, which is larger than the urban built-up area. But the model focuses on the urban built-up area because it is more relevant to project investment needs.
27. Data from the *China Statistics Yearbook of Urban and Rural Construction* and the *China Statistics Yearbook of City Construction*. Linear regression models for each urban category and infrastructure sector are estimated using cross-section data, including 656 cities and aggregates of county and town for 30 provinces. Physical capital stock in 2011 is regressed on urban population, density, and other explanatory variables. Variables are in log, and the estimated coefficients are the elasticities reported in the main text.
28. Physical capital stock in sewage and garbage sectors is assumed to be proportional to the quantities treated because data refer to sectoral outputs and not to the real assets involved in producing those outputs.
29. Data from the *China Statistics Yearbook of Education Finance*. There is no reliable information on the number of students attending schools in the residual "others" type, so it is assumed that such a number (whatever it may be) remains constant over time.
30. Estimates result from comparing the actual number of students attending primary and junior-middle schools in rural areas against the hypothetical number of students that would attend rural schools if the total student population were distributed among rural and urban schools in proportion to the urbanization rate (mimicking the distribution of the total Chinese population between rural and urban areas). Whereas the urbanization rate was 51 percent in 2011, nearly 70 percent of total primary-school students and 63 percent of total junior-middle-school attended schools in rural areas. Such an asymmetry reveals a backlog of rural students for the urban schools to absorb. Data on the actual number of students are from the *China Statistics Yearbook of Education Finance*.
31. For simplicity, no depreciation is assumed.
32. Data are from DRC.

33. Such figures often result from aggregate-level data and should be seen cautiously as working approximations because the limited availability of data precludes any accurate estimation of expenditure shares.

## References

- Baeumler, Axel, Ede Ijjasz-Vasquez, and Shomik Mehndiratta. 2012. "Sustainable Low-Carbon Cities in China: Why It Matters and What Can be Done." In *Sustainable Low-Carbon City Development in China*, edited by Axel Baeumler, Ede Ijjasz-Vasquez, and Shomik Mehndiratta. Washington, DC: World Bank.
- Bahl, Roy. 1999. *Fiscal Policy in China: Taxation and Intergovernmental Fiscal Relations*. San Francisco: 1990 Institute and University of Michigan Press.
- . 2009. *Property Tax Reform in Developing and Transition Countries*. Washington, DC: United States Agency for International Development.
- Bahl, Roy, Johannes F. Linn, and Deborah L. Wetzel, eds. 2013. *Financing Metropolitan Governments in Developing Countries*. Cambridge, MA: Lincoln Institute of Land Policy.
- Bahl, Roy, and J. Martinez-Vazquez. 2006. "Sequencing Fiscal Decentralization." Policy Research Working Paper 3914, World Bank, Public Sector Governance Group, Washington, DC.
- Bahl, Roy, and Baoyun Qiao. 2013. "Reforming the Public Finance System to Fit a More Urbanized China." Background Paper prepared for China Urbanization Project: Pillar Six.
- Bahl, Roy, and Geeta Sethi, editors. 2012. "Intergovernmental Fiscal Relations in Latin America: The Case of Argentina, Colombia, Mexico and Peru." Public Sector and Governance Unit, Poverty Reduction and Economic Management Unit, Latin America and the Caribbean, World Bank, Washington, DC, June.
- Bahl, Roy, and Christine Wallich. 1992. "Intergovernmental Fiscal Relations in China." Country Economics Department Working Paper, World Bank, Washington, DC.
- Blochliker, Hansjorg, and Camila Vammalle. 2010. "Intergovernmental Grants in OECD Countries: Trends and Some Policy Issues." In *General Grants versus Earmarked Grants: Theory and Practice*, ch. 6. Conference report from the Copenhagen Workshop 2009, Korean Ministry of Finance and Danish Ministry of Interior and Health.
- Blom-Hansen, Jens. 2010. "The Fiscal Federalism Theory of Grants: Some Reflections from Political Science." In *General Grants versus Earmarked Grants: Theory and Practice*, ch. 3. Conference report from the Copenhagen Workshop 2009, Korean Ministry of Finance and Danish Ministry of Interior and Health.
- Boadway, Robin W., and Anwar Shah. 2009. *Fiscal Federalism*. Cambridge, U.K.: Cambridge University Press.
- Canuto, Otaviano, and Lili Liu, eds. 2013. *Until Debt Do Us Part: Subnational Debt, Insolvency, and Markets*. Washington, DC: World Bank.
- Chen, Shiyi, and Jun Zhang. 2009. "Empirical Research on Fiscal Expenditure Efficiency of Local Governments in China." *Social Sciences in China* 30 (2): 21–34.
- de Mello, Luiz. 2010. "Fiscal Decentralisation and Public Investment: The Experience of Latin America." OECD Economics Department Working Paper 824, OECD Publishing, Paris.
- Deng, Shulian, and Jun Peng. 2011. "Reforming the Budgeting Process in China." *OECD Journal on Budgeting* 1: 75–89.
- Gao, Peiyong, and Dehua Wang, eds. 2012. *China Fiscal Policy Report 2012.2013: Housing Security in the Context of New Urbanization*. Beijing: China Finance and Economy Publishing House.
- Haines, Martha. 2009. "Regulation of the Subnational Securities market in the USA." Presentation to the International Forum on Subnational Debt Management, Zhuhai, China, September 25.
- Hameed, Farhan. 2005. "Fiscal Transparency and Economic Outcomes." IMF Working Paper WP/05/225, International Monetary Fund, Washington, DC.
- Hofman, Bert, and Susana Cordeiro Guerra. 2007. "Ensuring Inter-Regional Equity and Poverty Reduction." In *Fiscal Equalization: Challenges in the Design of Intergovernmental Transfers*, edited by Jorge Martinez-Vazquez and Bob Searle, 31–60. Amsterdam: Springer.
- IFC (International Finance Corporation). 2013. Opening remarks prepared for Vice President Jingdong Hua for the Conference on Securitization and Capital Markets Development in China, Beijing.
- Ivanyna, Maksym, and Anwar Shah. 2014. "How Close Is Your Government to Its People? Worldwide Indicators on Localization and Decentralization." *Economics: The Open-Access, Open-Assessment E-Journal* 8: 2014-

3. <http://dx.doi.org/10.5018/economics-ejournal.ja.2014-3>
- Kaganova, Olga, and Gary Windolph. 2012. "Introducing Management of Capital Assets in Secondary Cities in China: Laibin Inception Report." Background note prepared for the World Bank.
- Kaufmann, Daniel, and Ana Bellver. 2005. "Transparenting Transparency: Initial Empirics and Policy Applications." <http://mpira.ub.uni-muenchen.de/8188/>.
- Keen, Michael, and Maurice Marchand. 1997. "Fiscal Competition and the Pattern of Public Spending." *Journal of Public Economics* 66: 33–53.
- Lall, Somik V., C. Timmins, and S. Yu. 2009. "Connecting Lagging and Leading Regions: The Role of Labor Mobility." *Brookings-Wharton Papers on Urban Affairs*: 151–74.
- Li, Hongbin, and Li-An Zhou. 2005. "Political Turnover and Economic Performance: The Incentive Role of Personnel Control in China." *Journal of Public Economics* 89 (9): 1743–62.
- Liu, Lili. 2010. "Strengthening Subnational Debt Financing and Managing Risks." *Review of Economic Research* 46 (August): F-9.
- Liu, Lili, and George Peterson. 2013. "Managing Fiscal Risks of Land Financing." Draft of a Premise Note, PREM Network, World Bank, Washington, DC.
- Liu, Lili, and Juan Pradelli. 2013. "Monitoring Subnational Debt in China: Strategic Considerations and Policy Options." Policy note for China Ministry of Finance, World Bank Beijing Office.
- Liu, Lili, and Baoyun Qiao. 2013. "Restructuring of Legacy Debt for Financing Rural Schools in China." In *Until Debt Do Us Part: Subnational Debt, Insolvency, and Markets*, edited by Octaviano Canuto and Lili Liu, 81–108. Washington, DC: World Bank.
- Liu, Lili, and Michael Waibel. 2008. "Subnational Borrowing, Insolvency and Regulations." In *Macro Federalism and Local Finance*, edited by A. Shah. Washington, DC: World Bank.
- . 2010. "Managing Subnational Credit and Default Risks." Policy Research Working Paper 5362, World Bank, Washington, DC.
- Liu, Zhi, and Andrew Salzberg. 2012. "Developing Low-Carbon Cities in China: Local Governance, Municipal Finance, and Land Use Planning: The Key Underlying Drivers." In *Sustainable Low-Carbon City Development in China*, edited by Axel Baeumler, Ede Ijasz-Vasquez, and Shomik Mehndiratta, ch. 4. Washington, DC: World Bank.
- Lou, Jiwei. 2013. *Rethinking of Intergovernmental Fiscal Relations in China*. Beijing: China Finance and Economics Press.
- Man, Joyce. 2013. "Evaluation of Property Tax Reform and Experiments in China." Background paper prepared for World Bank urbanization project.
- Man, Joyce Yanyun, Siqi Zheng, and Rongrong Ren. 2011. "Housing Policy and Housing Markets: Trends, Patterns, and Affordability." In *China's Housing Reform and Outcomes*, edited by Joyce Yanyun Man. Cambridge, MA: Lincoln Institute of Land Policy.
- Martinez-Vazquez, Jorge, and Baoyun Qiao. 2011. "Assessing the Assignment of Expenditure Responsibilities." In *China's Public Finance in Transition*, edited by Joyce Yanyun Man and Yu-Hung Hong, 21–40. Cambridge, MA: Lincoln Institute of Land Policy.
- Martinez-Vazquez, Jorge, Violeta Vulovic, and Yongzheng Liu. 2011. "Direct vs. Indirect Taxation: Trends, Theory and Economic Significance." In *The Elgar Guide to Tax Systems*, edited by Emilio Albi and Jorge Martinez-Vazquez, 37–92. Northampton, MA: Edward Elgar.
- Merk, O., S. Saussier, C. Staropoli, E. Slack, and J.-H. Kim. 2012. "Financing Green Urban Infrastructure." OECD Regional Development Working Papers 2012/10, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5k92p0c6j6r0-en>.
- Mikesell, John L., and Daniel R. Mullins. 2011. "Reforms for Improved Efficiency in Public Budgeting and Finance: Improvements, Disappointments, and Work-in-Progress." *Public Budgeting and Finance* 31: 1–30.
- Ministry of Land and Resources. 2008. *China Land and Resources Almanac*.
- Open Budget Survey: China. 2012. International Budget Partnership. <http://www.oecd.org/gov/budget/database>.
- Painter, David. 2013. "Financing Policies for Urbanization." Background note prepared for the World Bank.
- Persson, Petra, and Anna Eriksson. 2006. "From Blind Pursuit of Growth to Balanced Development? An Analysis of the Political Logic of Fiscal Intergovernmental Transfers in China 1998–2003." Stockholm School of Economics, Stockholm.
- Peterson, George E. 2003. "Bonds or Banks? Building a Municipal Credit Market." In *Local Government Finance and Bond Markets*, edited by Yun-Hwan Kim. Manila: Asian Development Bank.



- . 2008. "Land Leasing and Land Sale as an Infrastructure Financing Option." In *Financing Cities*, George E. Peterson and Patricia Clarke Annez, eds. A copublication of the World Bank and Sage Publications (India Pvt Ltd), Washington, DC and New Delhi.
- Peterson, George E., and Olga Kaganova. 2010. "Integrating Land Financing into Subnational Fiscal Management." Policy Research Working Paper 5409, World Bank, Washington, DC.
- Qiao, Baoyun, and Lezheng Liu. 2013. *Inter-governmental Fiscal Relationship and Risk-sharing Function*. Beijing: China Financial and Economic Publishing House.
- Rojas, Eduardo. 2008. "The Metropolitan Regions of Latin America: Problems of Governance and Development." In *Governing the Metropolis*, edited by Eduardo Rojas, Juan R. Cuadrado-Roura, and Jose Miguel Fernandez Guell. Washington, DC: Inter-American Development Bank and David Rockefeller Center for Latin American Studies, Harvard University.
- Smolka and Amborski. 2007. Published online: <http://www.intechopen.com/books/energy-efficiency-a-bridge-to-low-carbon-economy>.
- Wang, Guixin, Jianfa Shen, and Jianbo Li. 2008. "Citizenization of Peasant Migrants during Urbanization in China: A Case Study of Shanghai." *Population and Development* 1: 2–23.
- Wang, Xiao, and Richard Herd. 2013. "The System of Revenue Sharing and Fiscal Transfers in China." OECD Economics Department Working Paper 1030, OECD Publishing, Paris.
- Woetzel, Jonathan, Lenny Mendonca, Janamitra Devan, Stefano Negri, Yangmei Hu, Luke Jordan, Xiujun Li, Alexander Maasry, Geoff Tsen, and Flora Yu. 2009. "Preparing for China's Urban Billion." McKinsey Global Institute, March.
- Wong, Christine, ed. 1997. *Financing Local Government in the People's Republic of China*. Hong Kong SAR, China: Oxford University Press.
- World Bank. 2013a. *Beyond the Annual Budget: Global Experience with Medium Term Expenditure Frameworks*. Washington, DC: World Bank.
- . 2013b. "China: The Role of Housing Provident Funds in the Construction of Affordable Housing." East Asia and Pacific Region, World Bank, Washington, DC, July.
- . n.d. "Economic, Financial, and Commercial Review of Urban Water Supply Utilities." World Bank, Beijing.
- World Bank and DRC (Development Research Center of the People's Republic of China). 2013. *China 2030: Building a Modern, Harmonious, and Creative Society*. Washington, DC: World Bank.
- World Bank Institute and PPIAF (Public-Private Infrastructure Facility). 2012. Public-Private Partnerships Reference Guide Version 1.0, Washington, DC: World Bank.
- Wu, Weiping. 2013. "Public Private Partnership for Urban Infrastructure Financing and Management." Background paper for the World Bank urbanization project.
- Yusuf, Shahid. 2013. "Metropolitan Cities: Their Rise, Role and Future." In Bahl, Linn, and Wetzel.
- Zhao, Min, Guangrong Ma, and Lina Li. 2013. "Province-Sub-province Government Relations in China: A Case Study of Hubei Province." Stocktaking Note for Discussion, World Bank, March.
- Zheng, Gongcheng. 2012. "Reform and Development Strategy of China Health Security." Dong Yi Forum. [http://www.qstheory.cn/sh/shbz/201208/t20120828\\_178251.htm](http://www.qstheory.cn/sh/shbz/201208/t20120828_178251.htm).
- Zhou, Li-an. 2007. "Governing China's Local Officials: An Analysis of Promotion Tournament Model [J]." *Economic Research Journal* 7: 36–50.





# Green Urbanization

## Introduction

China's growth model has brought tremendous economic and social rewards over the past three decades but also has come at the enormous cost of resource depletion and local and global pollution. Most resource use and pollution occurs in cities or is caused by demand from cities, which also bear some of the greatest impacts. Continuing on this path is not economically efficient because pollution imposes rising direct and indirect economic costs, even if those costs (to health or the environment) are usually not reflected in markets or in measures of national income. Such development is also not socially inclusive because—while pollution and resource scarcity affect all citizens—the poor are usually most heavily affected and least able to cope. As it seeks to attain high-income status, meet aspirations for a higher quality of life, and ensure that resources are available for future generations, China needs to transition to a growth path driven by more efficient and cleaner production and consumption. For that to become a reality, environmental sustainability must become an explicit policy goal on an equal footing with economic efficiency and social inclusion.

Raising the profile—and the effectiveness—of environmentally sustainable policies in the ongoing urbanization process requires that China's green governance matches its green ambitions. China has introduced a comprehensive set of environmental laws and regulations, but these have not brought the expected improvements in environmental quality. To achieve better outcomes, China needs to overcome what has been called the “paradox of advanced legislation but weak enforcement.” So far, environmental policy making has often favored narrow technical and engineering solutions over institutional development and economic approaches. Strengthening the incentives and accountability framework for environmental management requires addressing many interrelated challenges, including the following:

- First, by international standards and given the size of the problem, China's national-level environmental management capacity is relatively small and should be increased, while many local environmental protection bureaus need more resources and authority to enforce compliance.
- Second, incentives to implement environmental policies and complete complementary sector reforms have been weak.

Changing the cadre evaluation system would encourage local leaders to pursue sustainability goals more forcefully, and extending their tenure, which has dropped over the past decade, would promote longer-term thinking.

- Third, more channels are needed for public participation, which in practically all industrial countries is a key element for catalyzing demand for better environmental protection and a higher quality of life. Three main channels could be further opened to complement government efforts: consultation on policy design and projects, with a greater role for environmental nongovernmental organizations (NGOs); facilitation of stronger actions against polluters by adequately resourcing the formal complaint systems at local levels and by broadening access to the emerging environmental court system; and more public disclosure including use of public environmental performance ratings and strengthening of the Open Environmental Information initiative, a program of the Ministry of Environment (MEP).
- Fourth, there is a need to sharpen the mix of policy instruments. The most effective instrument to induce resource efficiency and lower pollution is pricing. China has removed many environmentally harmful subsidies and other distortions, but tariffs for energy, water, and other resources do not always fully reflect both the cost of providing them and the external costs that resource production and use impose on health, ecosystems, and the climate. Solid waste tariffs reflect only 10 percent of the cost of services, for instance, and should be adjusted. Road and congestion pricing, even higher parking rates, would more accurately reflect the full cost of using private vehicles. Pricing distortions in the electricity market could be addressed to create a more even playing field for renewable energy, including a well-coordinated and clear carbon-pricing policy. Pricing, however, needs to be complemented with strong regulations, setting ambitious targets for pollution controls and limits on resource use, but allowing for more flexible and market-based approaches to meet-

ing them, such as trading. Finally, better collection and wide disclosure of credible data, greater consideration of market signals, and more efficient management of trade-offs between sustainability and other development goals will improve the quality and enhance the implementation of environmental regulations. For example, affordability concerns should be addressed more through targeted subsidies rather than preferential residential energy tariffs.

There are numerous causes of environmental problems in China's cities, and improving urban sustainability requires a multisector approach. Structural shifts in the economy toward cleaner sectors will help, but only over the longer term. Urban infrastructure and energy sector policies that align environmental objectives with economic and social objectives therefore need to complement more effective green governance. Greening sector policies will require some action at the national level where broad legal and regulatory decisions guide local decisions. At local levels, more comprehensive overall planning supports more specific sector reforms. For instance, integrated urban land use, transport, and energy planning, by reshaping urban form, help avoid urban sprawl, which is raising the cost of public service provision and locking in wasteful energy consumption in many Chinese cities. And in larger urban clusters, air quality management must operate at a regional scale to account for all relevant pollution sources in the airshed and identify cost-effective regional abatement plans.

Beyond these cross-cutting issues, sustainable urbanization requires improvements in each sector. The reforms range from the mundane—such as better landfill management—to the monumental: an energy shift away from coal toward natural gas and a rising share of renewables. The priorities discussed in this report are specific to each sector, but the basic principle across all sectors is to limit environmentally harmful resource use as much as possible and then clean up what cannot be avoided. Resource use efficiency is thus the first priority, all the more so because it also yields important co-benefits by raising productivity and promoting eco-

conomic growth. Energy intensity reductions during the 11th Five-Year Plan averted the use of 630 million tons of coal equivalent, or 1.46 billion tons of carbon dioxide (CO<sub>2</sub>) emissions. Pollution control is closely linked with social development objectives. Achieving China's new air quality standards in all cities would add millions of healthy life years for China's urban residents. Some of the most important sectoral actions are as follows:

- Encourage a greater shift from private to public urban transport by using price instruments and investments in better service, and reduce pollution by promoting cleaner vehicle technology, especially a shift to ultra-low-sulfur diesel and gasoline, and enforcing fuel quality standards.
- To improve incentives and cost effectiveness in meeting the energy intensity reduction targets of industrial enterprises, rebalance regulatory and target-based approaches by introducing market-based policy tools such as tradable energy savings certificates. Further development of technical and financial services for energy efficiency, including deeper penetration of energy savings performance contracting, will also be helpful.
- Lead by example by implementing aggressive efficiency programs for public buildings; establish targets for progressively tightening the energy efficiency code; and broaden the use of benchmarking for existing buildings. Promote green buildings by linking incentives with clearer labeling schemes while strengthening capacities across the supply chain. Phase out harmful construction materials to reduce indoor air pollution in buildings.
- Secure cleaner urban energy sources by minimizing direct use of coal in cities through expanded access to piped natural gas—giving priority to households, commercial uses, and district heating—by removing pricing distortions, establishing a well-coordinated carbon pricing policy and restarting sector reforms that would establish a more even playing field for clean energy sources to contribute to urban energy supply. Continue to tighten power and heating emissions regulations.
- Ensure an efficient, safe, and secure water supply by reforming water rights systems, by using smart technologies to measure consumption, and by improving regional water resource and pollution discharge governance at the river basin and local levels. Expand use of payments for ecological services to address nonpoint source pollution challenges, and modernize urban water utility management.
- Improve cost recovery in the solid waste sector to promote waste reduction, recycling, and safe disposal, including, in the medium term, life-cycle product stewardship programs. Improve planning of waste disposal with better environmental impact assessments. Improve waste disposal operations through reduced air and water pollution from incinerators and landfills and through proper closure, rehabilitation, and safe reclamation of old landfills.

The task is urgent as the costs of growth mount and as citizens' demands and expectations increasingly include a clean environment. The task is also challenging. No country in the world can claim to have achieved truly green growth, and those that are greenest took decades to get there. But the challenge also provides an opportunity. Stronger environmental actions will further encourage the shift toward cleaner economic activities—towards growth that is built not on energy- and pollution-intensive low-margin production, but on services and higher-value-added manufacturing as countries such as Germany or Japan have done. Greener growth is a viable goal for China, as also argued by the Development Research Center of the State Council and the World Bank in *China 2030* (World Bank–DRC 2013). Progress on reducing pollution will not be fast, and China's current and future urban citizens will need some patience before their cities resemble their peers elsewhere that started this transition much earlier. But China has proven that it can implement major transformations more quickly than other countries, as the unprecedented scale and pace of its economic development shows. By continuing the tradition of adapting lessons from elsewhere to local needs and developing their own innovative

solutions, China's cities will become not just great places to make a living, but also great places to live.

## The challenge of sustainable urban growth

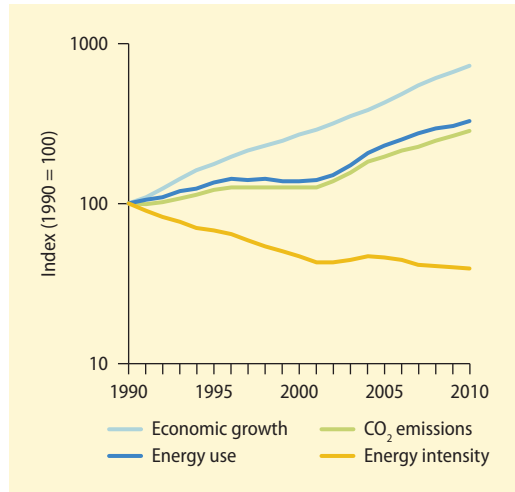
In 1997, a World Bank report titled "Clear Water, Blue Skies" reviewed China's environmental challenges. Fifteen years later, its findings and recommendations sound strangely familiar. Looking at the 15 years before 1997, when China's urban population grew from 191 million to 352 million people, the report documented high air and water pollution levels with large impacts on public health but also pointed to the many policy efforts under way to rein in pollution and the many successful initiatives for stabilizing or even reducing environmental problems such as urban air pollution. The report's hopeful conclusion was that "new policies and careful investments made today [in 1997] mean that China's children and grandchildren would also enjoy clear water and blue skies [by 2020]" (World Bank 1997, 3). This prospect still seems distant as China's economic growth since the late 1990s exceeded not only the most optimistic expectations but also the capacity of environmental institutions to keep pollution and resource depletion in check. Some key challenges are the following:

- The main source of air pollution in China comes from its dependence on coal for energy, and total energy use increased six times to fuel an economy that increased 18 times and meet the needs of a growing industrial sector and an urban population that more than doubled since 1978, when China began its economic reforms (Wang, Berrah, and Peng 2012). This growth in energy demand exceeded all expectations. By 2005, China had already almost reached energy consumption levels projected for 2020 in a joint DRC–Energy Research Institute (ERI) study published in 1999 (Berrah and others 2007). The share of coal in primary energy consumption has dropped from 78 percent in 1995 but remained at around 70 percent in 2011 (NBS 2012c). Emissions grew in parallel, although concerted efforts have been

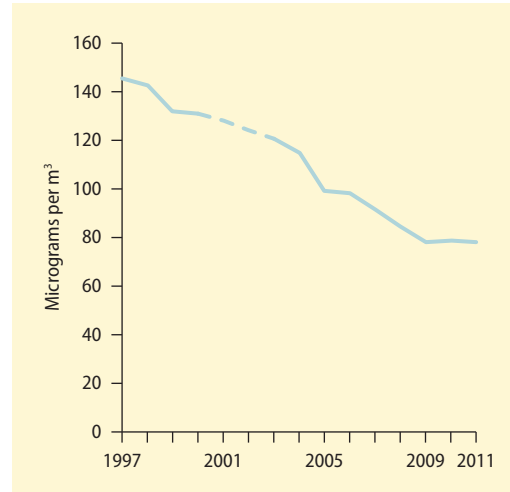
made to control particulate matter (PM) and sulfur oxides (SO<sub>x</sub>), and mono-nitrogen oxides (NO<sub>x</sub>) emission standards for power plants were strengthened in 2012. Greenhouse gas emissions also grew. According to the International Energy Agency, China now accounts for about a quarter of global CO<sub>2</sub> emissions from burning fossil fuel (IEA 2013a). Shanghai, Beijing, and Tianjin have estimated per capita emissions comparable to large European and even some North American cities (Sugar, Kennedy, and Leman 2012).

- While air pollution has grabbed recent international headlines, China's cities also face serious challenges in the quality and quantity of water. Nationwide, urban water supply falls short of demand by 6 billion cubic meters a year. The Ministry of Land Reclamation and Water Resources reports that 430 of 657 cities face water shortages; 110 of these had "severe" shortages (OECD 2009). The MEP reported 57 percent of the groundwater in 198 cities in 2012 was rated "bad" or "extremely bad," while more than 30 percent of the country's major rivers were found to be "polluted" or "seriously polluted," making their waters unfit for drinking or direct human contact (MEP 2013).<sup>1</sup>
- Municipal and industrial solid waste generation increased from about 1.2 billion to 2.6 billion tons between 2003 and 2010 and is expected to double by 2030—challenging the waste management systems in many cities. Urban residents represent 53 percent of the population, but generate 80 percent of the total waste amount.

As alarming as these trends are, there are some positive notes as well. The increase in energy consumption could have been much higher if it had paralleled economic growth, which averaged about 10 percent between 1990 and 2010. But China's economy also became more efficient in using energy during this period, as energy intensity fell by an average of 4.7 percent a year (figure 7.1). This is an impressive achievement even though a full decoupling—with the economy continuing to grow while energy use and carbon emissions are held constant or decline—has not been attainable with such high economic growth

**FIGURE 7.1** Fast economic growth outpaced improvements in efficiency

Source: IEA, World Energy Statistics and Balances (database), doi:10.1787/data-00510-en.  
 Note: CO<sub>2</sub> = carbon dioxide.

**FIGURE 7.2** Air pollution declined over time and has recently been stable: PM<sub>10</sub> concentrations

Source: Renmin University 2013, based on China Environmental Yearbooks.  
 Note: Data for 2000 and 2001 not comparable due to change in monitoring systems; m<sup>3</sup> = cubic meters; PM = particulate matter.

rates. Second, the trend over the past years has been a reduction of average annual concentrations of PM<sub>10</sub> (fine particulates with a diameter of 10 micrometers or less) despite the large increase in energy consumption (figure 7.2). Abatement policies have had an effect, although particulate matter concentrations in large cities remain unacceptably high. A third reason to be optimistic is that some experts expect a further slowing of energy consumption and resource use thanks to the restructuring of the economy. While still more is needed, a large share of the infrastructure to accommodate expected urban growth has been built, and more efficient technology is becoming more widely available—and is often produced—in China. These broader trends could provide a welcome tailwind for ambitious public policies aimed at greater resource efficiency and pollution abatement.

### The rising cost of environmental degradation

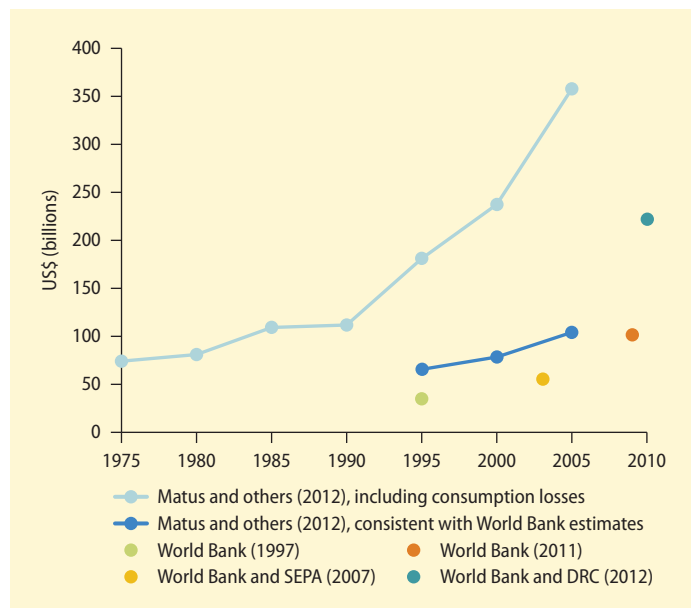
These successes are no cause for complacency because environmental degradation continues to compromise social and economic development objectives. Understanding of the severe health impacts of air pollution is growing, especially the effects on small children

and infants, including higher rates of infant mortality, birth defects, and impaired cognitive functions (Currie and Neidell 2005; Currie and Vogl 2012; Padula and others 2013). Estimates of mortality from air pollution in China are staggeringly high. Despite falling average annual PM<sub>10</sub> concentrations, impacts have been increasing, in large part because more people now live in cities. Two hundred million more urban residents were exposed to high air pollution levels in 2010 compared with the beginning of the decade. Estimated annual premature mortality from air pollution in Chinese cities increased from 418,000 to 514,000 between 2001 and 2010 despite a 25 percent reduction in average PM<sub>10</sub> (Cheng and others 2013). The recent Global Burden of Disease update issued by the World Health Organization (WHO) presents an even higher estimate of 1.2 million premature deaths in China in 2010 (HEI 2013).<sup>2</sup> The impacts of water pollution are less well researched. Water pollution contributes to China's rising cancer rates. Digestive cancers, for instance, increase by almost 10 percent with a one-grade deterioration of water quality (on a six-grade scale) (Ebenstein 2012).

These high mortality levels and other health damages have high economic costs. Because of differences in methodologies, esti-



**FIGURE 7.3** Estimates of the value of mortality and morbidity from air pollution



Sources: Matus and others 2012; World Bank 1997, 2011a; World Bank–DRC 2013; World Bank and SEPA 2007.

mates of health damages from air pollution, for instance, vary considerably, from close to \$100 billion to more than \$300 billion a year (figure 7.3). New research also finds impacts on productivity, with workers in highly polluted areas being absent more frequently. A study in California even showed that pollution from urban areas has a significant impact on the productivity of farm workers in nearby rural areas (Graff Zivin and Neidell 2012). Stricter standards that lowered the average ozone level by 10 parts per billion were found to increase farm worker productivity by 5.5 percent, which could translate into \$700 billion in benefits from higher productivity. Impacts could be even higher in China because of higher pollution levels. As a rising exporter of high-value farm products, both Chinese producers and their customers also have an interest in agriculture that is unaffected by pollution. Additionally, there is anecdotal evidence—supported by academic studies in other countries—that low environmental quality affects migration decisions and thus the competitiveness of polluted cities that may be less able to attract highly skilled workers and professionals. As incomes rise,

quality of life issues become more important, and people's calls for a cleaner environment in China are growing louder. Premier Li Keqiang called for a more transparent government and increased public supervision to improve environmental compliance and warned that economic growth at the expense of the environment "won't satisfy the people" (Kostka 2013). Better environmental quality will undoubtedly serve China's people well.

Practically all industrialized countries went through a phase of excessive pollution. Cities that have high environmental quality today suffered similar degradation decades ago (box 7.1). London's "great smog" event in 1952 may have killed more than 10,000 people over four December days. Smog levels in Los Angeles are down 70 percent from the 1970s, and high ozone advisory days have dropped from 184 to close to zero. Tokyo's campaign for cleaner air centered on the visibility of Mount Fuji. The mountain that can be seen on more than 130 days today could be seen on only 20 days a year in the 1960s. But there are some important distinctions in China's experience.

Given the size of China's population and economy, its structure, and the speed of its development, the country's environmental problems are larger than those experienced by other countries. But being a late developer also has advantages. China can benefit from the experiences of others and technology developed elsewhere and turn pollution curves around faster than was possible for earlier developers. Much of the research on air pollution sources, impacts, and abatement options was developed in North America and Europe over many decades and can be deployed more quickly and cheaply in China. Some of the benefits of technology and management are already apparent, and China has also produced indigenous solutions that can be shared with countries facing similar challenges today.

More so than in many countries, green urbanization in China is in everyone's interest. What happens in a Chinese city does not stay within administrative, regional, or even national borders. China is now the world's largest emitter of CO<sub>2</sub>, and air pollution from China frequently affects neighboring

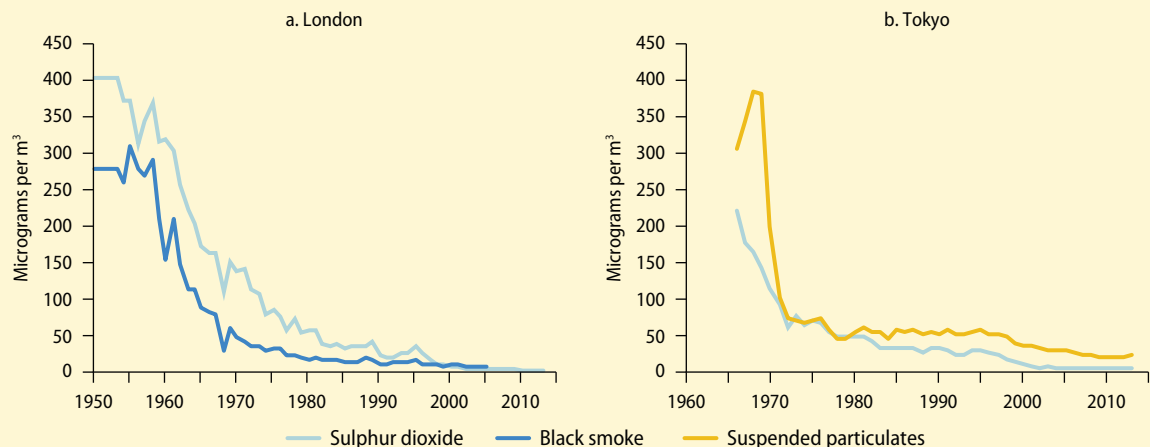
### BOX 7.1 Reducing severe air pollution in London and in Tokyo

In December 1952, London experienced an unusual cold spell, prompting greater than normal coal burning for heating. Although air pollution had been a problem for many years, from December 5 to December 9, London was covered by a thick blanket of what became known as the “Great Smog of ’52.” This event coincided with 4,500 more deaths than would normally have been expected. Later research estimated that almost three times as many fatalities could be attributed to persistently high air pollution during that winter.

The dangers of low air quality were known to Londoners as early as 1661, when John Evelyn presented evidence to King Charles II that smoke pol-

lution increases mortality. But it was not until the London smog incident that major pollution control legislation was passed, in the form of the Clean Air Act of 1956, which was subsequently expanded. Most importantly, the law regulated the use of domestic fires and encouraged the replacement of coal with natural gas or electricity for heating. Air pollution began a steady decline, even though London experienced another major smog event in December 1991 that caused about 160 deaths and could likely have been prevented by more ambitious air pollution policies. It was not until the mid-1990s that the United Kingdom adopted specific air quality standards in response to EU requirements (figure B7.1.1).

**FIGURE B7.1.1** Air pollution concentrations in London and Tokyo, 1950–2013



Source: Data provided by David Hutchinson (Urban Research) and Arata Ichihashi (Tokyo Metropolitan Government).

Note: For Tokyo, particulates (or dust) for 1966–1983 were measured using a light scattering method. Data for 1984–2013 show suspended particulate matter (SPM) as measured by beta attenuation monitoring.

In Tokyo, every day since January of 1963, observers at the Seikei Meteorological Observatory have recorded whether they can see Japan’s highest mountain, Mount Fuji, 83 kilometers away. The 1960s were a period of fast industrial growth in Japan that came with an equally rapid increase of soot, dust, and sulfur oxides ( $\text{SO}_x$ ) in the air. While the government was initially slow to respond to severe air pollution, citizen groups soon demanded stronger action. Seeing Mount Fuji again, which in 1965 was possible on only 20 days, became a rallying cry for Tokyo residents. Public pressure was further fueled by a series of environmental crises including the 1970 “Yokkaichi Asthma” incident—an outbreak of

severe chronic pulmonary disease, emphysema, and asthma among residents near a large petrochemical complex in Mie Prefecture south of Kyoto. The government was finally compelled to issue a slew of environmental rules in a special legislative session that became known as the “Pollution Diet.” The new rules required factories to report their activities, strictly regulated industrial emissions, and, as transport emissions replaced those from manufacturing as the most important problem, imposed tight pollution regulations on vehicles. Air pollution dropped rapidly between the mid-1960s and 1970s. In 2011, observers at Seikei Observatory saw Mt. Fuji on a record number of 131 days.

Box sources: Ren 2000; Bell, Davis, and Fletcher 2004; Hutchinson and others 2004; Okubo 2013.

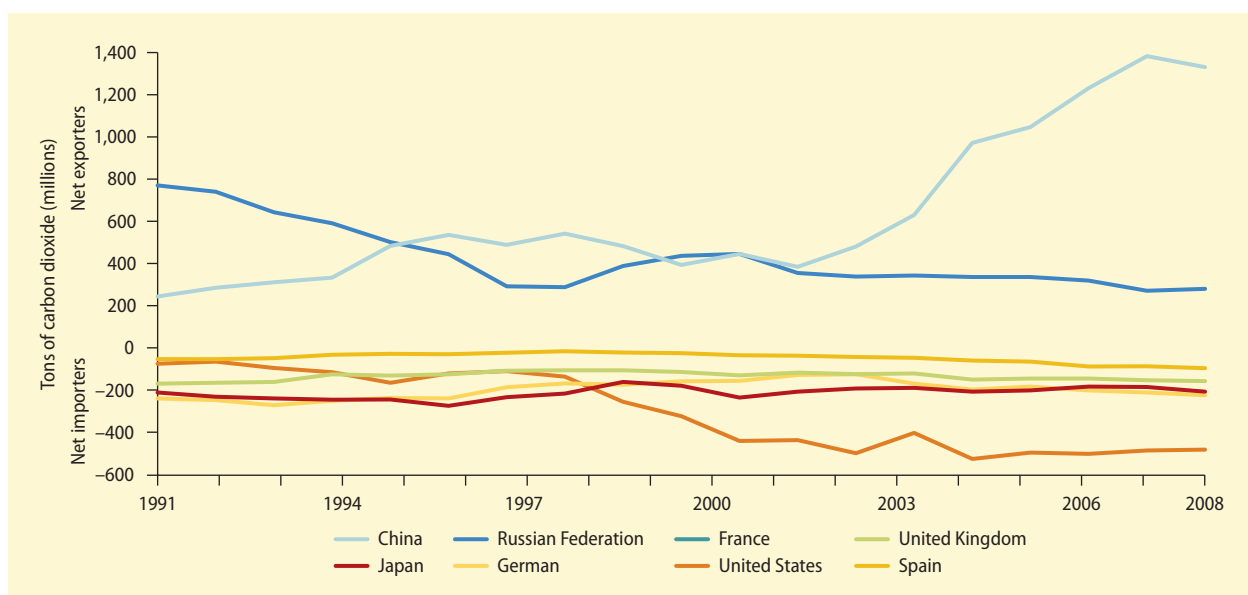
Japan and the Republic of Korea and can be carried in the jet stream for thousands of miles. North America and Europe still exceed China's cumulative historical greenhouse gas emissions, but, according to IEA data, China's per capita CO<sub>2</sub> emissions from fuel combustion of 5.4 tons in 2010 are still rising and are likely to reach the EU average by the middle of this decade (IEA 2013a, 2013c).

Finally, in contrast to experience elsewhere, a large share of China's pollution came initially from the expansion of dirty industries that were being phased out in developed countries. One estimate suggests that exports account for about one-third of China's energy use, and likely a similar share of air pollution (Weber and others 2008). China's export of CO<sub>2</sub> emissions embedded in manufactured products has risen sharply in the 2000s (figure 7.4). This happened even as its manufacturing sector became cleaner simply because exports increased so much. On balance, these trends were probably beneficial to China and to its trade partners. Europe and North America were able to green their production and access low-cost goods, but at the cost of sometimes painful economic restructuring at home as dirty industries closed down. China's industrializa-

tion helped lift hundreds of millions out of poverty, but at the cost of heavy pollution in its cities where the lower environmental standards at the time were among its comparative advantages. By shifting toward a growth model based more on services and consumption, China will be able to pollute less on behalf of other countries. On the other hand, global patterns appear to be replicated within China as coastal provinces have now become major importers of embedded CO<sub>2</sub> from interior areas (Feng and others 2013).

The past 15 years have yielded much better information about the sources and consequences of environmental problems in China. There have been promising developments, but excessive environmental burdens remain a major challenge. Much of what was written in the 1997 World Bank report could be written today. Will a report written 15 years from today be able to present a more positive appraisal? Much will depend on whether Chinese leaders can strengthen green governance to increase everyone's incentives for more ambitious greening, and whether provincial and local decision makers can implement sustainable sector policies that align greening with social and economic objectives.

**FIGURE 7.4** Global net transfers of CO<sub>2</sub> emissions embedded in traded goods, 1991–2008



Source: Peters and others 2011.

## Green governance must match China's green ambitions

China has one of the most comprehensive sets of environmental laws and regulations in the world. Since 1970, it has “enacted eight pollution control laws, 15 natural resources laws, over 50 environmental protection administrative regulations, over 200 departmental regulations and other regulatory documents, more than 1300 national environmental standards, more than 1600 local environmental regulations, and has approved and signed 51 multilateral international environmental treaties” (M. Zhang and B. Zhang 2012, 1). Yet, this growing body of laws and rules has not ensured environmental compliance by private and state-owned firms. Major pollution incidents are frequent, and persistent pollution continues to foul the air, land, and water in Chinese cities. How can China overcome this “paradox of advanced legislation and weak enforcement” (M. Zhang and B. Zhang 2012, 5)?

Investments in specific sectors, discussed in later sections, will increase resource use efficiency and reduce pollution. But the technical know-how or even the financial resources for these investments are not the primary problem holding back green progress. The fundamental problem is inadequate green governance—the institutions, incentives, and instruments that enable effective environmental management. There are four main ways in which China can make environmental management more effective:

- *Increase resources:* By international standards and given the size of the problem, China's environmental management capacity is relatively small—especially at the national level—and environmental agencies often lack sufficient authority to enforce compliance.
- *Strengthen incentives:* The current evaluation system for local officials, who are the primary authority for implementing environmental policies, puts insufficient weight on improvements in the quality of life of residents.
- *Open more channels for public participation:* Citizens' opportunities for contrib-

uting to the enforcement of green regulations, including those through the legal system, are still inadequate—in part because of limited access to information on the performance of environmental management authorities and the polluting activities of firms.

- *Employ sharper instruments:* Reflecting a strong emphasis on technical expertise in government, regulations and target-based approaches dominate, while economic and market-based instruments that can sometimes be more efficient remain underused.

Although governance is difficult to measure and formal evaluations are scarce, China has made progress in all of these areas. The government has announced increases in funding for pollution control. With rising incomes, local policies are shifting from a sole emphasis on growth to more balanced objectives. Individual citizens and organized groups are more and more active in environmental advocacy work, and initial steps have been taken toward full public disclosure of environmental information. And, finally, price instruments and market-based mechanisms such as pilot carbon markets play an increasing role in promoting resources conservation and pollution control. Yet, as this chapter shows, in all of these areas more progress is possible.

## Greater resources for effective environmental management

Achieving China's green goals requires stronger institutions responsible for designing and enforcing environmental rules. Government spending on environmental protection has been around 1 percent of gross domestic product (GDP) (World Bank–DRC 2013). That is similar to average GDP shares for public spending on the environment in countries belonging to the Organisation for Economic Co-operation and Development (OECD), although EU levels are at about 1.9 percent when including expenditures by government-controlled environmental agencies such as water treatment plants.<sup>3</sup> China's current expenditures represent an increase from the past, and, in response to recent pollution

problems, the government announced additional resources. Required initial spending to adequately address China's environmental problems is estimated at 0.5 percent of GDP above current levels (World Bank–DRC 2013). Conservative estimates put annual damages from environmental degradation at 3.5 percent of GDP in 2010, according to the Chinese Academy of Environmental Planning.<sup>4</sup>

The lack of sufficient resources is reflected in lower staffing levels at China's national environmental institutions. The Ministry of Environmental Protection has about 400 staff in Beijing, about 2,000 in affiliated institutions (*shiye danwei*) and 500 in five regional offices.<sup>5</sup> Compare that to the more than 17,000 who work at the U.S. Environmental Protection Agency, two-thirds of whom are based in regional offices. MEP, serving a population that is four times larger and arguably facing more severe challenges, has fewer resources available for centralized environmental management functions such as national collection and dissemination of data, research, policy and regulatory development, and supervision of large polluters than its North American or European counterparts.

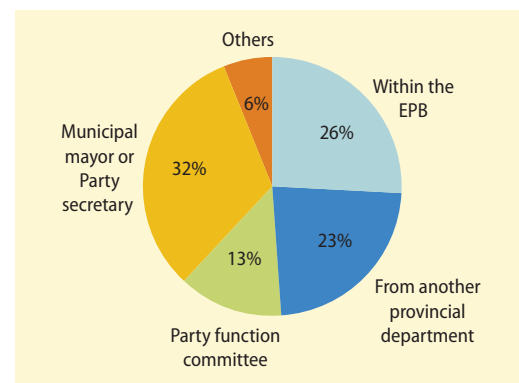
Provincial and local environmental management is the responsibility of the environmental protection bureaus (EPBs), whose staff numbers increased from 105,900 in 1998 to 166,800 in 2005 (Li and Higgins 2013, 412) and about 192,000 today.<sup>6</sup> While notionally partly accountable to MEP, EPBs mainly report to local governments and are dependent on them for funding and promotions. Local EPB budgets vary by region. In poorer parts of the country, budgets tend to be small, leading to staff shortages, lack of inspection and testing equipment, and inadequate skill development. Some EPBs located in regions experiencing rapid economic growth have not received funding increases that match their expanded obligations.

For instance, Kunshan City in Suzhou municipality in Jiangsu had a level of economic development in 2011 that was much higher than that of several of the poorer provinces in China, yet Kunshan's administrative status remained that of a county (Chien 2013; Kostka 2013). This "big foot in a small

shoe" (*dajiao chuan xiaoxie*) problem has sometimes adversely affected the work of the EPB. EPBs in these fast-growing urban areas complained that allocated resources and their rank did not match the higher workload. Some local governments and EPB leaders have tried to overcome inadequate budgets for environmental or restructuring projects by using debt financing or land sales, as has been the case in Datong City in Shanxi (Eaton and Kostka 2013). Inadequate funding means that local-level staff and managers often lack sufficient qualifications and training opportunities to cope with rising challenges. Furthermore, because of the current government officials' selection and appointment practice, only a quarter of EPB directors came from within the EPB system (figure 7.5)

EPBs also often depend on fines collected from polluters for funding. In one EPB in Central China, only 24 of 157 employees were covered by central government funding; the remaining 133 were supported by pollution fees.<sup>7</sup> Among six surveyed counties in Henan Province in 2009, 79 percent of staff were paid from fines paid by local firms. When the EPB staff's "daily bread comes from pollution fees," as one county EPB director put it, they have no incentive to increase fines to a level that would exceed damages or compliance costs and cause firms to stop polluting. It is not clear whether these reports are isolated cases or form a widespread pattern,<sup>8</sup> but they do imply that the

**FIGURE 7.5** Only a quarter of provincial EPB directors came from within the organization



Source: Kostka 2013.

Note: EPB = environmental protection bureau.

steady flow of fines may lead to overstaffing of some local bureaus without increasing their effectiveness. In addition, pollution fines and collection rates are generally low, and penalties do not generally increase for repeated violations (Economy 2010). That is in contrast to the U.S. Clean Water Act, for example, under which daily penalties can be imposed on noncompliant polluters.

Besides lack of funding, environmental management agencies in China also do not have sufficient authority to enforce regulations. Provincial EPBs have the authority to impose “regional investment restrictions” by holding up environmental approvals of new projects. But because EPBs report to provincial and local governments, local officials can override environmental concerns when they conflict with other objectives. Because EPBs rank relatively low in the administrative hierarchy, leaders of state-owned enterprises (SOEs) that operate nationally or internationally often outrank those who supervise their environmental compliance—a constraint often referred to as the “central SOE problem.” Especially where an SOE or even a private firm dominates a local econ-

omy, local leaders have few means and little incentive to enforce regulations. In fact, where one or a few large firms dominate a municipality, there tends to be less disclosure of environmental information, especially if the dominant firms are in heavily polluting industries (Lorentzen, Landry, and Yasuda 2014). Enforcement authority varies among other agencies responsible for attaining environmental objectives.<sup>9</sup> For example, the National Development and Reform Commission (NDRC), which is responsible for energy efficiency, has relatively strong influence through investments and financing. Local water and resource bureaus, which monitor surface water quality, on the other hand, have fewer enforcement tools. One such municipal bureau in Hunan Province was not only unable to penalize firms that violated water consumption regulations, it could not even obtain value-added figures for local firms from the statistical bureau to estimate their water consumption (Kostka 2014). Recently there have been some hopeful signs that strong leadership at EPBs are able to address some of these problems even if the low fines remain an ineffective deterrent (box 7.2).

### BOX 7.2 Addressing the “central SOE problem”

In June 2013, the local environmental protection bureau (EPB) of Anqing Municipality in Anhui charged the central state-owned enterprise (SOE) Sinopec Anqing with a RMB 90,000 fine for polluting the air. The fine was triggered by a production accident that in May 2013 caused black smoke to leak from Sinopec’s production facilities. The fine was one of the first of its kind, because local EPBs usually have no authority to charge pollution fees to central SOEs. Often managers of local branches of central SOEs also hold concurrent posts within the locality; the general manager of Sinopec Anqing, for instance, is concurrently also a member of the Anqing Municipal Standing Committee, a powerful position in the locality. The Anqing case could be a signal to other local EPBs to be bolder in addressing the “yangqi [central state-owned enterprise] problem.” However, the RMB 90,000 fine is relatively low for a central SOE and does not fully reflect the considerable local

ecological and health damage resulting from Sinopec’s pollution.

Two factors help to explain why the municipal EPB in Anqing dared to fine the central SOE:

- Public monitoring was an important stimulus: After the accident in May 2013, many citizens in Anqing complained about the pollution and posted pictures to the Internet.
- Strong EPB leadership arose: In early 2013, Anqing Municipality assigned a high-ranked local leader—a former vice mayor—to lead the municipal EPB. The new leader frequently visited the provincial EPB bureau and MEP to gain upper-level government support. The local EPB head’s high ranking together with the support from national level made charging the new fee possible.

Source: Kostka 2013.



### BOX 7.3 The three baos of data reporting

Shortage of advanced monitoring equipment at the local level hinders the verification of environmental outcomes. The verification of environmental targets differs depending on available technologies and forms of monitoring systems. For chemical oxygen demand (COD), a measure of water quality, and SO<sub>2</sub> targets, monitors are installed in larger companies. This monitoring equipment is often not very technically advanced, is unreliable, and is limited in number (Kostka 2014). For energy intensity targets, no purpose-built monitoring equipment is in place, and reports rely on self-reported figures from enterprises. Self-reported online data are sent to the local statistical bureau, which then collates sheets of data. Only data from very large enterprises are shared directly with the provincial and national statistical bureaus. A government official explains:

*Enterprises report their energy consumption through an online reporting system. Self-reporting by enterprises is problematic,*

Source: Kostka 2013.

*because there are three kinds of bao [reporting]. There is luanbao, which refers to messy data that [lack] logic. Often accountants enter the data into the online sheets but they lack training on energy bookkeeping, so they often make mistakes. There is manbao, which refers to companies underreporting production figures because they fear that this information is shared with the local taxation bureau. Because companies are afraid that they would have to pay more taxes, they do not report real production numbers. Finally, there is tuobao, where companies simply delay reports.*

Because the self-reported data from enterprises collected by the statistical bureau are so poor, one official admitted that he collects his own data from the town level, including data for both large and smaller enterprises. According to him, his independently collected data are more accurate, but for official purposes, he still has to use the data from the statistical bureau.

Strengthening the capacity of institutions for environmental management should also include improvements in the collection and wide dissemination of relevant data. Much progress has recently been made in collecting air quality data, including the recent establishment and real time release of monitoring data for PM<sub>2.5</sub> (very fine particulates with a diameter of 2.5 micrometers or less) in 74 cities. MEP plans to expand this system to more than 300 prefecture-level cities. But monitoring networks for many environmental indicators are still sparse. Provincial EPBs, but no local EPBs, are able to assess the 106 indicators defined in the new water quality standards (Qu and others 2012). Reporting protocols for environmental performance data are not very rigorous, allowing local institutions too much flexibility in what and how they report (box 7.3).

In response to recent environmental crises China's government has announced new financial resources for mitigating pollution

problems. Some of those resources could be allocated to strengthen the policy development and enforcement capacity of MEP and its affiliated institutes. At the local level, additional resources in capacity and technology for monitoring will also be needed. Additional administrative changes could disconnect the funding for local EPBs from the collection of pollution fees, but without removing the incentive to go after polluters. Fines and pollution fees can be an important source of funding for environmental management, but, as in most countries, revenue should flow into general budgets from which EPBs would then be financed. A more difficult problem will be to make local EPBs more independent, especially in enforcement action, without reducing the responsibility of local governments for environmental outcomes. That may require stronger oversight and performance monitoring from provincial and national authorities, combined with better incentives for local officials and greater scope for public participation.

### Stronger incentives for local governments

The disconnect between the national government's environmental goals and local implementation is also a reflection of insufficient incentives for local governments to improve environmental outcomes and for firms to reduce resource consumption and avoid pollution. Local government officials who do not see sufficient benefits or penalties for environmental performance will focus on other priorities. National directives and local priorities continue to encourage a dominant concern for economic growth targets over social and environmental objectives. As one local leader said: "It is like a constrained maximization problem (*youyue shue de jidahua*): We try to maximize GDP and fiscal income, but we meet only the bare minimum of environmental standards. This is of course not always efficient for the environment" (Kostka 2013).

Such attitudes are reinforced by promotion criteria that put relatively little weight on environmental quality achievements. This system is formalized in the government's performance assessment system, which gives different weights to targets in the cadre evaluation forms (*kaohetiao*). Economic targets tend to overshadow social and environmental targets. In one Shanxi county 2011 evaluation form, government officials could reach up to 28 points for meeting economic targets, 19 points for improving people's lives, 11 points for social development, 14 points for resources and environment, and 13 points for social safety (Eaton and Kostka 2013). Environmental goals thus accounted for, at most, 16 percent of the total performance score. Consequently, one EPB official said: "Environmental and energy targets are binding targets but they are not our ultimate targets. No leader will be promoted because of their better achievements in environmental protection and energy savings. GDP growth is still the target that we work hardest to achieve" (Kostka 2013). A recent statistical analysis confirms that environmental improvements are uncorrelated with probability of promotion, while spending on transport, for instance, promotes GDP growth and thus career advancement (Wu and others 2013). Given the long list

of central government directives, local leaders therefore act rationally by investing their time and resources in other objectives that are more likely to advance their career. This pattern will not change unless promotion criteria are revised and penalties for nonachievement increased.

The relatively short tenure of local cadres also reduces their incentive to invest in environmental projects whose benefits may only be apparent after some years. Nominally 5 years, the average tenure of local mayors and party secretaries has dropped from 4.2 years in the 1993–2001 period to 3.3 years during 2002–11 (Kostka and Yu 2014). Provincial DRC heads stay an average of 3.6 years and provincial EPB directors 4 years. While there are some advantages of periodic turnover to bring in fresh ideas, short tenure times encourage a focus on projects with short-term results that increase promotion odds rather than on more complex restructuring or pollution mitigation efforts whose benefits are in the future and that may be stopped by one's successor (Eaton and Kostka 2014). Extended tenures would encourage long-term thinking and more emphasis on quality of life issues in evaluation systems. Xiaoyi in the coal country of northern Shanxi province turned itself into an attractive place to live under the leadership of a locally rooted group of policy makers who built constructive relationships with residents and local industry (box 7.4).

Further reducing the effectiveness of environmental policy implementation is that local decision makers frequently concentrate on the appearance of environmental gains rather than on cost-effective greening. In selecting environmental investments, many local leaders thus favor "political accomplishment projects" (*zhengji gongcheng*) over more efficient solutions. In Shandong Province, one county plans to build water treatment plants in each town to show progress in implementing the 12th Five-Year Plan, rather than upgrade a centralized larger plant more cheaply (Kostka 2013).

There are some signs that these problems are being addressed. Promotion criteria have begun to change, and Zheng and others (2013) find that this is having an impact on local policy makers' environmental achieve-

### BOX 7.4 Co-opting local businesses into green growth in Xiaoyi

Xiaoyi County in northern Shanxi effectively managed to co-opt local businesses into sharing the burdens of green growth and economic restructuring. Xiaoyi is a resource-based economy with an undiversified, coal-dependent industrial structure in the midst of transformation. Leaders in Xiaoyi's leadership group have cooperated closely with local businesses to share the burden of reducing Xiaoyi's coal dependence. Strikingly, local coal enterprises, many of which are privately owned, have actually been given soft targets in local plans for investment in economic transformation projects: "Coal production enterprises should each launch non-coal projects of between one and two billion RMB; each coking enterprise should launch projects of one billion RMB or more in non-coal or downstream processing projects." (Xiaoyi Government Work Report 2011, 20). In addition, Xiaoyi leaders have effectively bundled coal restructuring with the goal of developing non-coal industries by providing incentives for former coal bosses whose enterprises were eliminated as part of a 2006 industry clean-up to start greener businesses. For instance, with government backing, a former mine owner whose enterprise was shuttered brought a Walmart outlet to Xiaoyi and also has a new business marketing agricultural products.

*Source:* Kostka 2013.

Xiaoyi's greening growth strategy has built up gradually with guidance from a strong and locally rooted leadership group. Recent party secretaries in Xiaoyi have served for an average of 8.3 years and mayors an average 6.2 years, much longer than the average tenure of local leaders of three to four years. A unique characteristic of Xiaoyi is that leaders from elsewhere put down roots in Xiaoyi: "Most of the Party secretaries, mayors and CCP Organization Department heads are from outside. But they all settle down here." The attractiveness of Xiaoyi as a place to live (good primary and secondary schools, high environmental quality, and a developed entertainment industry) does seem to have contributed to its success. Living environment is often cited as an important factor in luring investors, but the example of Xiaoyi shows that it also may be important in attracting and retaining able government leaders.

This continuity helped Xiaoyi's leadership group make very effective use of the relationships it has built over time with local industry. Leadership continuity likely contributed to the leaders' success in securing investment because investors could be confident that plans would not shift radically with personnel changes in the leadership group.

ments, especially in cities where mayors have better education levels. China's government can accelerate this process by further reforming the reward and incentive system for local officials. Together with increasing public involvement (discussed in the next section), stronger incentives will put pressure from two directions on local officials to improve environmental performance.

#### More channels for public participation

In practically all industrial countries, environmental management has become stricter over time largely as a response to vocal public demand for better protection from pollution and for a higher quality of life. China is no exception. As incomes and access to information increase, public pressure on polluters directly and on governments charged with environmental management will con-

tinue to grow. Public participation—whether by individuals, by grass-roots initiatives, or by well-organized NGOs—plays a vital and constructive role that complements official efforts but does not replace it. The public's concern often focuses on visible problems such as air pollution, while less visible or long-term problems such as sporadic toxic releases or soil contamination can be just as bad or even more dangerous. Most people also react most to problems in their own backyard (although NGOs tend to have a broader perspective). So the problems identified by well-educated people, who are often more vocal and well connected, might receive a disproportionate amount of attention. Public participation is therefore no substitute for the government's investment in environmental monitoring and enforcement.

Yet, public participation will be an important factor in the success of China's efforts

to improve the environment. Citizens can currently have influence through three main channels: the consultation process that is part of the environmental impact assessment of large public and private projects, various public complaint mechanisms, and the legal system. For these channels to be effective and efficient, citizens must have access to credible and up-to-date information about pollution and emissions from companies. Progress on public disclosure of such information has been made in some parts of China, but information release is still too much up to the discretion of firms and local officials.

As in other countries, NGOs play an important role in facilitating public participation in China (Kostka 2013). There are an estimated 1,000 registered environmental NGOs (or ENGOS) and an equal number of unregistered ones. Those that have been most influential have often been closely associated with governmental organizations (government-organized NGOs, or GONGOS). They can more easily bridge the gap between civil society and the state but have sometimes been criticized for not being as forceful in pursuing environmental objectives as more independent ENGOS, who still often run into the limits of what the government considers an acceptable role for NGOs (Hildebrandt 2011; Wu 2013). ENGOS could become more effective in helping achieve China's green goals if they had more opportunities to participate in policy design and formulation and not just implementation. ENGOS are far more influential in China's large international cities, especially Beijing, Shanghai, and Guangzhou. Officials in other parts of China too often see them as adversaries rather than as stakeholders, which limits their role, for instance, in environmental education, advocacy, and monitoring of environmental compliance. ENGOS can also play an important role in promoting sustainable lifestyles—an essential task for China to build up awareness and support for green actions and to build a market to demand greener products.

### *Environmental impact assessments*

The earliest mechanism for the public to provide input to environmental decision making was through participation in environmental

impact assessments (EIAs), which were first introduced in China in 1973 (M. Zhang and others 2012). The guiding concept for EIAs is the “three simultaneities”: any major project should anticipate adverse impacts on the environment by designing, constructing and operating protective measures during the project cycle. By the 1990s, EIAs for international cooperation projects started to include public consultation. In 2003, the Environmental Impact Assessment Law specifically stated that if a project involves the environmental interests of the general public, inputs from stakeholders, experts, and the general public need to be collected. EIAs have become one of the main instruments for environmental protection. They have been effective in significantly modifying or preventing some projects that could have caused large environmental damages, including the Panyu Waste Incineration Project or the Shanghai-Hangzhou Maglev train line (Zhao 2010).

But there are weaknesses both in the EIA implementations generally and in their participatory components. EIA compliance is mandatory only for a relatively small number of projects and often weakly enforced. Large companies sometimes fail to perform EIAs, instead paying relatively modest fines. In soliciting inputs from the public, EIAs often pick an unrepresentative sample of respondents and allow public comments for only a short period early in the process when the full implications of the project are not yet clear. There is often too little opportunity for face-to-face consultation. Recently, the central government has endorsed a strengthening of public participation in EIAs. What would help most would be a shift in the mindset of local officials about the value of the public's feedback, more rigorous methodologies for questionnaire design and feedback collection, and clearer operational rules for public participation throughout the project cycle (Li, Ng, and Skitmore 2012).

*Formal complaint systems.* As early as the 1990s, some city governments had established formal channels through which residents could complain about environmental violations. Many provinces and cities have established 24-hour hotlines that allow citizens to register environmental complaints.

Citizens also can complain directly to local EPBs, which received over 700,000 complaints in 2010. With rising access to social media—42 percent of Chinese are now connected to the Internet—some local governments have begun using such channels that allow for broader information distribution and feedback collection. The Chengdu EPB, for instance, assigned staff to set up a microblog for citizen outreach and information dissemination. By documenting and publicizing local environmental problems, citizen groups can be effective partners of the government in pursuit of shared environmental goals. As the example in a previous section showed, in May 2013, public monitoring helped encourage Anqing Municipality in Anhui Province to impose a fine on the production facility of a large SOE after a pollution incident. Formal complaint systems thus complement the efforts of local agencies, which usually do not have the resources to monitor compliance of numerous potential polluters.

The question is how efficient and effective complaints are. There are many examples of polluters being caught who would not have been detected by the EPB. But the costs of a complaint system can be high, because many complaints are about minor nuisances. Improving formal monitoring aided by more complete pollution registries could prevent many complaints in the first place. Despite the large number of complaints, relatively few trigger enforcement actions. Between 2006 and 2010, MEP received 300,000 environmental complaints.<sup>10</sup> These led to a re-examination of 2,614 administrative decisions. Only 980 of these were administrative court cases, and only 30 resulted in criminal cases, suggesting that few environmental conflicts are resolved through the legal system. Greater public participation in detecting and publicizing environmental wrongdoing—whether through formal channels or informally—will be an effective means to support the government's environmental goals only if there is an outlet for such protests. Otherwise they can lead to social instability. One such outlet is the legal system where citizens, community groups or local governments could initiate cases of gross violation of environmental laws.

*Legal system.* Most national and local environmental agencies around the world have limited enforcement capacity. Ministries of Environment typically have much smaller budgets than other departments. Enforcement of environmental rules in Europe or North America—but also in Brazil, India, or Thailand, for instance—therefore relies substantially on the court system. A famous example is the role of courts in enforcing air quality standards in Delhi in 2001 (Bell and others 2004). Successful lawsuits by individuals affected by pollution in China have resulted in compensation payments in some instances. In one prominent ongoing case, a chemical plant in Yunnan released 5,000 tons of chromium dregs into the Nanpan River in 2011. A group of NGOs filed a public interest lawsuit on behalf of thousands of affected farmers that could become a landmark case if it is recognized by the Supreme People's Court as a precedent. Overall, however, pursuing polluters through the legal system is still difficult, and many cases never reach trial stage (Stern 2011).

China has for some time been experimenting with specialized environmental courts. By mid-2012, almost 100 such courts and tribunals had been established in 16 provinces of China (Zhang and Bao 2012). Such courts could provide an effective way of assisting more direct government efforts in enforcing environmental laws if a number of problems with existing environmental courts are resolved. The main issue is that there are high barriers to bringing cases to court. Less than 1 percent of environmental disputes reach the court system (Stern 2011), in part because only few organizations can file public interest environmental law suits. Revisions to China's environmental law proposed in July 2013 would further restrict the right to file such suits to only one MEP-affiliated organization—the All-China Environment Federation.<sup>11</sup>

Barriers also exist where judges close to local governments prevent individuals or groups of affected citizens trying to bring cases to court from going forward (Zhang and Bao 2012). The resulting small number of environmental cases has been used as



a reason to close environmental courts. A more certain legal basis for these courts and greater independent procedures would help overcome these problems. The legal system can be a slow and expensive way to resolve environmental disputes. More comprehensive enforcement of environmental laws and mediation or conflict resolution by public or non-state organizations should play an important role and usually be the first best option. But, as experience in other countries has shown (for example, Lin and others 2009), for complex cases or where officials are unable or unwilling to pursue polluters, stronger environmental courts will be an important means to hold polluters to account.

### *Public disclosure*

Public pressure on polluters can be an effective way to encourage greater environmental compliance. But citizens often do not realize that a facility is polluting air, water, or soils until harmful effects are obvious. Disclosure of polluting behavior by firms gives people the information they need to assess whether they are affected. China has experimented with public disclosure of pollution performance ratings since the 1990s (Wang, Wheeler, and Jin 2010). Piloted in Zhenjian (Jiangsu Province, box 7.5) and Hohhot (Inner Mongolia) by MEP's predecessor organization, SEPA, together with the World

## **BOX 7.5 Environmental performance ratings in Jiangsu Province**

Despite long-standing efforts to control pollution with traditional regulatory instruments, China continues to have severe pollution problems. Environmental performance rating and public disclosure (PRPD) has emerged as a complement for traditional pollution regulation. It helps overcome institutional weaknesses that hinder conventional monitoring and enforcement of environmental laws, regulations, and standards, and lowers regulatory costs. In the past decade, Jiangsu and several other areas in China have practiced the PRPD approach and have found it an effective pollution control instrument.

Jiangsu started its PRPD program with support from the World Bank in 2001, after a pilot test in Zhenjiang Municipality. The program rates firms' environmental performance from best to worst in five colors—green for superior performance; blue for full compliance; yellow for meeting major compliance standards but violating some minor requirements; red for violating important standards; and black for more extreme noncompliance. The primary benchmarks for ratings are China's emission and discharge standards that specify effluent concentration limits. The rating system also incorporates other performance indicators, including hazardous waste disposal practices, solid waste recycling, pollution accidents, public complaints, internal management requirements, China cleaner production certificates, ISO 14000 certificates, administrative penalties, and other citations for illegal

activity. For each indicator, the system specifies a clear, unambiguous, and publicly available link to ratings.

Evidence for the PRPD program in Jiangsu Province indicates both increasing participation by firms and improvement in their compliance rates. The number of rated firms increased more than twentyfold in 10 years, from 1,059 in 2001 to 20,261 in 2010. The percentage of firms with positive ratings increased to 96 percent in 2010. Research has found that PRPD program in Jiangsu has significantly reduced pollution from rated firms, with particularly strong impacts on firms with poor ratings. PRPD has significantly increased market and stakeholder pressure on managers to improve their firms' environmental performance. Firms with better ratings perceive positive impacts on market competitiveness, overall market value, and relationships with different stakeholders, while the firms with bad ratings are more likely to perceive deterioration.

Recently, Jiangsu Province has linked the environmental performance ratings to eligibility for bank loans, the market list inspections requirement, and the environmental responsibility insurance premium, among other things. All firms' environmental performance information has been posted on the province's intranet, which is accessible to all local environmental officers. It is expected that stronger incentives will be generated for firms to further reduce pollution with the PRPD program in Jiangsu Province in the future.

*Source:* Jin, Wang, and Wheeler 2010.



Bank, such initiatives have now been implemented in the Yangtze River delta (Jiangsu, Shanghai, Zhejiang), Hunan, Hebei, Anhui, Guangdong, Shanxi, Shenyang of Liaoning, Shenzhen, Chongqing, Ningxia, and soon Hubei. These systems summarize and publicize firms' environmental compliance information into a color-coded ranking from excellent to severe underperformance, essentially shaming persistent polluters and rewarding clean production.

Social pressure can be effective, and many companies will voluntarily seek improvements. But such systems will work only in cities with an environmentally proactive government, which are usually already better performing places with higher incomes. Although decentralized, this approach again requires the voluntary support of a central (provincial or municipal) authority (Economy 2010). The system also still will need to be backed up by comprehensive monitoring and strong enforcement, which has been uneven in China—better in coastal areas and in areas with a more diverse economy (and therefore less susceptible to capture by dominant firms), where enforcement capacity is greater, and where there are a larger number of complaints, which highlights the role of public participation (van Rooij and Lo 2010).

As part of China's Open Government Information initiative in 2008, MEP introduced an Open Environmental Information (OEI) regulation. It requires disclosure of environmental information including the allocation of emissions quotas, pollution fees collected, outcomes of investigations, and lists of violators of environmental rules. These measures are an important step in moving from voluntary public disclosure schemes toward more formalized attempts to introduce greater transparency in environmental performance. The regulation still has some shortcomings. First, in contrast to most other such regulations, China's OEI makes the government, rather than industry, responsible for disclosure. The toxic release inventory in the United States and the European Pollutant Emission Register in contrast make it mandatory for companies to report emissions above a threshold. Furthermore,

there are seven types of exceptions that Chinese environment management officials can invoke to refuse release of information, such as state or commercial secrets or information that could endanger public security or social stability. These exceptions make it too easy to suppress information about pollution that is of public interest.

Second, as a general set of regulations aimed at improving governance, OEI does not convey a right to disclosure. Given China's decentralized environmental administration, that means that the most polluted municipalities have the weakest disclosure (Tan 2012). There is even some evidence of backsliding. The Institute of Public Policy and Environmental Affairs, which annually ranks 113 cities by their environmental transparency, found that about 40 cities had lower disclosure performance in 2012 than a year earlier.<sup>12</sup> And third, implementation of OEI is quite expensive for environmental authorities and will require further large investments in technology. MEP, for instance, receives "a flood of requests," as one official put it, and does not have the staff and resources to respond to all.

The government still acts as a gatekeeper for environmental compliance information. Some municipalities have made significant efforts to open up environmental information. Jiangsu Province has become a national model for public disclosure.<sup>13</sup> Hunan Province's publicizing of persistent polluters shamed one company into immediately investing in cleaning up production. And Zhejiang Province is the first in China to require firms to publicly release their pollution data. The current system gives a lot of leeway to individual provinces, which encourages experimentation. Over time, this should lead to mandatory policies that require municipalities in all parts of China to collect and disclose high-quality pollution monitoring data and information about government enforcement. This kind of disclosure will be an important step toward a system where local authorities—with the help of the public—monitor the compliance of firms and prosecute violators, and where provincial governments and MEP, in turn, monitor the

environmental management performance of municipalities.

### Sharper policy instruments

As in other areas of policy making, governments have three types of instruments available to promote environmental objectives. They can use price instruments such as taxes, fees, or subsidies. They can pass regulations such as technology or emission standards. And they can spend resources on things like research, information programs (Annex 7A), or transfers to compensate those affected by other policies. All three types of instruments are necessary, although the efficiency with which they achieve their policy goal can vary. Price instruments, if they are designed to ensure economically efficient resource use, tend to be the most efficient. But they are often not enough to trigger the desired response such as a certain level of energy savings. So additional instruments may be required to address separate market, information, or behavioral failures. Governments should be careful when adding additional instruments, however. Too often, overlapping instruments cancel out each other, create new market distortions, or create confusing and inefficient signals to firms and households. A simple principle is that each problem or market failure should be addressed by a separate instrument. In practice, policies do interact and need to be taken into account when introducing new instruments. The following sections briefly discuss the three main types of instruments—prices, regulations, and investments and transfers.

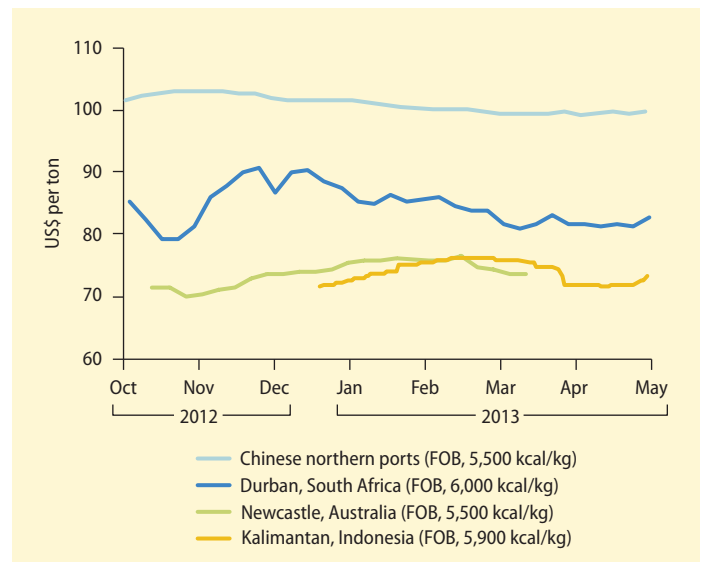
#### Prices

Besides reforming institutions for environmental management in China, the most effective way to induce greater resource efficiency and lower pollution is through prices. China has removed the most egregious distortions and subsidies in the energy sector—the source of most air pollution and greenhouse gas emissions. Prices for coal, electricity, some petroleum products, and natural gas generally reflect financial costs over the long

run, and some are at or even above international market levels.

*Coal prices.* Coal prices paid by industrial consumers have been relatively high compared with prices in other countries. Over the past year, the benchmark spot price for thermal coal traded at China's northern ports has remained well above that of similar-grade coal produced in South Africa, Indonesia, and Australia (figure 7.6). Domestically produced hard coking coal has generally been up to 20 percent more expensive than in the United States between 2009 and 2012, in part because of high transport and handling fees that can make up to 70 percent of the industrial consumer price in coastal areas. Environmental taxes and fees have also increased. Publicly traded coal mining companies in China paid around RMB 140 (\$22) in taxes per ton of coal produced in 2012 (RMB 110 or \$17 per ton excluding income taxes).<sup>14</sup> A 2013 review by China's Central University of Finance and Economics found 25 different environmental resource taxes and fees among the 109 taxes and fees currently levied on coal producers.<sup>15</sup> Prices will

**FIGURE 7.6** Border spot prices for thermal coal traded in China and other countries, 2012–13



Source: China Coal Industry Association data.

Note: Free-on-board (FOB) prices, expressed in U.S. dollars at monthly market exchange rates. Kcal/kg = kilocalories per kilogram.

rise further as tonnage-based resource taxes are converted to value-based resource taxes.

*Electricity prices.* Electricity prices in China overall are now generally comparable to long-run marginal supply costs (before accounting for environmental damage and other nonmonetized costs) (Moskovitz and others 2007; Zhang 2012). Industrial users pay around RMB 0.70 (\$0.10) per kilowatt hour on average. By comparison, the average rate for industrial users in the OECD countries in 2010 was \$0.11 per kilowatt hour (IEA 2013b). Taken on a purchasing power parity basis, China's effective average rate for industrial users is about \$0.17, which would place it in the middle of the pack among the OECD countries. Urban residential prices

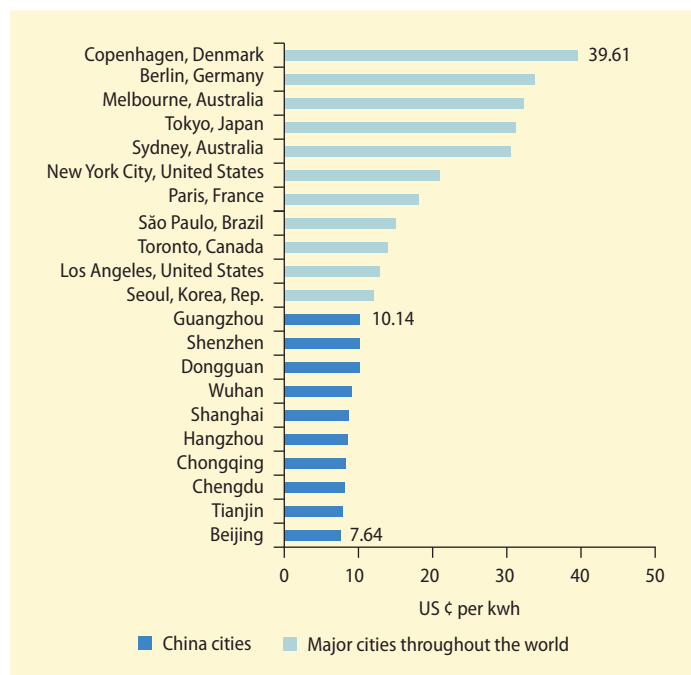
vary between \$0.08 and \$0.10, lower than in many industrial country cities (figure 7.7).

*Oil and gas prices.* NDRC, which regulates petroleum prices, has used international oil prices as the benchmark for domestic prices since 2009, although with a break on cost increases. If benchmark prices exceeded \$130 a barrel, then “on principle of maintaining economic stability,” diesel and gasoline prices are not raised or are raised only by a small margin (Xinhua 2009). Taxes now make up more than 35 percent of retail gasoline and diesel prices in China,<sup>16</sup> compared with 13 percent in the United States and 47 percent in the European Union. Gasoline and diesel prices are higher today than in Russia or the United States, although still much lower than in Europe (figure 7.8). New rules introduced by the NDRC in March 2013 have allowed petroleum prices to be adjusted more frequently to follow movements in benchmark prices more closely (NDRC 2013).

Natural gas prices are also closely regulated by pricing authorities. Prices for industrial users in major Chinese cities are relatively high, especially at purchasing power parity prices (figure 7.9). Prices for fertilizer producers and urban residents are typically set 30–35 percent lower than those for industry.

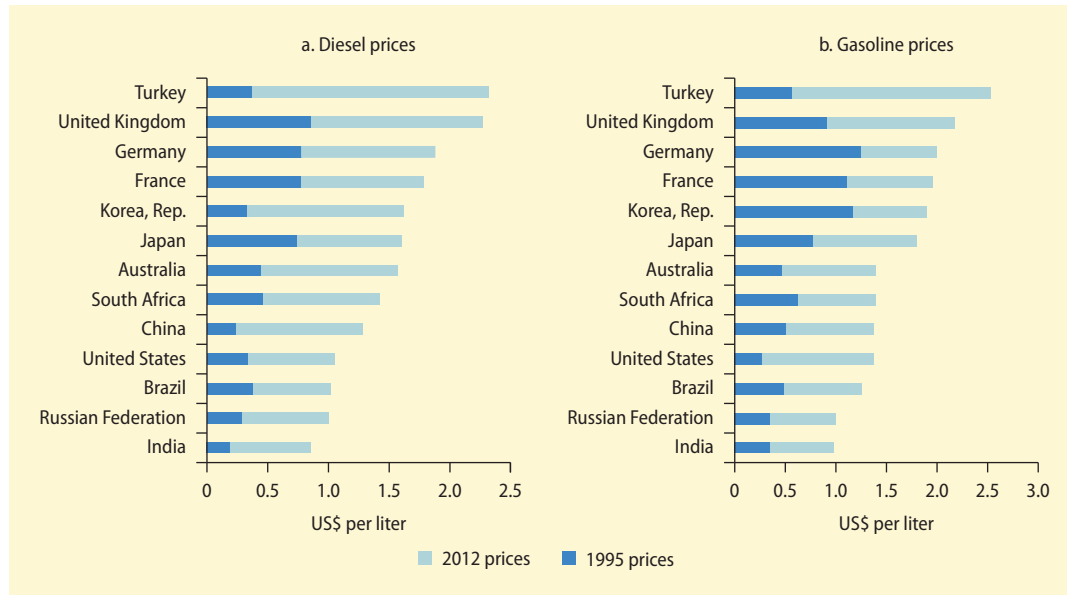
Although energy prices generally reflect production and supply costs and are close to or sometimes even exceed global price levels, some government policies cause some prices to deviate from market costs and encourage inefficient energy consumption. The most important of these is the continued favorable pricing policies, sometimes cross subsidies, for residential energy prices through higher tariffs for industrial users. One study estimates that in 2007, overall electricity subsidies were RMB 76.4 billion (\$10.1 billion, 2007 prices) (Lin and Jiang 2011). While the residential sector received an estimated RMB 202.6 billion in net subsidies, the industrial and commercial sectors combined overpaid (had a negative net subsidy) by an estimated RMB 126.2 billion. In industrial countries residential tariffs are usually higher, reflecting higher distribution costs. Cross-subsidies have social objectives. They follow the prin-

**FIGURE 7.7 Residential electricity prices of 10 cities in China compared with other major cities, 2011–12**

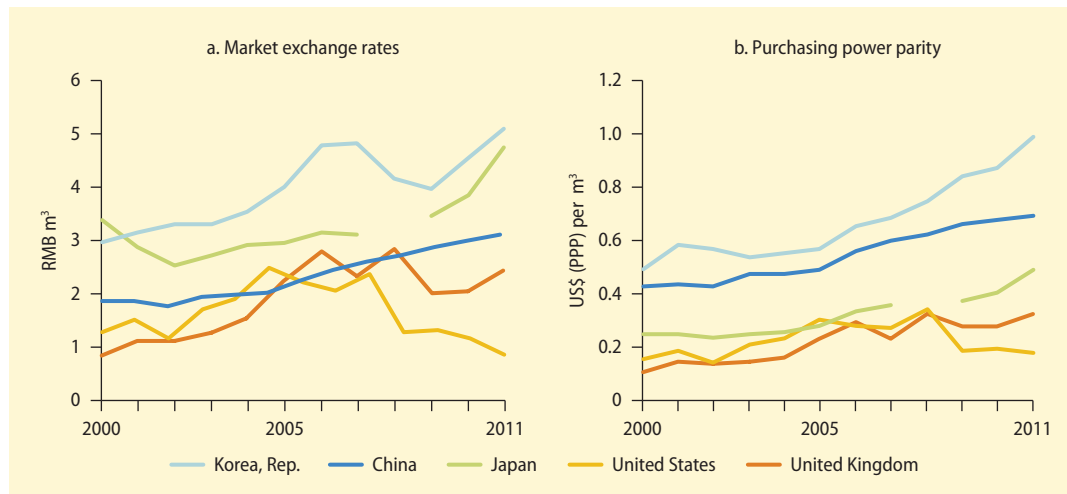


Source: China Electricity Council data; E-Control and VaasaETT (2012), “Household Energy Price Index for Europe” media releases, <http://www.energypriceindex.com> (accessed June 2013); U.S. EIA, Form EIA-826 detailed data, <http://www.eia.gov/electricity/data/eia826/> (accessed June 2013); Tokyo Electric Power Company (2012), “Press Release (May 11, 2012) Regarding Electricity Rate Increase”, [http://www.tepco.co.jp/en/press/corp-com/release/2012/1204304\\_1870.html](http://www.tepco.co.jp/en/press/corp-com/release/2012/1204304_1870.html) (accessed June 2013); Kepco, electricity rates calculator, <http://cyber.kepco.co.kr/kepco/EN/F/B/ENFBPP002.do?menuCd=EN060202> (accessed June 2013); Ausgrid, 2012, “Residential Electricity Prices and Energy Bills 2011/2012—Sydney vs Melbourne,” <http://www.ausgrid.com.au/Common/About-us/Newsroom/> (accessed June 2013).

Note: Prices for China's cities are for 2011; data for other cities are for 2012.

**FIGURE 7.8** China's transport fuel prices are still relatively low but have increased significantly

Source: GIZ 2013.

**FIGURE 7.9** Natural gas prices paid by industrial end-users in Chinese cities compared to prices in other countries, 2000–11

Source: NBS 2005d–2012d; U.S. EIA, US Price of Natural Gas Delivered to Residential Customers, <http://www.eia.gov/dnav/ng/hist/n3010us3m.htm> (accessed December 2013); Korea Energy Economics Institute, Energy Info.Korea 2012, [http://www.keei.re.kr/main.nsf/index\\_en.html](http://www.keei.re.kr/main.nsf/index_en.html) (accessed December 2012); UK DECC, Table 5.7.1 Industrial gas prices in the EU and the G7 countries, <https://www.gov.uk/government/statistical-data-sets/international-industrial-energy-prices> (accessed December 2013).

Note: Chinese data represent prices paid by sample of industries in 36 large cities; data for Korea, Japan, the United States, and the United Kingdom are national averages of urban consumers; data include all taxes, surcharges, and other fees.

ciple of “equal burden sharing,” where price setting considers affordability and social concerns in addition to supply costs. But they come at the cost of lower economic efficiency.

Furthermore, they tend to be regressive because wealthier households, who consume disproportionately more energy, receive the largest share of the benefit.

Other distortions include pricing practices that prevent electricity producers and some other energy suppliers from passing input costs above a certain level on to consumers. The difference between market-based import prices for natural gas and regulated domestic prices have generated large losses for importers. In 2011, for example, PetroChina lost RMB 21.4 billion on sales of pipeline gas imported from Turkmenistan because of price regulation. Such losses have dampened incentives to boost supplies of this relatively cleaner fuel. As pricing reform continues, better information about the size, fiscal costs, and distributional impacts of distortions in resource prices would provide greater momentum for reform and a better basis for deciding which policies, on balance, are justified when economic, social, and environmental considerations are taken into account. Such a review could take the form of an inventory or audit of environmentally harmful policies similar to those performed by some European environmental agencies (UBA 2011, for example).

Getting to cost recovery levels is only the first step. China's coal, electricity, and gasoline pricing policies have also begun to account for damages caused by resource production and consumption—local pollution that harms people's health and greenhouse gas pollution that fuels global warming. Adding such "external" or "social" costs is usually the most efficient way to change the behavior of people and firms. Determining the appropriate pollution charges can be difficult, however. Estimated health impacts or climate change impact modeling can provide guidance. One large U.S. study for instance, estimated that the health damages from fossil fuel power plants range from 0.002 to 0.12 cents per kilowatt hour depending on the size and age of the plant (NRC 2010). A study by Chinese experts estimated that adding a comprehensive estimate of the social cost of coal—including indirect costs from mining, transport, production, and emissions—would raise the market price of coal by 23.1 percent (Mao, Sheng, and Yang 2008). The social cost of climate change damages from energy use are more difficult to determine, because of uncertainty about specific impacts. The

U.S. government recently revised its official estimates of the social cost of carbon upward based on extensive modeling—to \$38 per ton of carbon dioxide for the year 2015.<sup>17</sup> This number is used to estimate the climate benefits of environmental rule making.

Such extra charges are imposed in two ways. One is through an energy or resource tax. Ecological tax reforms would put a charge on energy or water use to encourage conservation. Carbon taxes specifically charge greenhouse gas emissions (box 7.6). Charges could rise over time in line with efficiency improvements and become a new source of revenue, which can be earmarked for related goals, such as funding energy efficiency investments, or they can reduce other distorting taxes such as those on labor or replace municipal revenue from land sales. The alternative policy is a cap-and-trade system. This system establishes a clear limitation on pollution and lets a market for emission allowances determine the price for pollution, ensuring that pollution reductions occur where they can be achieved at least cost. Allowances have been initially distributed freely to make the system acceptable to firms, which if possible should be avoided. They can be auctioned off to raise revenue similar to a tax. Revenues from a tax or cap-and-trade allocation auctions can be reinvested in further resource savings or emission reduction, contributing to higher benefits than the price effect alone. Pollution trading systems in China have been piloted for sulfur dioxide (SO<sub>2</sub>) and carbon, and in several countries they are also used for water pollution (Fisher-Vanden and Olmstead 2013).

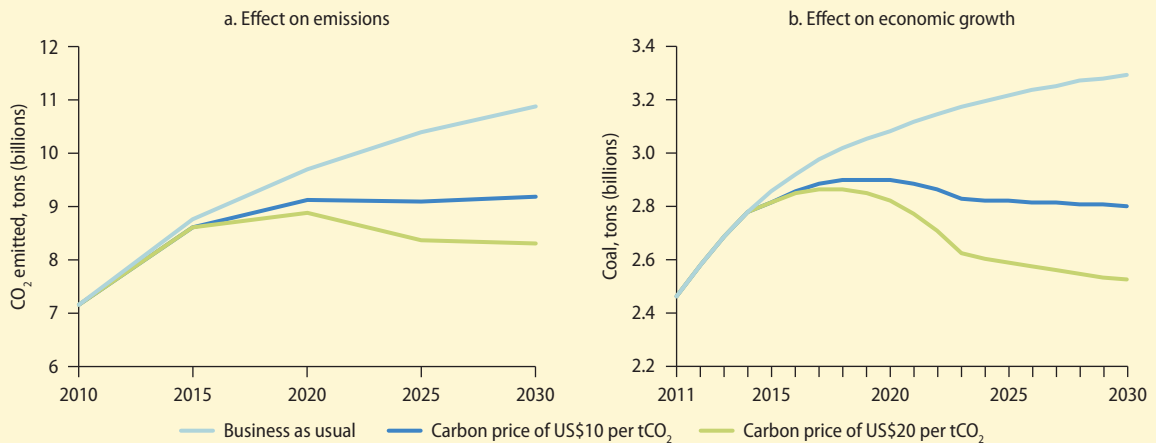
The following sections on sector priorities discuss the use of some price instruments in China in more detail. Several policies and pilots introducing environmental taxation and cap-and-trade systems are already under way in China. These will be useful as a way to collect information and experiences but will need to be expanded nationally if they are to become truly effective. Furthermore, cap-and-trade systems need to be frequently recalibrated. An economic slump will reduce emissions or pollution even without firms' efforts, adding to the frequent problem of initially overallocating allowances. In addi-

### BOX 7.6 China 2030: Estimated impacts of carbon pricing

According to a recent analysis by the World Bank and DRC, a price of \$10–\$20 on a ton of carbon dioxide (CO<sub>2</sub>) (RMB 83–166 in 2004 prices) starting in 2015 would effectively bend the curve of China's rising greenhouse gas emissions, causing emissions to plateau or peak before 2030. Total coal use would peak in or around 2020. The price would effectively be equal to a tax on steam coal of about \$22–\$44

a ton. While carbon pricing would have a dramatic effect on CO<sub>2</sub> emissions and the use of dirty fossil fuels, it would only have a modest long-run effect on economic output (figure B7.6.1). Even with a carbon price of \$20 a ton, average annual growth in GDP slows by only 0.06 percent between 2015 and 2020 and 0.05 percent between 2025 and 2030 compared with a baseline scenario.

**FIGURE B7.6.1** Effect of a carbon price on emissions and economic growth



Source: World Bank background analysis done for World Bank–DRC 2013.

tion, complementary energy efficiency and renewable energy policies may “loosen” the cap and add to a surplus of allowances, dragging down CO<sub>2</sub> prices, as seen in the EU carbon trading system (Grubb 2012). As China moves from pilot schemes to full deployment, these interactions among overlapping policy instruments need to be dealt with based on careful analysis with a coordinated effort between ministries and agencies.

#### Regulations

Price incentives are an efficient and noncoercive way to encourage changes in behavior, but there remains an essential role for strict environmental regulations as well as for social transfers. Price instruments can be blunted by behavioral factors such as short-

termism (people look at the higher purchase price of energy-efficient light bulbs but ignore their long-term savings) or split-incentives (a landlord may not make energy saving upgrades as long as the tenant pays the utility bills). Regulations can also be more effective when the need to stop or reduce a harmful activity is urgency. But regulation is only as good as its enforcement. China's current reliance on target-based regulations is producing desirable results but may lead to unintended consequences and weaker compliance incentives. The regulations are often rigid and may not reflect local environmental conditions and priorities, often lack a scientific basis, are sometimes arbitrarily exaggerated as they pass through the administrative hierarchy, and compliance is difficult to verify (Kostka 2013). More rigorous technical, social, and



economic analysis of regulatory decisions and investment projects could make them more effective.

### *Investments and transfers*

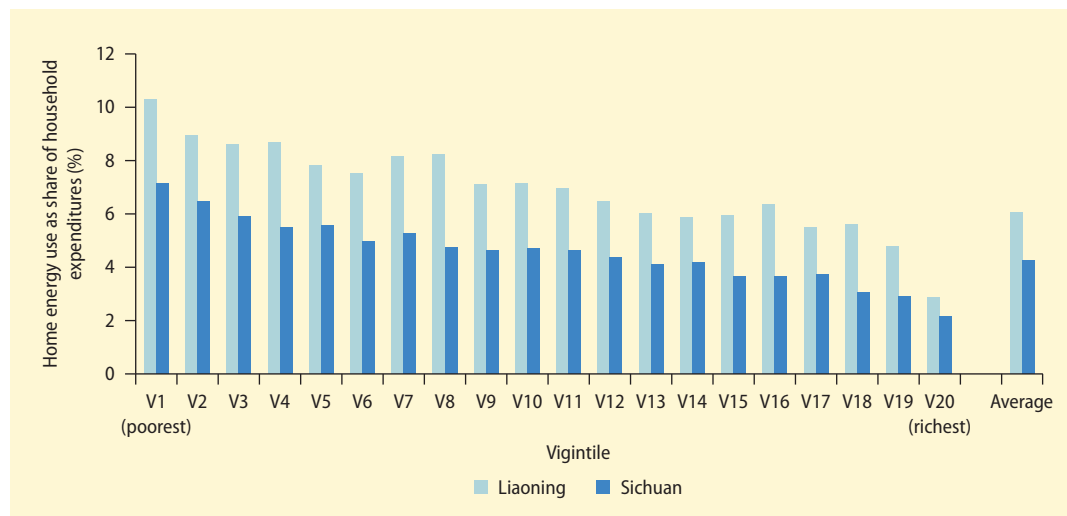
Besides influencing prices and issuing regulations, governments also spend money directly to pursue greening, for example, by funding information programs, training, or upgrading public infrastructure. In some instances, such direct government expenditures can help buffer the unintended consequences of environmental policies. Market instruments are economically efficient, and complementary regulations are effective where markets do not work well. But both usually raise prices for resources, at least in the short term, which can affect the competitiveness of firms and the welfare of low-income households. For environmental policies to be efficient, effective, *and* fair, assistance to households and companies will sometimes be necessary.

For instance, household expenditure shares for energy in two of China's provinces, Liaoning and Sichuan, range from about 2 percent for the richest households in Sichuan to just over 10 percent for the poorest in Liaoning (figure 7.10 shows expenditures are higher in Liaoning because of winter heating needs). Wealthier households usually have

higher total energy expenditures, but the expenditures account for a smaller share of their income. An international benchmark for energy poverty is when households have to spend more than 10 percent of their income on energy. If energy prices rise by 15 percent when cross-subsidies are removed or an ecological tax is imposed, up to 20 percent of households in Liaoning could fall above that threshold. This example illustrates that the social consequences of sustainability policies need to be studied carefully, but it does not argue against raising prices to market or even to social cost levels. A block tariff that maintains a lower price for a minimum amount of energy is one option to address social concerns, as already implemented for electricity. But, if the block is not well designed, it can have significant benefit leakage to the non-poor. Generally, rather than keeping energy prices low across the board, which would discourage energy efficiency efforts by households, a more effective strategy is to complement sustainability policies with targeted sector and social protection policies that help the poorest cope with energy price rises (Ruggeri Laderchi, Olivier, and Trimble 2013).

Local officials in China already have extensive powers to force the shutdown of inefficient or outdated production capacity for which energy efficiency upgrades would

**FIGURE 7.10** Household energy expenditure shares, 2012



Source: China Household Income and Expenditure Survey data.

Note: Vigintile = one-twentieth or each 5 percent increment.

not be sufficient. To soften the blow to local employment and economic output, city governments may provide reemployment assistance to displaced workers, financing for affected enterprises to pursue other lines of business, and partial compensation for retired equipment (Kostka and Hobbs 2012; Li and others 2009; Taylor and others 2010).

### **Sustainable sector policies are closely aligned with green objectives**

Differing resource endowments, economic structures, climactic conditions, and other conditions mean there can be no universal definition of a green city. Because the specific issues that need to be addressed in these sectors vary widely, and because sector reforms have advanced more in some sectors than in others, no generic set of options or recommendations can be applied. But there are a number of common themes. First, action in all sectors is urgently needed because of the immediate health and ecosystems impacts from high pollution and because poorly designed urban infrastructure investments during the next wave of urbanization could lock China into further cycles of unsustainable development.

Second, problems of the magnitude and complexity faced by China's urban policy makers cannot be solved in sector silos or geographic niches. Land management, transport, building, and public service sectors need to be closely coordinated to shape cities that are resource efficient and low polluting while also promoting economic efficiency and quality of life. And because air pollutants travel over long distances, air quality management needs to be organized at a geographic scale that matches the footprint of the problem.

Third, reducing local pollution (immediate benefits) and global carbon pollution (with most benefits in the future) often go hand in hand. Increasing energy efficiency, by reducing fossil-fuel burning, can save lives that would be lost to air pollution today and will also help reduce future global warming. But end-of-pipe abatement technologies for power plants and cars, for instance, can

reduce air pollution concentrations but will not capture carbon emissions. As a rule of thumb, when retrofitting existing infrastructure, it will often be most cost-effective to prioritize local pollution reductions because they bring important, near-term benefits to local populations. For new investments, low-carbon designs will be easier and often cheaper to incorporate at the beginning than retrofitting these assets later, so both objectives can be considered at a lower life-cycle cost. Assessment tools are available that evaluate both local and global emissions, and these should be developed further to optimize solutions based on local circumstances (annex 7B). Sector investments and policies should seek to limit environmentally harmful resource use as much as possible and clean up what cannot be avoided. Table 7.1 presents the main messages for each sector.

### **Crossing jurisdictions for effective air quality management**

Recent episodes of severe air pollution in many cities have brought air quality into the center of environmental policy debates in China. There is a growing realization of the scope and scale of health impacts from polluted air, and the government has demonstrated its willingness to use its financial and administrative resources to address this problem more forcefully. Improving air quality in China's cities is a massive challenge not only because of the scale of the problem but also because the large number of pollution sources, and chemical reactions between different pollutants, make it particularly complex. Some of the key elements of an effective air quality action plan are addressed here. Three principles for policy making stand out. One is that adopting a more flexible approach for setting targets for air quality management (AQM) within China's National Ambient Air Quality Standards (CNAAQs) could facilitate implementation by accounting for the currently very large differences in pollution levels and conditions across cities and regions. A second point is that regional institutions for AQM must be endowed with greater authority, because air pollution travels across municipal boundaries and solutions

**TABLE 7.1** Sector priorities for green urbanization

<b>Integrated approaches to resource use efficiency and pollution management</b>	
Promote resource efficiency by revising statutory urban planning rules and coordinating urban and sector planning more closely.	Implement regional air quality management based on sound monitoring, comprehensive technical assessment, and economic analysis.
<b>Providing sustainable and safe urban transportation</b>	
Reduce reliance on private cars by charging the full cost that their use imposes and by making urban public transit and nonmotorized transport more attractive.	Enforce fuel quality standards, continue to tighten and enforce vehicle emission standards, expand low-emission and alternative fuel vehicles, and encourage retirement of older, highly polluting vehicles.
<b>Meeting urban energy needs by prioritizing efficiency and greening the energy mix</b>	
<b>Rebalancing markets and mandates to reduce energy use in industry</b>	
Rebalance administrative measures with more market-based approaches that motivate enterprises to prioritize energy efficiency as part of their own business interest; maintain enterprise obligations while providing more options, like trading, to meet targets; and strengthen local government capacity in regulatory supervision and policy implementation.	Strengthen development of energy-efficiency services industries, giving enterprises increased access to technical services and financing, and promote deeper penetration of energy savings performance contracting.
<b>Leading by doing: serving the people in more efficient and cleaner buildings</b>	
Lead by example with aggressive building efficiency programs in public institutions.  Establish targets for progressively tightening energy efficiency codes to set clear market signals; broaden use of benchmarking for existing buildings as basis for retrofit policies and programs; promote green buildings by linking incentives with clearer labeling schemes and strengthening capacities across the supply chain.	Phase out harmful construction materials to reduce indoor air pollution.
<b>Securing clean energy sources</b>	
Minimize the direct use of coal in cities by expanding access to piped gas (with priorities given to households, commercial uses, and district heating) and clean energy sources.	Establish a more even playing field for cleaner energy to contribute to urban energy supply by removing pricing distortions and by improving efficiency of energy supply systems through increased competition and modernization of sector regulation.
<b>Integrating water resources and pollution management to improve water quality</b>	
Ensure a efficient, safe, and secure water supply by reforming the water rights system, using smart technologies to measure consumption, and enhancing water resource and pollution discharge governance at the basin level and at local levels; broaden use of payments for ecological services to address nonpoint source pollution challenges; and increase public awareness through new means like water footprint accounting.	Modernize urban utility management by reforming water pricing to improve sustainability of water and wastewater treatment services; strengthen governance by piloting mechanisms like water boards in metropolitan areas and aggregating services in small towns, adopting transitional arrangements for meeting wastewater standards for weaker cities to help improve coverage.
<b>Improving solid waste management: waste reduction, recycling and disposal</b>	
Charge waste removal fees that can fund more efficient collection, separation, and disposal of waste, and encourage life-cycle product stewardship programs that help avoid waste generation.	Improve the planning of waste disposal by strengthening environmental impact assessments, improve their operations by reducing air and water pollution from incinerators and landfills, and provide for the proper closure, rehabilitation and safe reclamation of old landfills.

can be cost-effective only when applied at a larger scale beyond the jurisdiction of each city and province. Third, spending resources for air pollution mitigation wisely requires a comprehensive, multipollutant approach that identifies those policies and interventions that

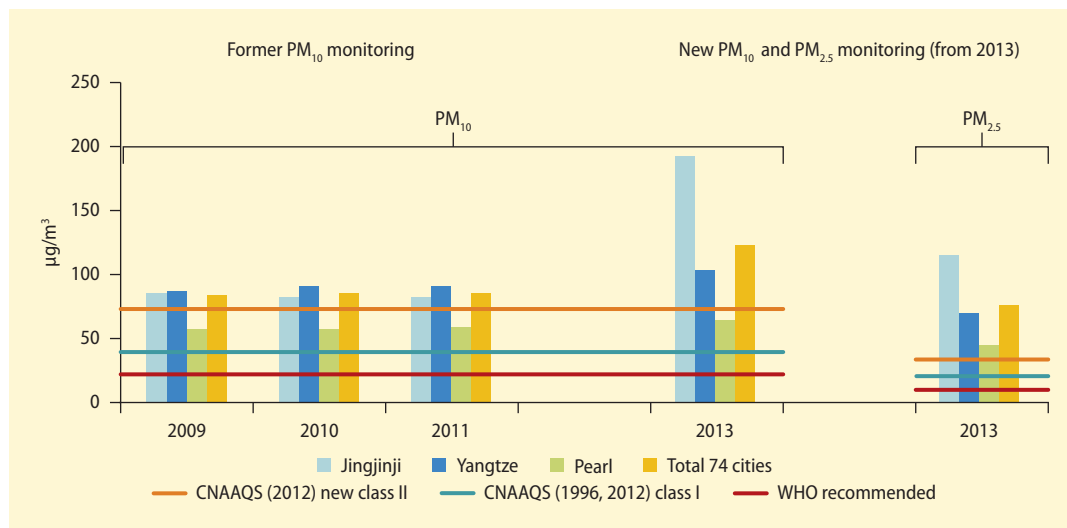
provide the largest pollution reductions at the lowest cost. This strategy also includes the identification of abatement options that result in both local air pollution and climate change reduction (co-benefits). Specific abatement actions will occur at the sector level. Because

of the cross-sectoral nature of the air pollution problem, an effective institutional and regulatory framework is critically important.

Urban air quality has gradually improved as prevention and control policies have been successively tightened (World Bank–MEP 2012). The annual average concentration of relatively coarse particulate matter ( $PM_{10}$ ) for 113 priority cities fell by about 40 percent, from 145 to 83 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) between 1997 and 2012.  $SO_2$  emissions have been declining since the late 1990s and particularly since the mid-2000s, mainly because of the wide application of flue-gas desulfurization at power plants (Lu and others 2010). Overall,  $NO_2$  emissions have also showed a decreasing trend over the past 15 years, although this trend has leveled off in recent years most likely because of the increasing vehicle fleet in Chinese urban areas (Nygard and Deichmann 2013). Much progress has also been made in collecting and disseminating information on urban air pollution. A nationwide monitoring program for fine particulate matter ( $PM_{2.5}$ ) initially covered 74 cities. China's Center for Environmental Monitoring now provides hourly updates of air quality for about 175 cities on the web, with plans to expand the program to all 325 prefecture-level cities.

Despite these positive trends, air pollution levels remain high. Average  $PM_{10}$  concentrations in 2012 are still more than 20 percent higher than the new Class II rating under CNAQS and 325 percent higher than the WHO preferred standard of  $20 \mu\text{g}/\text{m}^3$ . Moreover, these averages mask far higher levels in individual cities and city clusters, especially in the North China plain including the Beijing, Tianjin, Hebei (Jingjinji) region (figure 7.11). Furthermore, data for the first half of 2013 suggest that  $PM$  concentrations may have increased, with  $PM_{2.5}$  levels about twice the Class II standard and seven times the WHO standard of  $10 \mu\text{g}/\text{m}^3$ .  $PM_{2.5}$  is of great concern because these very small particles can enter deep into the cardiovascular and respiratory systems, causing high morbidity and mortality. Overall, the newly available monitoring data suggest that  $PM_{10}$  concentrations appear substantially higher than earlier reported. The Jingjinji region experienced severe pollution, where even healthy people should avoid outdoor activities, on 48 days during the first half of 2013. While cities in West and North China once had the highest  $PM_{10}$  concentrations, the new  $PM_{2.5}$  and ozone ( $O_3$ ) data indicate that the centers of heavy air pollution are now in the industrial centers in the North China Plain.

**FIGURE 7.11**  $PM_{10}$  and  $PM_{2.5}$  monitoring results from 74 pilot cities, including 3 regions, 2009–13



Source: Calculations based on Renmin University 2013, World Bank–MEP 2012, and CNEMC 2013.

Note: Since the 2013 figures are for the first half year only, both the standards and the concentrations levels are illustrated in dotted lines and bars.

Unless the patterns found in early 2013 are due to unusual circumstances, it seems unrealistic for many cities to achieve CNAAQs Class II standards as intended by 2016.

*China's air pollution problem may be getting more complex*

The causes of these unexpected spikes in air pollution are still debated, and they may well be temporary. But air pollution problems will remain challenging for a number of reasons that also have a bearing on possible mitigation strategies. First, the composition of pollution sources in China's cities is gradually changing. It is also highly variable, because China's cities have different geography, industrial structure, and energy supply patterns. Far too few rigorous and comparable pollutant source apportionment studies have been done for Chinese cities. Overall, coal combustion—in power plants, industry, and residential use—remains an important contributor to China's air pollution, especially in winter, where it can account for as much as 60 percent of  $PM_{10}$ . The share of emissions from vehicles is rising. Although new cars are cleaner, the volume of new vehicles is very large and vehicular emissions can account for as much as 30 percent of  $PM_{2.5}$ . Natural

sources in the form of dust worsen air pollution problems, especially in the North, where seasonally and during severe dust storms they can make up to 60 percent of  $PM_{10}$  in some cities, including Beijing (table 7.2). The continued uncertainty about pollution sources and the dynamic nature of source compositions show the need for a much better understanding of where air pollution comes from.

Second, the way in which particulates form is growing more complex, with the share of so-called “secondary pollutants” increasing. This is the share of fine particulates such as  $PM_{2.5}$  that forms in the air when gases such as sulfur dioxide ( $SO_2$ ), nitrogen oxides ( $NO_x$ ), and ammonia ( $NH_3$ ) react chemically. Most  $SO_2$  comes from coal combustion, while most  $NO_x$  is emitted by vehicles. Ammonia is an important precursor. In fact, such chemical reactions are facilitated by cold temperatures such as those that the Jingjinji region experienced in early 2013 during the spike in  $PM_{2.5}$  concentrations.<sup>18</sup> Over the North China Plain, most ammonia comes from agricultural activities—nitrogen fertilization (54 percent) and livestock emissions (46 percent; see Zhang and others 2012). Ammonia emissions have increased rapidly over the past twenty years. Because ammonia emissions worsen the impact of gaseous emis-

**TABLE 7.2 Breakdown of  $PM_{10}$  and  $PM_{2.5}$  sources nationwide and in Beijing**

Sources	$PM_{10}$ % share	$PM_{2.5}$ % share	
		Nationwide	Beijing
Suspended dust	30–60 (North) 5–30 (South)	34 (North) 29 (South)	17 (suspended) 7 (construction)
Coal combustion	20–60 (Winter) 5–20 (Summer)	10–30 (within city only)	16.7 within city 24.5 outside city
Industrial processes (iron steel, cement dust)	Up to 20	Up to 32 (mainly cement)	—
Vehicle emission	5–20	15 (North) 20 (South)	22
Biomass burning	Up to 10	14 (North) 20 (South)	9
Secondary PM (Beijing, Yangtze, Pearl River)	20–40 (largely $PM_{2.5}$ )	10–57 (from $SO_2$ , $NO_x$ , $NH_3$ )	40–50% (from $SO_2$ , $NO_x$ , $NH_3$ )

Source: World Bank—MEP 2012, 11; Nygard and Deichmann 2013; Yang and others 2012; Lei and others 2011.

sions from fossil-fuel burning by helping to create more PM<sub>2.5</sub>, reducing them will also lessen the impact of emissions from energy generation and use. That will require halting the considerable overapplication of fertilizer (Liu, X., and others 2013) and introducing better livestock management. The complexity is further increased by the need to also consider greenhouse gas emissions. Air pollution abatement often can yield significant CO<sub>2</sub> reductions as a co-benefit (Liu, F., and others 2013) and also reduces short-lived climate pollutants, of which black carbon is of particular importance. Because pollutants from different sources interact in complex ways, it is important to address pollution from all sources—that is, a multipollutant approach that also considers carbon pollution—rather than focus on one in particular.

The third aspect is the role of long-distance transport of air pollutants. Dust and particulates produced in one province can reach cities in a neighboring province. Emissions caused by agricultural activities in distant rural areas can worsen urban pollution problems. As a result, already high pollution levels may become even more severe by events or actions that take place far away from the area of impact. In the Jingjinji region, Hebei accounts for as much as 89 percent of the industrial PM emissions and 81 percent of the SO<sub>2</sub> emissions, while Beijing accounts for only 4 percent and 6 percent, respectively (Xinhua 2013). Similarly, in the lower Yangtze River Delta, 84 percent of industrial PM and SO<sub>2</sub> originate in the neighboring Jiangsu and Zhejiang provinces, while 16 percent of the emissions originate in Shanghai city. Long distance transport of pollutants implies that air quality management cannot only be done on city-by-city level but rather must be planned and implemented at a closely integrated regional scale (for example, in a regional “airshed”) that brings local urban and regional AQM together.

Finally, an emerging question is whether climate change could have an impact on local air pollution levels. One well-understood aspect is that the higher temperatures expected with global warming facilitate the formation of ozone, which can harm the respiratory system and lead to asthma,

bronchitis, and premature death. A less researched aspect is arctic amplification that can cause greater swings and a slowing down of the jet stream (Francis and Vavrus 2012; Nygard and Deichmann 2013). Weather systems may remain in place longer, leading to a greater accumulation of pollutants. The possible role of climate change highlights the fact that uncertainty is likely to increase, so our assumptions must be continuously updated.

### *Strengthening air quality management*

Many parts of China’s air pollution control policies have worked well. For instance, the amended air quality law of 2000 focused control efforts on 113 priority cities with the greatest air pollution problems. These cities significantly reduced PM<sub>10</sub> concentrations over the following decade. Lessons learned should now benefit all of China’s cities that face air quality challenges. A comprehensive air quality improvement strategy needs to address three important aspects.

Different cities face very different challenges in meeting China’s ambient air quality standards, and these differences should be reflected in the prescribed implementation schedule for pollution reduction policies. The standards establish a uniform target air quality level for all cities under the principle that all of China’s urban residents should be able to enjoy clean air as soon as possible. But cities have very different pollution levels that arise from industrial structure, natural conditions, and capacity to implement mitigation policies. A uniform path to compliance is therefore unrealistic and probably counterproductive. A more differentiated set of target dates, with intermediate targets for the most polluted cities, can make achievement more manageable while still retaining the incentives for already-cleaner cities to reach targets faster or to overcomply, for instance by pursuing the stricter WHO standards.

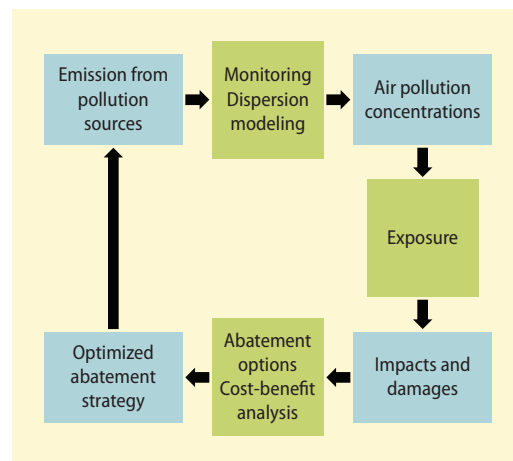
Because air pollution travels across administrative boundaries, control programs must be organized regionally. Much of the air pollution in many of China’s cities originates from areas that are beyond the control of city governments—from other urban centers but also from nearby agricultural areas. Purely



local abatement action will not be sufficient to clean the air, especially in larger city clusters. Other global metropolitan areas with historically large pollution problems have set up powerful regional AQM authorities. In the United States, the South Coast Air Quality District is in charge of air quality planning, regulation, compliance assistance, enforcement, monitoring, technology advancement, and public education for the greater Los Angeles region in California, home to 17 million people. And the Ruhr area in Germany established a regional AQM strategy (*Luftreinhalteplan Ruhrgebiet*) that coordinates abatement measures across 13 individual cities such as Essen and Dortmund. Such models could be adapted to strengthen regional institutions in Chinese city regions with severe air quality problems such as Jingjinji. To be effective, such regional institutions or similarly effective mechanisms need to be endowed with a clear mandate and legal authority across municipal boundaries, together with strong enforcement mechanisms, which in most countries leverage the legal system. A clear coordination mechanism also is needed covering the many municipal sector and environmental management bureaus whose actions affect air quality.

Air quality action plans need to be guided by a comprehensive and rigorous analysis of the costs and benefits of abatement options. In response to recent severe air pollution incidents in China, the government has announced large additional air pollution control efforts, including a RMB 1.7 trillion program to be implemented over 2013–17 (Xinhua 2013). To ensure that such funds are well spent, a solid technical and economic analysis should identify the most cost-effective abatement strategies. The approaches need to be both broader—by considering pollution sources and impacts in a larger geographic region—and deeper—by employing much finer-grained data on individual pollution sources and exposed populations. These are common in North America and Europe, and Chinese researchers and policy analysts also have the expertise to implement them. A comprehensive, integrated AQM approach involves four major steps (figure 7.12; see also box 7.7).

**FIGURE 7.12 Framework for comprehensive integrated air quality management**



Source: Nygard and Deichmann 2013.

The first step is the identification of emission sources, including their geographic location, by conducting a detailed inventory and analysis of emission sources, both stationary ones such as power plants and nonstationary ones such as vehicles. In the second step, a combination of ground-monitoring data and atmospheric dispersion modeling determines air pollution concentration levels in all parts of the area. In a regional application, this step will involve a hierarchically structured set of models with fine resolution local models nesting into coarser resolution regional or even national models.<sup>19</sup> In the Jingjinji region, for example, the overall regional level could be covered by 50-by-50 kilometer grids at a coarser resolution in an overall 700-by-700 kilometer coverage, while 14 urban areas would be covered by finer resolution grids of 1–5 kilometers within the 50-by-50 kilometer coverages (figure 7.13). The resulting information can then be used to predict how pollution concentrations in individual locations change with the introduction of very specific abatement measures, even at individual facilities. In principle, this procedure allows design of abatement options to achieve specific air quality targets at the level of individual monitoring stations.

The third step translates observed and modeled air pollution concentrations into impacts by estimating who is exposed to how

### BOX 7.7 The call for integrated, multipollutant approaches to air quality management in the United States

An extensive review by the National Research Council of air quality management (AQM) in the United States since introduction of the Clean Air Act in 1978 concluded that further improvements would require “an integrated multi-pollutant approach to controlling emissions of pollutants posing the most significant risks” (NRC Committee 2004). The council advised that such approaches should seek opportunities for addressing air pollution and climate change mitigation simultaneously. Recent research has highlighted the importance of short-lived climate pollutants such as black carbon that are also reduced through measures that target

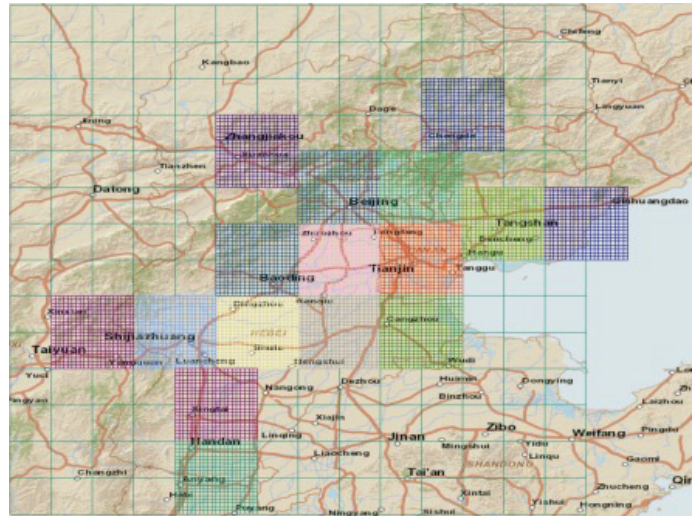
PM<sub>2.5</sub>. Since the council’s review, states and local governments have passed laws requiring multipollutant AQM planning that takes greenhouse gases into account. States can also save money and achieve air quality targets more effectively if control measures for traditional pollutants, such as NO<sub>x</sub> and SO<sub>2</sub>, are integrated with required CO<sub>2</sub> reductions (James and Schulz 2011). As China embarks on more aggressive pollution controls and decarbonization efforts, such integrated, multipollutant approaches can identify cost effective pathways that lead to significant emission reductions in local and global greenhouse gas emissions.

Source: NRC Committee 2004; James and Schulz 2011.

much air pollution and then applying so-called dose-response functions, which link pollution levels to health outcomes including premature death. In an urban context, the impacts on human health are most important, but other impacts include diminished visibility, corrosion, or cleaning needs. In a broader context, impacts on natural ecosystems through eutrophication or acid rain as well as long-term climate change impacts, for example, should also be considered. Comparison of current impacts with those modeled under various abatement scenarios provides measures of benefit (avoided damages). If the abatement option is an efficiency measure, additional co-benefits could also include energy or other resource material savings. In the final step, these benefits are compared with abatement costs. Going through this process for various abatement options identifies the most cost-effective air pollution control strategy, for instance in the form of a marginal abatement cost curve that ranks policies or investments according to their damage reduction per unit of expenditure. An effective tool is to present the abatement options on maps and show how much air pollution concentrations will be reduced in separate sections of the city.

Given the recent spikes in air pollution in many Chinese cities, it is easy to forget that

**FIGURE 7.13** Example of a nested modeling system of air quality in the Jingjinji region in China



Source: Nygard and Deichmann 2013.

Note: See text for explanation.

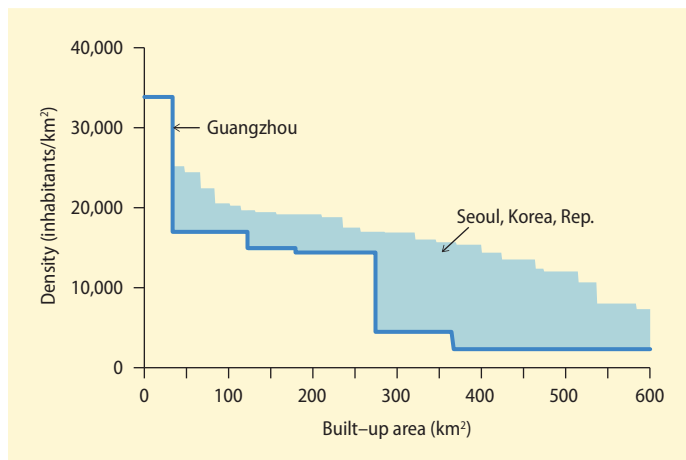
air quality today is better than a decade or two ago. With rising wealth, expectations for quality of life increase, and China’s urban residents today value clean air more. China can leverage experience and technology from elsewhere and mobilize significant domestic expertise and resources to tackle the urban air pollution problem. But international experience also shows that quick improvements

are unlikely. Heavily polluted cities in Europe and the United States reduced pollution levels by well over 90 percent from their peak, but it often took several decades of determined policy implementation. China can achieve its goals faster, but blue skies will not come overnight.

### Shaping urban energy and infrastructure needs through urban form and planning

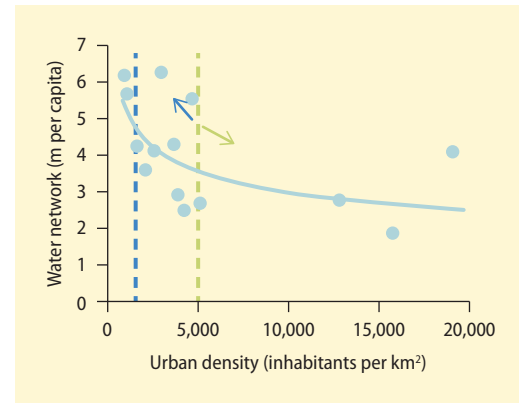
The urban form—a city's spatial development—will shape China's urban energy and infrastructure needs and thus heavily determines their environmental impacts.<sup>20</sup> Urban form strongly influences city infrastructure and in turn the behaviors of city dwellers. Because of its multisector nature, urban form is a key lever for strategies to improve resource efficiency and to maximize use of renewable resources. Urban form, once established, is very difficult to change. Urban infrastructure embeds a path dependency, possibly for generations—it establishes the way people travel and live, encouraging a lifestyle that is hard to change after people grow accustomed to it. Yet it is still possible to change mobility choices and the sizing and scaling of street patterns that meet the needs of all users, both motorized and nonmotorized (Ollivier and others 2013).

**FIGURE 7.14** Potential of redensification in the densest 600 km<sup>2</sup> in Guangzhou, compared to Seoul



Source: Salat 2013.

**FIGURE 7.15** Water network length and urban density

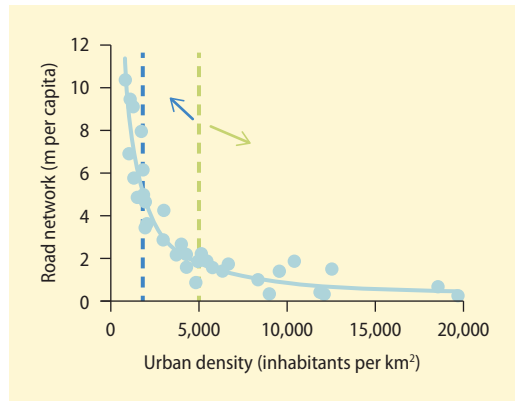


Source: Adapted from Müller and others 2013.

Note: This and subsequent figures map a set of cities worldwide to illustrate the relationship between density and water and transport networks. The green line corresponds to the current average urban density levels in Chinese cities. The red line illustrates urban sprawl impacts. The green arrow illustrates the path efficiency from denser urban development.

China has the world's largest urban population, but, surprisingly, its cities are not particularly densely settled. Guangzhou for example, could increase its population in the densest 600 square kilometers by 70 percent, or 4.2 million people, if it raised its density to the level that prevails in Seoul (figure 7.14). Similarly, Shenzhen could increase its population in the densest 600 square kilometers by 98 percent. Population densities are also less uniform in Chinese cities. Densities of neighborhoods vary by a factor of 10 in the Paris and New York metropolitan areas but densities of some neighborhoods of Beijing, Shanghai, Guangzhou, and most other large Chinese cities are as much as 20 times greater than other neighborhoods in the same city.

Urban sprawl—with rapid growth of low-density areas at the urban periphery—increases resource use in three general ways. First, low-density development increases fuel consumption in urban transport through longer commutes and more private motorized trips. Second, low-density areas increase living space per person, and consequently lead to higher per capita energy use for home heating, cooling, and general power consumption. Third, low-density development produces infrastructure used less intensively than that in dense urban cores, lowering economies of

**FIGURE 7.16** Road network length and urban density

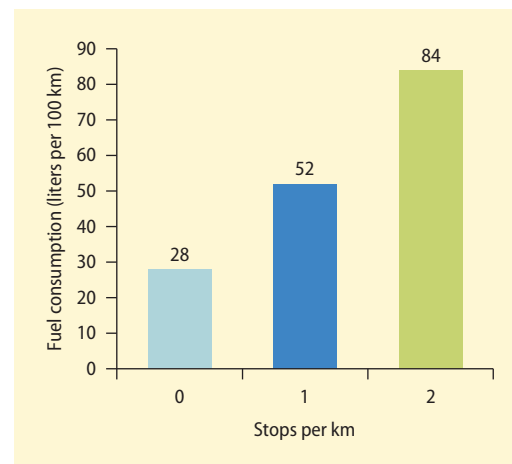
Source: Adapted from Müller and others 2013.

scale (figure 7.15; figure 7.16) and increasing the capital, operation, and maintenance costs for infrastructure services. Globally, efficient urban forms are quite diverse because the relationship between end users and the urban fabric is complex. There is no ideal urban form that can be copied from place to place. However, there are characteristics common to most efficient cities that typify outcomes of good urban planning practices. First, while efficient urban forms vary in scale and density, compact urban forms make it easier to support public transport; generate lower demands for energy, water, material and waste; and limit encroachment on farmland and natural areas. Second, efficient urban forms mix different uses with housing to provide shops, services, and employment nearby, reducing the need for a car. Third, efficient urban forms stand out as high-quality places to live and offer a diversity of interactions among residents and businesses that fosters innovation.

As urban form locks in a path dependency, it locks out options for greener urbanization. For instance, studies have shown that a 10 percent increase in density reduces transportation energy consumption much more in already denser urban areas than in less dense ones, because the relationship between transportation and density is nonlinear (Porter and others 2013). Transit-oriented development, an energy-efficient option for cities, is generally not practical or economically viable

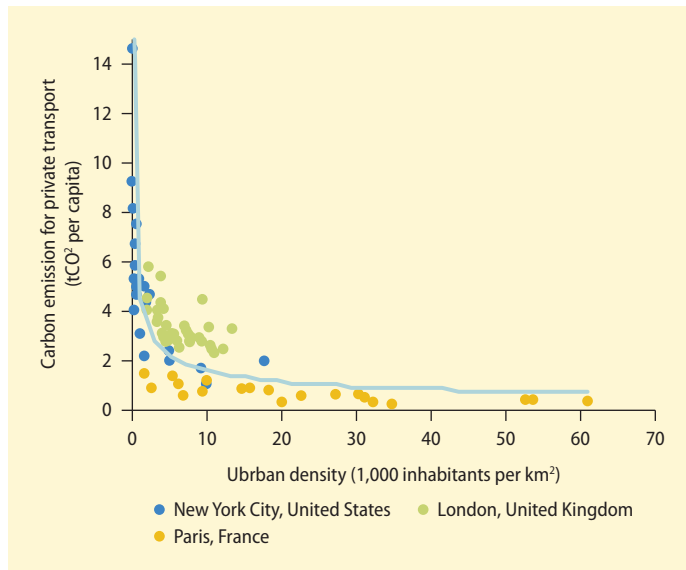
in low-density suburban areas (figure 7.18). Unbalanced metropolitan areas, with dense urban cores and an extended low-density periphery induce greater commuting flows from the periphery to the center. As a result, both transit capacity and road networks must be oversized to accommodate peak loads during rush hour. The resulting congestion of the street network is responsible for significant increases in energy consumption and greenhouse gas emissions from transportation, up to 300 percent for freight (figure 7.17). Studies in Jinan, for instance, calculated that household vehicle kilometers traveled are five times larger in the more modernist single-use superblock configuration than in a mixed-use, traditional street-grid neighborhood (MIT-Tsinghua-EF 2011).

A priority action for promoting compact urban form is to revisit the statutory urban planning rules that are barriers to optimizing resource use. Lower densities are partly a consequence of China's statutory urban planning rules and related land market policies (see supporting report 2). Largely unchanged for decades, statutory urban planning rules require blocks to measure 400 meters on a side, which locks cities into car dependence. Japanese cities, by comparison, have an average distance of 50 meters between intersections, making them more pedestrian-friendly.

**FIGURE 7.17** Fuel consumption for freight (40-ton trucks) and congestion

Source: Larsson 2008.

**FIGURE 7.18** Superposition of carbon emissions per capita for private transport and urban density in metropolitan London, New York, and Paris



Source: Bourdic 2011.

Among the key statutory urban planning practices or rules to be reviewed are these:

*Oversizing of urban street grids.* Unchanged for the past 20 years, the sizing of the grid prescribes a main road every 500 meters and an even bigger road (10 lanes) every kilometer. This rule is responsible for three constraints on energy efficiency: the oversized urban “super” blocks; oversized main roads with 8 to 10 lanes and high speed limits create a “constrained” hierarchy that makes adjacent urban elements difficult to access; and they prevent street scaling that is needed for efficient distribution of traffic flows, resulting in lower linear densities of streets (kilometers of roads to square kilometers of urban area), more traffic jams, and higher energy use and carbon emissions from transportation. The absence of a scaling hierarchy in the street network—that is, the absence of secondary and tertiary levels of streets—results in a linear density of streets that is on average five times lower than in Europe and in Manhattan and ten times lower than in Japan.

*Setback rules.* In some cases, the frontage is set back 100 to 150 meters from the already

oversized road width, resulting in distances of 300 to 450 meters between buildings on opposite sides of the roads. These setback rules prevent reducing the size of the urban block to a more energy-efficient size—if the urban block were smaller than 400 meters, after deduction of setbacks, there would be very little land left for the building footprint.

*Green space requirements in the block.* Although a global target of 30 percent green space may be desirable if applied throughout a city or neighborhood, its calculation at the block scale and the requirement to implement it block by block prevent any size reduction of the blocks—again, if the block size were reduced there would be little ground left for buildings.

*Absence of superblock subdivision into smaller plots.* This rule results from the state ownership of the land and prevents any complexity and fine grain in the clusters of buildings through a progressive development of the block. Once developed, the superblock cannot be redeveloped afterward because of the lack of a land market allowing further subdivisions and sales either of smaller land plots or of building rights.

*Spacing between the buildings for solar access.* The rule that requires spacing the buildings at a distance equal to 1.7 times their height to ensure solar access has a very strong impact on the built volumes by constraining the form and height of the buildings. Combined with the setback rule, the rule prevents a perimeter development of the block, it requires leaving the land in the superblock almost empty, with plot coverage ratios around 15 percent. The only solution left to developers to increase density is to make the buildings larger and increase their height, with detrimental effects on energy efficiency.

*Large-scale zoning.* Chinese zoning practices are set at a very large scale, preventing a finer grain of zoning that would allow mixed uses. These practices could be revisited to promote greater mixed uses, which would bring amenities, jobs, and services, closer to housing, thus reducing transport needs.



Compact urban forms will need strict emission controls because more people will be exposed to pollution in a smaller area. Many public outcries from environmental incidents originated in cities in China. When people are concentrated in a smaller area, a single negative environmental incident can have large multiplier effects on human health. Therefore, policies that promote redensification offer both challenges and opportunities. While exposure levels have increased as a result of urbanization, measures to reduce exposure in dense areas can reach more people, more quickly, and thus improve cost effectiveness.

### **Providing sustainable and safe urban transportation**

An efficient transport system supports urban economic growth by moving goods and people within and between cities quickly and at low cost.<sup>21</sup> Transport is also critical for social inclusion. As cities grow in size, the distance between one's residence and one's job also rises, and it is often low-income groups who can find affordable housing only far away from economic centers. Besides supporting growth and inclusion, transport also affects sustainability. Overreliance on individual transport and a large stock of inefficient vehicles lead to congestion, rising energy consumption, and air pollution. China's cities have two tasks to ensure that urban transport not only supports inclusive growth but also sustainability objectives. First, they can avoid emissions and lower congestion by continuing to encourage a shift to public and nonmotorized transport with much greater attention to the quality and convenience of public transport services. Price instruments and regulations will help reduce car travel, but urban planners should also create compact cities with well-coordinated land use and transportation plans where alternatives to automobiles are more feasible and efficient. Second, for vehicle traffic that cannot be avoided, the second priority is to reduce emissions from a cleaner vehicle fleet. Here, China should broaden achievements in transport pollution control by accelerating the switch to ultra-low-sulfur diesel and gasoline

for vehicles nationwide, transitioning to new vehicle emission standards for heavy-duty vehicles, and rapidly phasing out high-emission vehicles that account for a large share of emissions.

Reducing the environmental burdens imposed by a growing transport sector is not just a welfare issue. Impacts from the sector also have a large, measurable cost. Time lost to congestion and associated higher fuel use causes by far the highest external, or indirect, costs from transportation, followed by health damages from air pollution, traffic safety, and noise pollution. International estimates of total indirect costs from road transport range from \$0.05 to more than \$0.40 a kilometer (Proost and van Dender 2011). Two studies have estimated the indirect costs from transport in Beijing. Mao, Zhu, and Duan (2012) put the figure at 4.2 percent of GDP for congestion costs only, while Creutzig and He (2009) put it at 7.5–15 percent for all types of externalities. Even at the low end of these estimates, the large external costs from private transport can justify significant policy intervention including support for public transit from general revenue or dedicated taxes where preferred policies such as congestion charges or energy and carbon taxes are not feasible (Parry and Small 2009).

### *Encouraging more efficient urban transport*

Urban road expansion will not be able to keep up with the continuously rising number of vehicles in China's cities. China's vehicle fleet has grown by more than 14 percent a year on average over the past two decades, largely fueled by private car ownership. In 1990, China had 5.5 million vehicles, of which only 800,000 (14.5 percent) were privately owned. In 2012, China had 121 million vehicles, of which 93 million (77 percent) were private cars. As incomes rose, the number of vehicles grew even faster. While better mobility is a universal human ambition, the reality has been that in Chinese cities, more cars have actually reduced mobility because many are stuck in traffic for long hours. So far, the response has been to increase the supply of roads, creating impressive urban road networks in many cities.



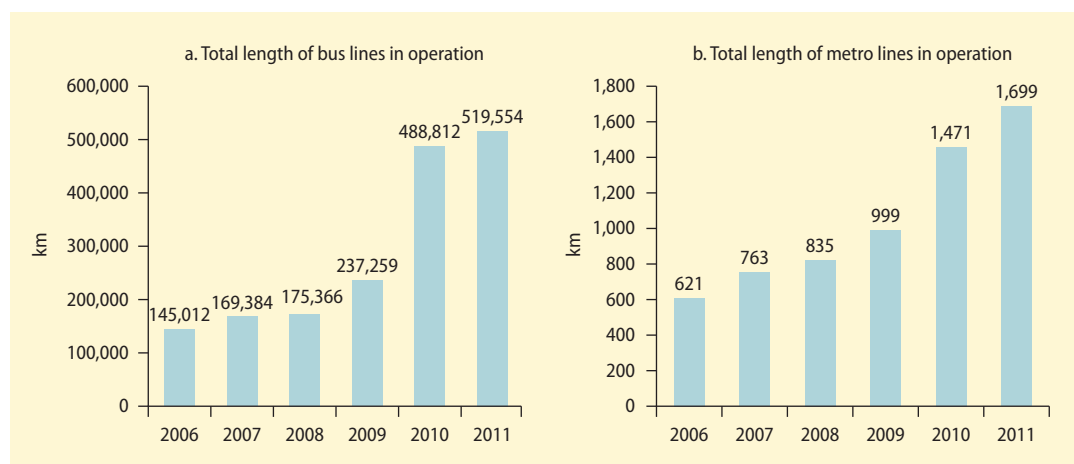
As road construction becomes more costly or impossible in dense urban areas, more emphasis must be put on demand management, which reduces the amount of travel and shifts traffic to public transit. The most effective management measure is to fully charge drivers the cost of using private vehicles, including environmental and social costs. Road pricing, including congestion charges in all or part of a city, is the economically most efficient management measure, but it is complex to implement and, like all price instruments, affects lower-income drivers relatively more. There are therefore few cities, such as London and Singapore, where comprehensive congestion charging has been introduced. It will often be more manageable to charge tolls on selected roads, such as major arteries or bridges into a city, as in Wuhan where electronic toll collection has been introduced on seven bridges and one tunnel. Parking policies also affect traffic densities. Cities can ration parking spaces, for instance by reducing required minimum parking spaces for new housing or office developments as is now happening in many U.S. cities. And charges for parking spaces should reflect the value of the land, which often exceeds the cost of the vehicles that occupy it.<sup>22</sup>

Other demand management approaches already used in some Chinese cities include quotas on license plates assigned through auctions or lotteries. International evidence

has been mixed on temporary restrictions, for instance based on license plate numbers. Well-designed restrictions can reduce emissions quickly (Viard and Fu 2013), but they are usually not sufficient to stem the growth of the car fleet over time, and, if poorly designed, they can increase emissions as many households purchase lower-efficiency second cars with different plate numbers. The central government can play a role in establishing clear guidelines for introducing demand management procedures for congested cities. Technical standards and public communication strategies to make congestion and parking charges more acceptable would be included. While national guidelines provide a reference frame, the most appropriate specific policy mix will be city specific.

Policies to reduce driving by making private vehicle use more expensive or more difficult should go hand in hand with making mass transit options more convenient. Chinese cities have vastly expanded public transport. The total length of bus lines in operation increased from 145 thousand kilometers in 2006 to 520 thousand kilometers in 2011, about 62.5 thousand kilometers a year (figure 7.19). The total length of metro lines in operation increased from 621 kilometers in 2006 to 1,699 kilometers in 2011. By the end of 2012, the total length of metro lines in operation had reached 2,008 kilometers in 17 cities in China. Moreover, metro systems

**FIGURE 7.19** Total length of bus and metro lines in operation



Source: NBS 2007a–12a.

in 28 additional cities have been approved or are already under construction, and the total length in operation is expected to reach 5,000 kilometers by 2015.

Despite these significant capital investments in and operating subsidies for public transport in recent years, its modal share in major Chinese cities remains lower than in other major cities such as Seoul, New York City, and Tokyo. Not only is more investment in capacity needed, however, service quality and comfort needs to be improved through better system integration and accessibility. Better service integration includes more convenient, efficient, and safer access to train stations and bus stops, particularly for walkers, cyclists, and people with disabilities; better connections between mass transit and buses; and improved and expanded park-and-ride lots. Integrated traveler information systems facilitate trip planning and keep travelers informed. Giving buses priorities on roads makes the service more convenient, reliable, and efficient. That can be done by creating bus-only lanes and queue jumps that allow buses to proceed with little or no traffic delay, providing traffic signal priority at certain intersections, and installing preboarding payment systems to allow passengers to board buses faster. These measures help buses keep to their schedules, improve bus service, and reduce roadway congestion.

Transit-oriented development (TOD) can further improve the convenience of public transit and the efficiency of service provision but has rarely been a specific aim of major developments and transport investments in China. In California, research showed that TOD can increase ridership on rail and buses by three to four times relative to control sites (Lund, Cervero, and Willson 2004). TOD emphasizes compact, mixed-use buildings and neighborhoods that encourage walking, cycling, and use of public transit. The high density of residential and commercial buildings allows proximity to and a functional relationship with transit stations and terminals, giving easy access to high-quality public transport to a large share of the population. Construction of transit hubs as part of TOD also raises surrounding land values signifi-

cantly. Part of the increased land values can be captured through taxes or special assessments, thus helping to finance public investments. Better road planning complements TOD through hierarchically classified road networks providing complete city coverage, and through people-oriented facilities for safe walking and biking such as those provided by “complete streets” that consider all transport modes equally.

To make integrated, multimodal transport planning work requires close cooperation among the planning bureau, development and reform commission, finance bureau, construction commission, transport bureau, traffic police department, land resources bureau, and others. Many cities have therefore set up a metropolitan transport authority with responsibility for planning and overseeing all transport mode investments and operations in that metropolis. Hong Kong SAR, China, and Singapore offer good examples in the region. Vancouver and London provide good international examples. Such transport agencies are suitable not only for large cities. In the United States, for example, almost 400 federally mandated and federally funded metropolitan planning organizations bring together representatives from a range of local and state agencies and from different transportation modes, such as public transit, freight, bicycling, and pedestrian. The planning organizations also have a citizens’ advisory committee that represents community groups, professional organizations, neighborhood associations, and the private sector.

Building and operating an efficient transport network is not feasible without dedicated and predictable funding mechanisms, especially because of the long planning and construction process and the long life span of transport infrastructure. A dedicated fund to improve public transport services could be created in cities through various charges on private vehicles, including earmarking a share of the fuel levy and vehicle purchase fee, currently collected by the central government, but which is mostly used for highways. China’s government should revisit the current central road-financing arrangement to allow for the establishment of urban transport funds for major cities.

### Controlling vehicle emissions in urban areas

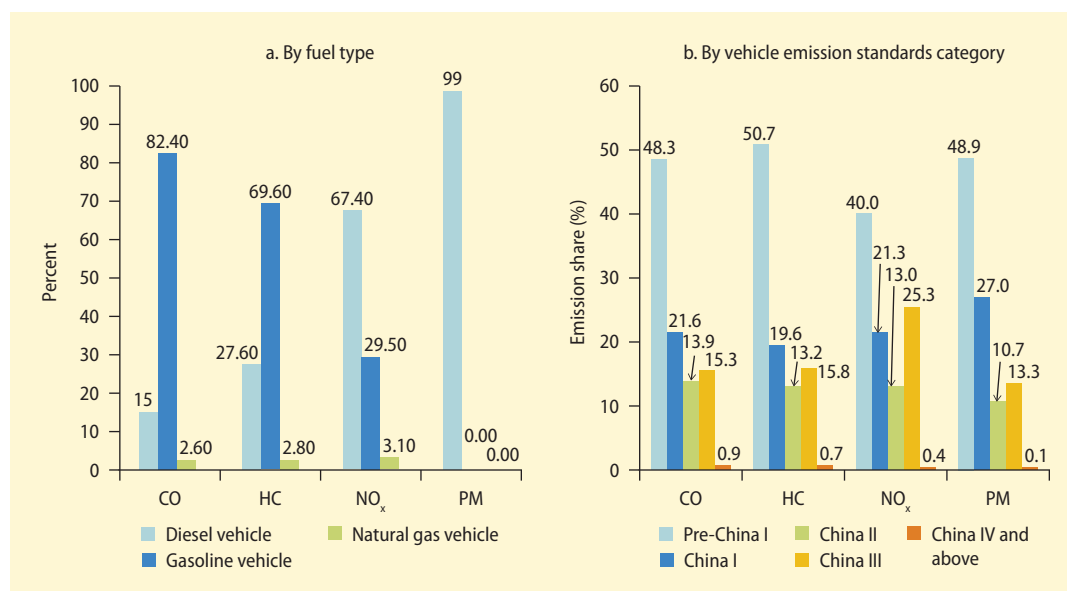
Transport-related emissions, mostly from road transport, are a large and growing contributor to air pollutants in urban areas in China. In 2011, vehicle emissions produced 621,000 tons of PM<sub>2.5</sub> in China, 4.4 million tons of hydrocarbons, 6.4 million tons of NO<sub>x</sub>, and 34.7 million tons of CO. Vehicle emissions account for a high share of emissions in cities: for example, 56 percent of NO<sub>x</sub> and 22 percent of PM<sub>2.5</sub> in Beijing, 25 percent of PM<sub>2.5</sub> in Shanghai, and around 30 percent of PM<sub>2.5</sub> in Shenzhen.<sup>23</sup> A disproportionate level of NO<sub>x</sub> and PM<sub>2.5</sub> vehicle emissions comes from relatively few vehicles. In China in 2011, about 4.6 million diesel-fueled heavy-duty and 2.7 million medium-duty freight vehicles together accounted for 7.7 percent of the total vehicle fleet but 62.8 percent of NO<sub>x</sub> and 69.6 percent of PM<sub>2.5</sub> emissions from all vehicles (MEP 2012).

Sixty percent of emissions of four major air pollutants are caused by pre-China I and China I emission standard vehicles, which account for only a quarter of all vehicles (figure 7.20). A China I truck, if properly maintained, emits 36 times more PM<sub>2.5</sub>, 20 times more NO<sub>x</sub>, 9 times more hydrocarbon, and

3 times more CO than a similar truck that achieves the latest standard used in Europe (Euro VI). Vehicles also cause a significant and rising share of greenhouse gas emissions. Nationwide, the transport sector accounts for 7.1 percent of CO<sub>2</sub> emissions from fossil fuel burning, of which 78 percent are from road transport, according to IEA figures for 2010 (IEA 2013a).

While the overall fleet is becoming cleaner, the sheer number of new vehicles is still causing emissions to rise. Continued efforts to reduce vehicle emissions are needed. China has already made major progress over the past decade in reducing such pollution. It has tightened emissions standards following European benchmarks, although with a time lag. Since 2009, it has also begun to encourage scrapping of older vehicles. Fuel standards have been improved to some extent. In its retrospective, the International Council of Clean Transportation (ICCT) estimated that the programs adopted avoided 44 million tons of hydrocarbons, 239 million tons of CO, 38 million tons of NO<sub>x</sub>, and 7 million metric tons of particulate matter, preventing an estimated 170,000 deaths in 2010 (Fung and others 2010). In the long term, the use of natural gas could be expanded in the

**FIGURE 7.20** Vehicle emissions contributions in China



Source: MEP 2012b.

Source: MEP 2012b.

### BOX 7.8 Promoting electric vehicles in China: Opportunities, challenges, and implications

Hydrogen fuel cell and battery electric vehicles (EVs) produce no tailpipe emissions and accordingly little direct pollution in urban areas. Where electricity comes mostly from clean energy sources, total emissions associated with electric vehicles can be dramatically reduced. The introduction of such vehicles has accordingly become central to emission reduction objectives in many places such as the European Union. By 2030, the European Commission targets a 50 percent reduction in the use of conventionally fueled cars (EC 2011). If China's continuing efforts in energy restructuring are successful, vehicle electrification could contribute significantly to pollution abatement and climate change mitigation over the long term.

In 2009, the Chinese government initiated the *Ten Cities, Thousand Vehicles Program* to stimulate EV development (later expanded to 25 cities). Meanwhile, there is significant EV technology development in China by industry and academia, focusing primarily on batteries and charging technology. The result is an emerging EV value chain with new business models to provide the infrastructure, components, vehicles, and related services. But several challenges need

to be addressed to enable more widespread adoption of EVs:

- *Standards.* China has not yet launched its national standards for EVs, including those for vehicle charging, physical interface, safety and power grid standards, and compatibility with international standards.
- *Integrated charging solutions.* Since the pilot program focused on fleet vehicles (such as buses or taxis), charging infrastructure for private cars has not been fully developed technically and systematically.
- *Commercial models.* It is essential to build a commercially viable business model that bears the cost of charging infrastructure, because the industry cannot indefinitely rely on government funding.
- *Customer acceptance.* The significant up-front vehicle cost still deters customers, even as the lifetime ownership costs gradually become more favorable for EVs. While leasing could help address this issue, a secondary market for batteries in addition to a vehicle finance market would have to be established.

Source: Cackette 2013.

transport sector—if overall gas supplies can be increased. Hydrogen fuel cell and electric vehicles are expected to eventually capture a greater share of the transport market (box 7.8). In the meantime, China should broaden achievements in transport pollution control in three main ways:

*Accelerate the production of ultra-low-sulfur diesel and gasoline for vehicles nationwide.* Enabling China's refineries to produce ultra-low sulfur (10 parts per million or lower) will require large up-front investments, but the additional costs to consumers will be small. The ICCT estimated the annual cost of refinery upgrades (over a 10 year depreciation period) at RMB 9.6 billion for low-sulfur fuel and RMB 16.5 billion for directly upgrading to ultra-low-sulfur fuel. That translates to 2.5 fen and 8.1 fen per liter of low-sulfur gasoline and diesel respectively, equivalent to 0.33 and

1.08 percent of current retail value. Directly upgrading straight to ultra-low-sulfur fuel could raise prices by 5 fen for a liter of gasoline and 13.6 fen for diesel (ICCT 2012b). The most effective instrument to encourage the switch to cleaner fuels is through price instruments (ICCT 2013). For example, Germany's tax incentive of 12 fen a liter on ultra-low-sulfur fuel (both gasoline and diesel) led to a rapid drop in the average sulfur content to 3–5 parts per million (Walsh 2006). Consultation and communication well in advance of the introduction of these policies is essential to ensure their acceptance and effectiveness. Considering the relatively moderate fuel prices in China, a price differential between ultra-low-sulfur fuel and higher-sulfur fuel could be introduced through revenue-neutral preferential fiscal policies. Tax incentives to refiners provided in the form of accelerated depreciation, deductions in corporate taxes,

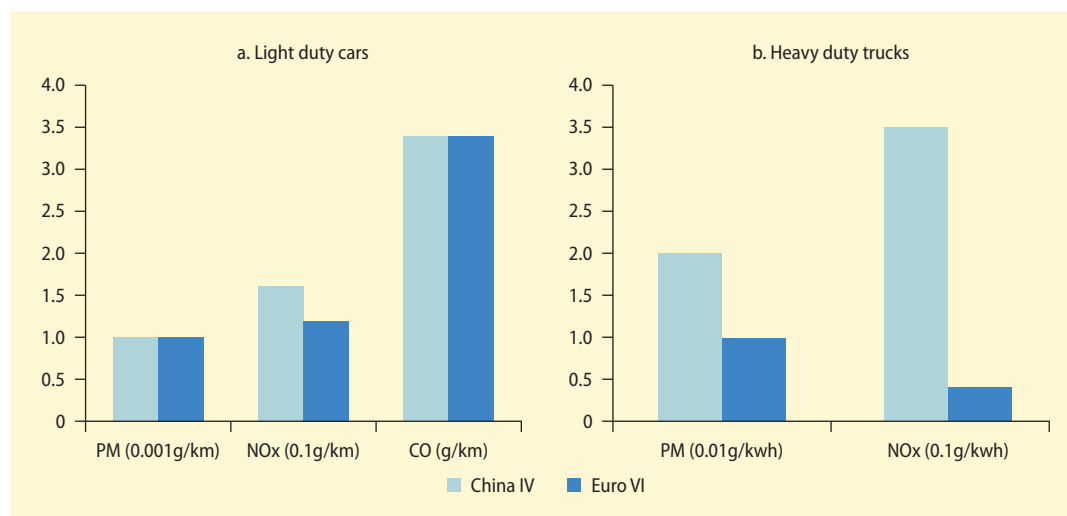
and direct government subsidies have accelerated the transition to ultra-low-sulfur fuel in Japan. In the United States, small refiners were given a tax incentive of RMB 0.08 a liter to produce ultra-low-sulfur fuel.

The transition to low- and ultra-low-sulfur fuels needs to be accompanied by strong standards, coherent administration, and effective enforcement. Currently in China, authority for vehicle emission control is scattered across multiple agencies, with MEP setting vehicle emission standards, the Ministry of Industry and Information Technology registering new types of vehicles, and the National Petroleum Products and Lubricants Standardization Committee (called TC280) setting fuel standards. Oil industry representatives and experts close to the industry dominate TC280 and its subcommittee (Fung and others 2010). MEP also lacks capacity for both fundamental research and testing capability. It currently has far less expertise and technical capability than the oil industry, particularly in evaluating the emission implications of various fuel compositions, which is essential for recommending standards. In addition, MEP has limited access to data on refinery capacity and has to rely on the industry's analysis of the cost and technical implications when considering adopting more stringent standards.

*Transition to stricter vehicle emission standards especially for heavy-duty vehicles.* Reducing emissions from new cars is important, because once on the road, vehicles are usually not replaced for more than a decade. For China, the difference between current standards (China IV) and Europe's current Euro VI standards will be relatively modest for light-duty vehicles. The difference is much larger for heavy-duty diesel-fueled vehicles, where  $\text{NO}_x$  emissions are 80 percent lower and  $\text{PM}_{2.5}$  50 percent lower under Euro VI compared with China IV standards (figure 7.21). One reason for high truck emissions is that there are fewer joint ventures in truck manufacturing compared with the car industry where there is greater access to cleaner technology and domestic innovation are more widespread.

The cost of adopting new emission standards evolves over time. The standards specify the emissions rather than the technologies to be applied. Accordingly, new emission control technologies emerge continuously and their cost drops as market penetration increases. For gasoline light-duty vehicles, the cost increase is low—on the order of \$45—to move from Euro III to VI. For diesel vehicles, the cost is substantially higher—\$1,200 for light-duty, and \$5,000–\$8,000 for heavy-duty (ICCT 2012a). For the often very small

**FIGURE 7.21** Expected pollution reduction from raising current emission standards to Euro VI standard



Source: Team calculations based on data from TransportPolicy.net, EU: Heavy-duty: Emissions, [http://transportpolicy.net/index.php?title=EU:\\_Heavy-duty:\\_Emissions](http://transportpolicy.net/index.php?title=EU:_Heavy-duty:_Emissions) (accessed December 2013).

trucking companies in China, these are substantive outlays, but the accelerated adoption of new standards is still justified by the large anticipated health benefits. For such regulations to be effective, they need to be supported by credible enforcement. Otherwise fake certificates and counterfeited or mislabeled fuel will inevitably appear. Enforcement requires resources and sufficient authority to apply fines, as in the case under the Texas Regional Emissions Enforcement Program.<sup>24</sup>

Achieving significant emission reductions in the urban road transport sector also requires addressing the administrative organization for enforcing vehicle emissions standards. The current Air Pollution Prevention and Control Law provides an incomplete framework to manage emissions from vehicles. It does not explicitly confer to any ministry the authority to recall vehicles that do not meet emission standards. While it allows provincial and municipal level EPBs to randomly select vehicles for in-use testing (like conducting road-side tests), it does not explicitly grant MEP such authority. Lacking clear authority to conduct in-use testing, to assess a penalty on manufacturers producing non-conforming vehicles, or to require manufacturers to recall noncompliant vehicles, MEP has weak enforcement power and limited means to deter production of sub-standard vehicles.

*Rapidly phase out high-emission vehicles.* With China's rising motorization rate, the number of new vehicles entering its roadways each year far exceeds the number of old vehicles being scrapped. To lower the average emissions of the entire fleet, the phase-out of the most polluting cars and trucks from urban areas should be accelerated. Governments in other countries have used two main measures to achieve this goal: penalizing high-emission vehicles, and providing incentives for early scrapping. Annual vehicle registration fees based on a vehicle emission levels provide the most straightforward way to charge for the damages caused. Seventeen European countries have also extended this concept to address climate change concerns and base all or part of their registration fees

on vehicle CO<sub>2</sub> emissions.<sup>25</sup> Individual cities, such as Milan, have also begun to penalize high emission vehicles by either charging them to enter the central and more congested areas or prohibiting them altogether. Providing a subsidy for owners to scrap high-emission vehicles can also be an effective way of accelerating fleet turnover. Several countries introduced time-limited scrapping programs in recent years, although often primarily as a way to stimulate the economy during recession.<sup>26</sup> The environmental benefits of scrapping programs need to be carefully evaluated because running a higher-emission vehicle for a few additional years may have less impact than the emissions from producing a new car, especially when the emission requirements for the new car are not strict (Gayer and Parker 2013). Environmental objectives may sometimes be better reached through taxes on high-emission vehicles (Li and Wei 2013).

### **Meeting urban energy needs by prioritizing efficiency and greening supply**

China has made enormous strides to improve the energy efficiency of its economy and mitigate some of the environmental impacts of burning fossil fuels in urban areas. Reductions in energy intensity during the 11th Five-Year Plan averted the use of 630 million tons of coal equivalent, or 1.46 billion tons of CO<sub>2</sub> emissions. Uncontrolled emissions of SO<sub>x</sub>, NO<sub>x</sub>, and PM<sub>10</sub> are in decline overall. Yet, the scale and complexity of the challenge remains daunting. Coal still hovers at around 70 percent of primary energy consumption, a similar percentage as in 1980, and severe air pollution persists in many cities despite ever stricter standards. As China's urban economy grows more efficient and sophisticated, continuing with the same approach to energy policy will not yield the visible, stepwise improvements in environmental quality that China's urban dwellers will increasingly demand.

With efforts in three main areas, China's cities can accelerate their progress in lightening the environmental footprint of their energy use. First, energy planning should be coordinated with the planning process for



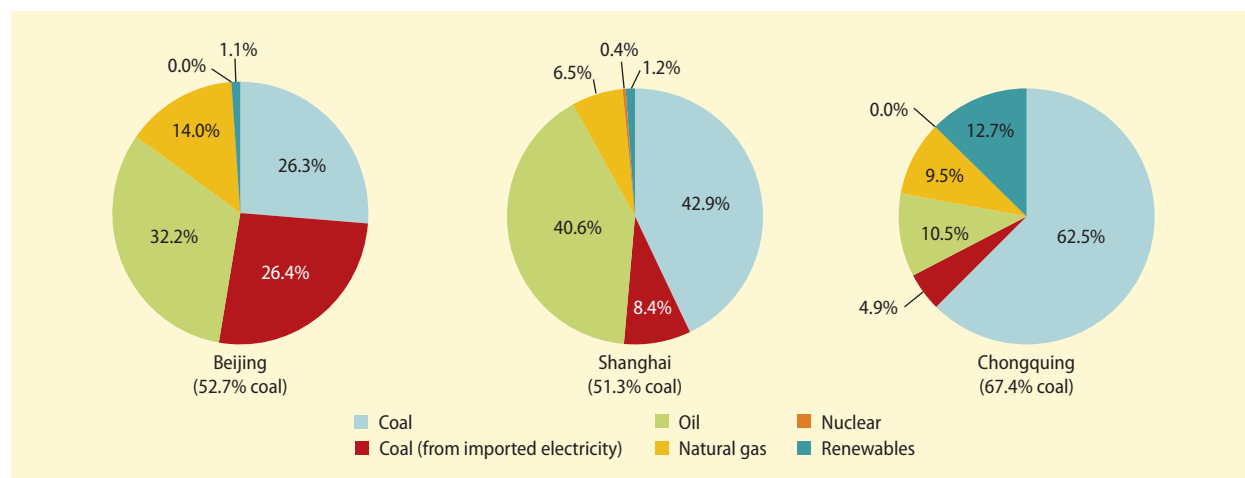
cities. City planners should work with energy planners to take a systematic approach in evaluating ways to optimize energy consumption by reducing demand across the main end-using sectors and greening the supply mix to meet the residual energy demand. Second, broad-based energy efficiency efforts should be accelerated in the main end-using sectors through a better balance of regulations and market-based policy tools. Third, after measures are taken to reduce energy demand, direct use of coal in cities should be eliminated as much as possible by expanding access to natural gas, removing barriers to commercial renewable energy, and continually strengthening emissions controls of remaining coal-fired power plants and industry. Across all three policy areas, encouraging compact urban forms will be fundamental.

The rapid, sustained growth of energy demand presents a unique environmental challenge for China's cities. Few modern cities in the world depend on solid fuels to the extent that Chinese cities do. In London, for example, household coal use was banned in the 1950s in response to serious air pollution. By contrast, 43 percent of Shanghai's primary energy supply still comes from burning coal inside the city's borders (8 percent more is from coal-fired power "imported" into the city) (figure 7.22). Nor is the predominance of coal limited to China's big cities.

For example, it makes up 65 percent of the primary energy supply in Zibo City, Shandong. In China's 15 cold climate provinces, where provision of heating is a legal requirement, coal represents over 90 percent of the fuel burned for district heating. Although a greater share of coal is being used in larger, more efficient power (and heating) units that are subject to stricter emissions standards—and pollution controls in all sectors have improved—the absolute increase in coal use in cities, driven by demand, is the number-one reason for poor local air quality and CO<sub>2</sub> emissions. Intensive coal use has resulted in per capita CO<sub>2</sub> emissions in large Chinese cities that are already higher than in many other cities around the world (figure 7.23).

Industry uses the lion's share of energy in urban areas, representing an estimated 70 percent of total energy demand and 69 percent of electricity use in 2010 (figure 7.24). Heavy industries have been responsible for most of the historic growth in urban energy demand (Hong and others 2011; Ma and others 2012). Because these industries rely mainly on coal, they have also deepened the carbon footprint of Chinese cities. In 11 big cities studied by H. Wang and others (2012), 75 percent of total greenhouse gas emissions came from industrial fossil-fuel use (figure 7.25). By comparison, industrial emissions represent only 10 percent of total emissions

**FIGURE 7.22 Primary energy supply in Beijing, Shanghai, and Chongqing municipalities, 2011**



Source: Authors' estimates based on data from NBS 2012c; China Electric Power Yearbook Committee 2011; and State Grid Corporation of China 2011.

**FIGURE 7.23** Per capita CO<sub>2</sub> emissions for 11 large Chinese cities and selected cities around the world



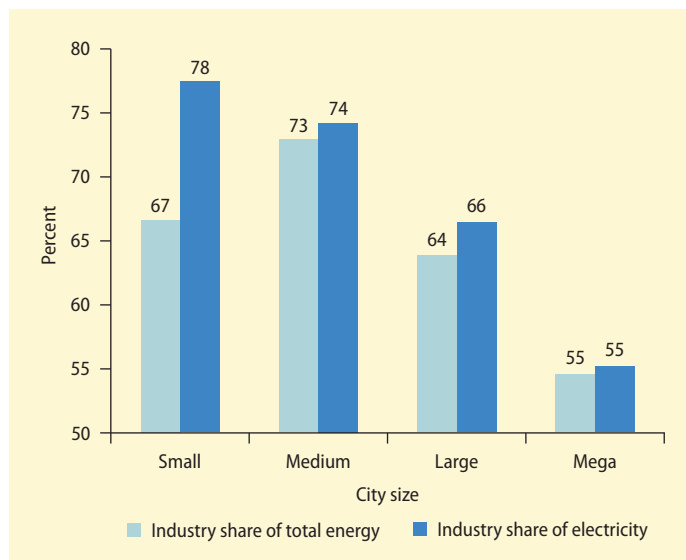
Source: Chinese cities: H. Wang and others 2012; other cities: Carbon Disclosure Project 2012.

Note: Per capita emissions for Chinese cities and C40 cities reporting Scope I and II emissions using similar methodologies.

for Tokyo (2007), 16 percent for New York City (2011), and 7 percent for London (2006).

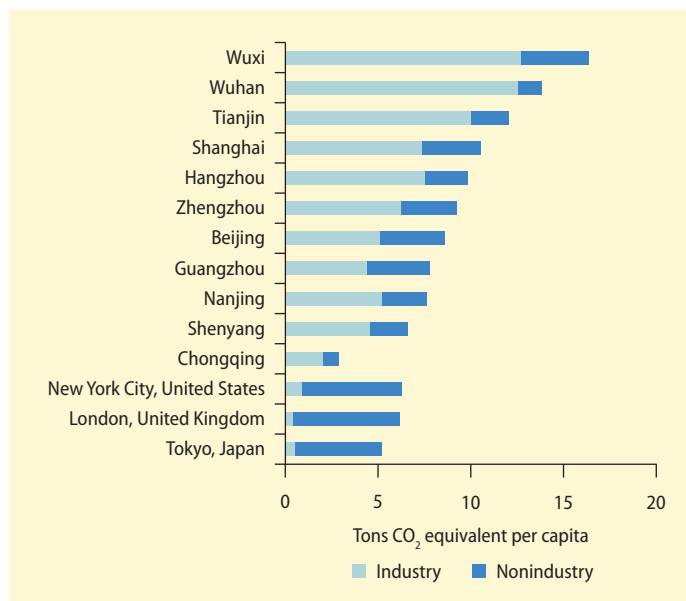
Although industry will continue to account for the majority of energy demand in urban areas, energy for heating, cooling, lighting, and equipment in buildings is projected to be one of the fastest-growing segments of demand (Fridley and others 2012). In China's cities, energy use per square meter of floor space in buildings is still only a small fraction of that used in buildings in high-income countries (figure 7.26). Drivers of energy demand vary between residential and commercial buildings. Based on Fridley and others (2012) and Levine and others (2012), much of the energy used in urban residential buildings will continue to be for space heating and cooling, but by 2020, appliances

**FIGURE 7.24** Industrial energy use as a share of total energy demand in cities, 2010



Source: World Bank calculations using data from Renmin University 2013; NBS 2011a, 2011b. Note: Electricity use is for downtown areas (main city districts) of the 287 municipalities at administrative prefecture level or above; total energy use is for the entire municipality; where 2010 data unavailable, 2009 data are used instead.

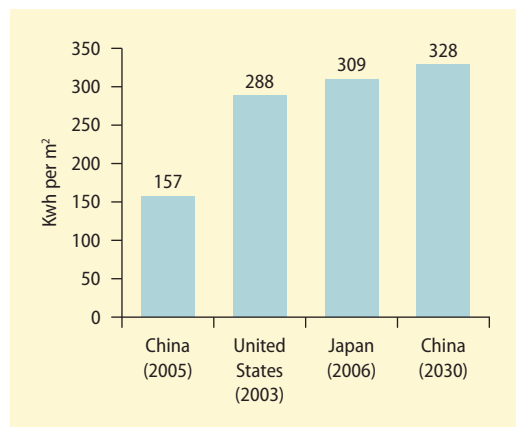
**FIGURE 7.25** Industrial and nonindustrial CO<sub>2</sub> emissions per capita in selected Chinese and other cities



Source: China: H. Wang and others 2012; New York City: Dickinson and others 2012; London: Mayor of London 2007; Tokyo: Tokyo Metropolitan Government.

Note: Consumption-based accounting of greenhouse gas emissions, including emissions from direct energy use and from the power sector allocated to end-use sectors. Chinese data are for 2005, New York City data are for 2011, London data are for 2006, and Tokyo data are for 2007.

**FIGURE 7.26** Energy use in commercial buildings in China, the United States, and Japan



Source: Fridley and others 2012; Levine and others 2012.  
Note: Kilowatt hours per square meter of floor space.

will account for a larger share of demand. Increased energy requirements for commercial buildings will come mostly from lighting, plug-in equipment, and central space conditioning.

An estimated quarter of urban households in China rely on coal for their cooking and heating needs, representing an important and at times overlooked source of local exposure to harmful air pollution, most notably very fine particulates (PM<sub>2.5</sub>) (figure 7.27). Coal-burning stoves and boilers typically have short stacks and no filtering systems. They are often used in peri-urban areas, where

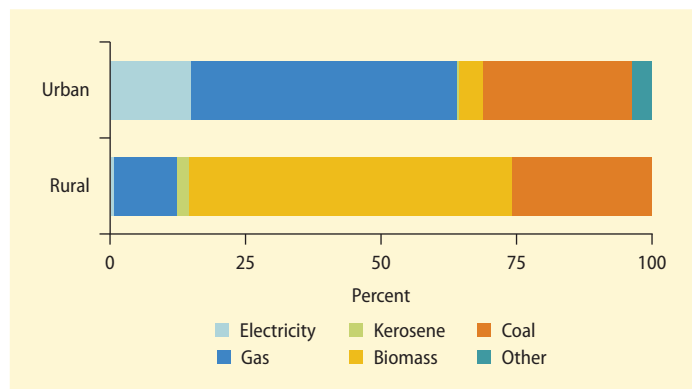
clusters of modern residences are intermixed with more rudimentary housing. Household coal use is most prevalent in—although not limited to—the poorer provinces, especially in the north (World Bank 2013a).

#### *Planning for greener urban energy systems*

Leading cities around the world are starting to take a more systematic look at how they can reduce the environmental footprint of their energy use by making energy supply and demand a more integral part of their city plans. Planning for greener urban energy systems is largely about finding synergies between different energy users in urban areas that can achieve environmental objectives through the most resource efficient and cost-effective path. Improving energy efficiency across the different end-using sectors is a top priority, followed by identifying local sources of green energy, “importing” cleaner sources of energy from outside city borders, and mitigating the residual environmental impacts from energy use. This approach to planning will require dedicated leadership to establish effective coordination across different departments and jurisdictions according to specific local circumstances. China is developing an ever-increasing range of targets for “eco-cities” and “low-carbon cities.” If China’s ambition is to bend its environmental Kuznet’s curve more quickly, then it can encourage cities to do the same, especially the more capable ones. As China considers a mix of incentives and regulations to make cities greener, “green” cities could be recognized, like “top runners” in industrial energy efficiency, as those that not only meet their targets but exceed them.

While ensuring safe and reliable energy supply, some cities have recently taken a broader view of how they can control their own emissions and environmental footprint by looking at both energy demand and characteristics of the energy mix to see what they can do to green their overall urban energy systems. Traditional sector plans will continue to be needed—new approaches will always depend on strong and well-managed sectors, but they often neglect looking across sectors. Nearly all urban infrastructure sys-

**FIGURE 7.27** Primary household cooking energy in urban and rural areas, 2006



Source: World Bank 2013a.

tems depend on energy to function—water supply, wastewater treatment, solid waste management, and, of course, electricity, heating, and cooling. Until recently, city managers have tended to overlook the links between energy end-users, and the ever-growing possibility for end-users to capture and use waste energy and generate distributed energy. At the strategic level, a city should encourage coordinated and reoriented planning for meeting specific emission and environmental goals; this planning would systematically look first to reduce energy consumption as much as possible, then at supply options (prioritizing clean energy resources), and then to managing residual emissions from the remaining use of fossil fuels. As this coordination matures, planning methods integrating various energy sources can be introduced, including energy efficiency (box 7.9). As China’s power sector planning process evolves, energy efficiency should be considered as a resource that is compared with conventional generation to develop a least-cost plan for meeting demand (RAP 2013). The national plan would need coordination with and support from provincial and national energy planning processes.

Urban planners should pay much closer attention to neighborhood-scale planning, especially for existing cities. Neighborhoods are fundamental building blocks of cities and can be a useful unit of analysis for understanding city energy patterns and issues. For instance the energy performance of a neighborhood comes from complex interactions of several factors, including construction and (eventual) demolition of buildings, which embody energy over their life cycle; operation of the buildings for heating, cooling, lighting, and the like; travel needs of residents and users of the neighborhood; and the ability of the neighborhood to produce on-site clean energy, offsetting the need to import it from outside its boundary. A joint MIT, University of Shandong, and Normal University of Beijing study compared 27 different neighborhoods in Jinan city, taking into account embedded, operational, and transportation-related energy consumption (MIT-Tsinghua-EF 2011). The study showed significant differences among different neighborhood forms and demonstrated that high-rise superblock forms consume up to twice as much energy as other neighborhoods (figure 7.28). Analyses

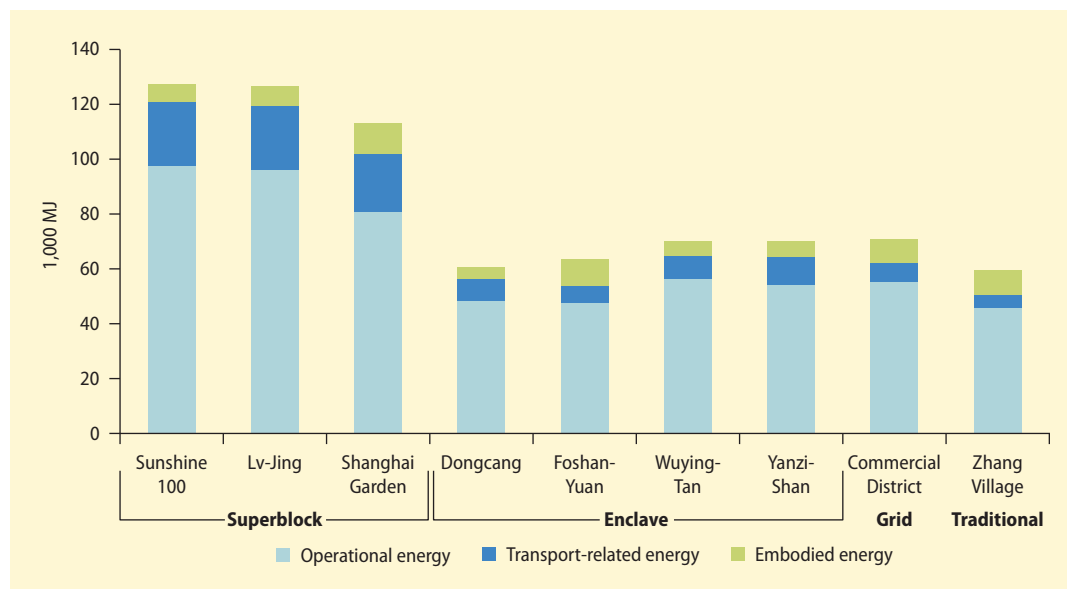
### BOX 7.9 “Energy efficiency utility”: Efficiency Vermont, United States

Efficiency Vermont was the first “energy efficiency utility” in the United States and provides a good example of how local governments can structure a results-focused model using a third-party entity to package and deliver energy savings. Efficiency Vermont is a nonprofit corporation created to provide incentives and support to consumers for energy-efficiency programs. The corporation is run by a public board that oversees all power utilities; its members are appointed by the Vermont state governor and are subject to legislative confirmation. It is funded through surcharges on consumers’ electricity utility bills. Some of these funds are used to provide technical assistance for auditing, project development, energy management, and employee training, as well as financial incentives to support companies investing in energy efficiency projects. Financial compensation levels for Efficiency Vermont are contingent on the corporation meeting specified targets for energy

savings delivered and other performance indicators. The better the corporation performs, the more compensation it receives (up to a ceiling set by the state government). Energy savings are independently monitored and verified to ensure actual savings are achieved. Targets and funding may be reviewed and adjusted every three years, as part of a longer 20-year plan.

Efficiency Vermont has been highly successful in meeting and exceeding its goals. In 2011, initiatives financed and supported by Efficiency Vermont reduced the state’s electricity needs by about 2 percent, at a cost of 4.3 cents (about RMB 0.28) a kilowatt hour—far cheaper than the 12.1 cents it would cost to supply a kilowatt hour of electricity. Because it had a good track record, it now participates in generation planning by offering predictable load reduction through its ability to package energy efficiency improvements.

Source: IIP 2012; Taylor, Trombley, and Reinaud 2012.

**FIGURE 7.28** Energy consumption by neighborhood

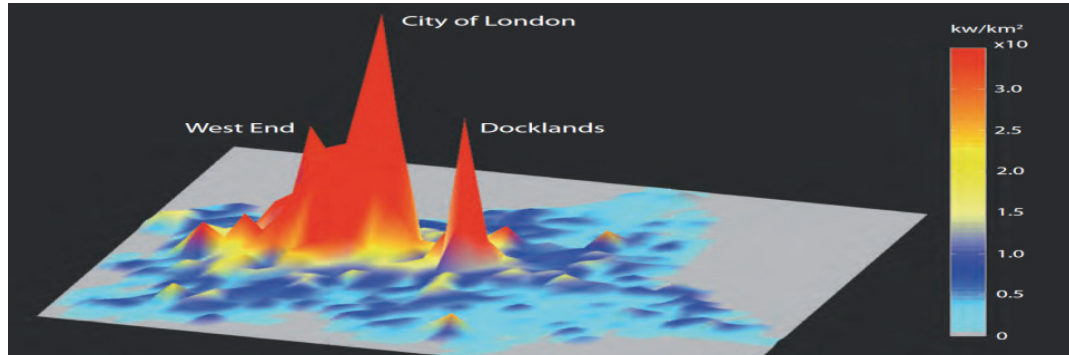
Source: MIT-Tsinghua-EF 2011.

at the neighborhood level such as these could start to identify locational priorities within cities, for instance. Apart from energy, the U.S. Green Building Council has in the past few years initiated a neighborhood development sustainability rating system with a large number of indicators that aim to define and measure what it means to have a green neighborhood.<sup>27</sup>

Systematic approaches to optimizing urban energy systems to meet specific environmental objectives requires rigorous data collection and synthesis. Dense, mixed-use neighborhoods, for example, offer opportunities for emerging approaches such as waste heat recycling (storing excess heat from a factory or office building for use in a nearby apartment complex, for example) and, in larger, dense areas, economies of scale for district heating. Yet, densely populated areas can constrain use of local renewable resources because energy needs may significantly exceed the locally available renewable energy (Grubler and Fisk 2013). Mapping where peak energy demand loads and potential local resources are located can help city managers and sector planners in identifying the best-suited energy supplies and uses of land for different neighborhoods

or districts (figure 7.29). A number of analytic tools exist that can assist local city governments in applying energy and emissions reduction planning principles and setting priorities (annex 7.2). Using these tools is still a stretch for many Chinese cities but could be introduced in a number of pilot studies. For instance, Shanghai (Changning District) and Qingdao have used marginal abatement cost curve tools to establish a cost-effective path to realizing their carbon emissions reduction targets (box 7.10).

Measures for controlling pollution that cannot be avoided by reducing energy demand or changing the energy supply mix are also essential. Understanding the residual environmental footprint of energy use will clarify outcomes of the choices made for efficiency and supply. It can help to compare the costs of greater efficiency or greener supplies with the costs of end-of-pipe pollution controls. Furthermore, actions to abate local pollution may have trade-offs that affect local supplies of recycled waste energy, such as closing or relocating industry, which are a viable source of jobs and income. Land markets often play a major role in this process. As cities become richer, land values in inner city areas rise, forcing low-value land uses such

**FIGURE 7.29** Mapping London's electricity demand

Source: UK Power Networks in City of London 2011.

as heavy industry out of the city. Additionally, emission standards, if enforced, can play a supplemental role in relocating polluting enterprises. While the use of industrial waste heat for district heating may be an attractive option, for instance, it cannot be evaluated without taking these issues into account.

It is especially important to study how cities organized their many departments to work in an integrated and systematic manner. Because this systematic approach cuts across sectors, it does not have a natural constituency or agency that would “plan” urban energy systems. City mayors have been at the forefront of many global initiatives on climate change, and their leadership has been instrumental for green initiatives in their cities. Cities such as New York (box 7.11), Paris, Rotterdam, and Stockholm that have undertaken systematic planning for low-carbon and green development, which is principally looking at urban energy systems, have all used different tools and institutional arrangements to meet their specific needs. Based on local conditions, establishing formal institutional arrangements for this systematic approach to energy planning, optimization, and efficiency in Chinese cities would help meet energy consumption and pollution reduction goals.

Even if advanced tools and methods for energy planning are still out of reach for many cities, focusing on efficiency improvements in individual urban sectors can bring substantial benefits. Investments in energy efficiency can significantly lower the operat-

ing expenses of municipal service providers. Some measures can be done quickly, without waiting for new institutional mechanisms or plans. For example, cities can introduce requirements for the use of energy-efficient pumps or efficient street lighting that meet minimum energy performance standards and can be implemented through municipal investment approval processes or other oversight functions. Spending on electricity represents about 18 percent of the costs of supplying and treating water in medium to large cities in China—slightly better than the average for municipal water utilities in other upper-middle-income countries (19 percent) but still higher than the average for utilities in the upper-income countries (15 percent).<sup>28</sup> There are significant disparities between urban water utilities in China and room for improvement among lower performers to reach best-practice levels. If wastewater treatment facilities in all Chinese cities could operate as efficiently as they do in Shenzhen (figure 7.30), annual electricity use could be reduced by about 3.1 terawatt hours (TWh), translating into cost savings around RMB 2.4 billion.<sup>29</sup>

Reorienting approaches to optimizing urban energy systems involves not only local but also regional and national stakeholders. Cities will need to work actively with energy supply companies, and perhaps with neighboring municipalities, to promote greater supply of cleaner energy. This work is important not only because cities host the major energy consumers in China and can there-

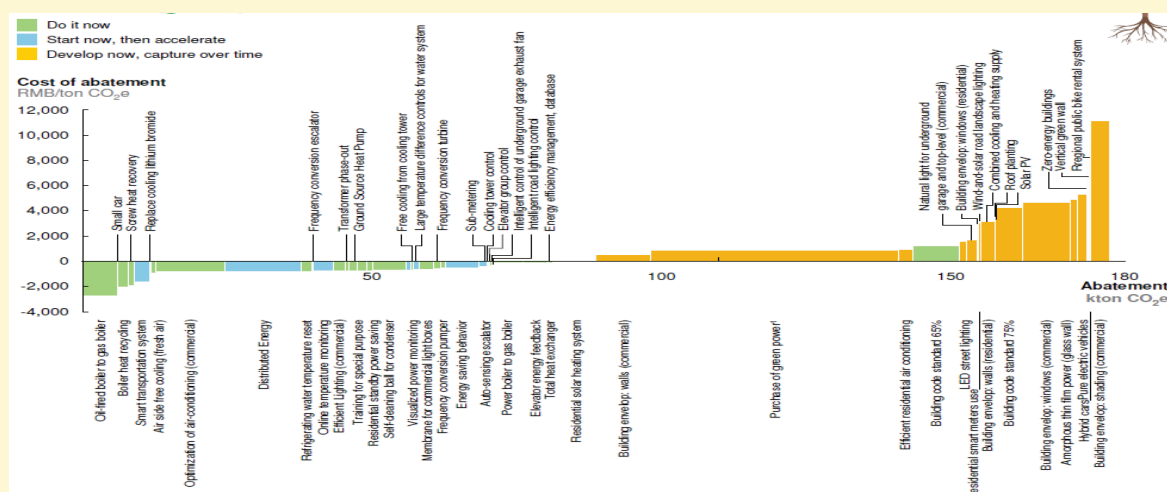


## BOX 7.10 Tools for low-carbon development planning: The experience of Changning District in Shanghai

Shanghai City's Changning District has set out a vision to become a leader in low-carbon urban development. To advance its vision, the district teamed up with the Shanghai Energy Conservation Supervision Center, the World Bank, and McKinsey & Co. in 2010 to develop a marginal CO<sub>2</sub> abatement cost (MAC) curve for the Hongqiao area, an economic hub in the center of the district (figure B7.10.1). The MAC curve study will help the district set medium-

term targets and policies for reducing CO<sub>2</sub> emissions by allowing city leaders to evaluate the abatement potential of a menu of technologies, weigh the cost and difficulty of deploying these technologies, and identify priority investments. The results show that Changning District can meet its target of reducing the carbon intensity of its economy by 17 percent between 2010 and 2015 by investing RMB 500 million in a basket of easy-to-implement, least-cost technologies.

**FIGURE B7.10.1** Marginal abatement cost curve for Hongqiao area of Changning District, Shanghai



The MAC curve is a powerful tool to visualize abatement potentials and costs in setting CO<sub>2</sub> reductions for local city governments, but it does require a great deal of detailed information on energy use, technologies, and costs. It may be most appropri-

ate for larger, relatively sophisticated cities where data are readily available. By focusing squarely on the technology options, other options such as land use planning and behavioral changes are separately considered.

Source: World Bank ESMAP 2013.

fore influence supply, but because ambient air pollution trends in China show that cities are heavily affected by energy consumption in surrounding provinces. Policies influencing clean energy supplied from outside city boundaries also clearly need national leadership and support: green urbanization is a shared responsibility between national and local stakeholders.

The following sections of this chapter follow the principles of the approach above by

first exploring options for improving energy efficiency in key energy-using sectors of the urban economy and then identifying priority actions that can be taken to support shifts in the energy structure of cities.

### Rebalancing markets and mandates to reduce energy use in industry<sup>30</sup>

While China has built a comprehensive system of regulations, policies, and institutions

### **BOX 7.11 New York PlaNYC 2030 case study: Integrated centralized planning relying on decentralized delivery**

New York City, America's largest municipality, embarked on a long-term planning process called PlaNYC 2030 to devise wide-ranging strategies for reducing materials and energy use, improving natural spaces, planning for and mitigating the effects of climate change, and creating a more equitable and engaged society. Strategies were designed and are being executed by a joint task force, led by a specially designated mayoral office and comprising 25 city departments and stakeholders from state and federal agencies, businesses, and nonprofit groups. To strengthen local ownership of the plan, the task force has engaged in media outreach efforts and offered incentives and support to encourage active participation by local business owners and residents, including grant programs and changes in zoning codes intended to create new development opportunities (ICLEI USA and City of New York 2010). The plan is now in its fourth year of implementation.

The energy and emissions strategy for PlaNYC is focused on achieving a goal of reducing city-wide greenhouse gas emissions by 30 percent in 2030 compared with 2005. Because buildings account for 75

percent of the city's total carbon emissions, PlaNYC has kick-started a number ambitious programs and policies to improve energy efficiency in the city's building stock. This buildings effort has two major elements: the promulgation of new laws (together called the Green, Greater Buildings Plan), and the formation of the 200-person Green Codes Task Force to recommend code and other reforms to reduce a number of environmental impacts of buildings (that is, not just energy use). The green plan requires regular energy audits, retro-commissioning, and data sharing for large public and private buildings; lighting upgrades; and submetering of government buildings and commercial tenant spaces. These measures will cover more than half of the space in 16,000 buildings in the city. To ensure compliance, procedural incentives exempt from retro-commissioning and audits buildings that adopt measures early or comply with Leadership in Energy and Environmental Design (LEED) standards for existing buildings, a revolving retrofit loan fund has been created with federal stimulus funds, and the city is forming a large energy service company.

*Source:* Adapted from Zhou and Williams 2013.

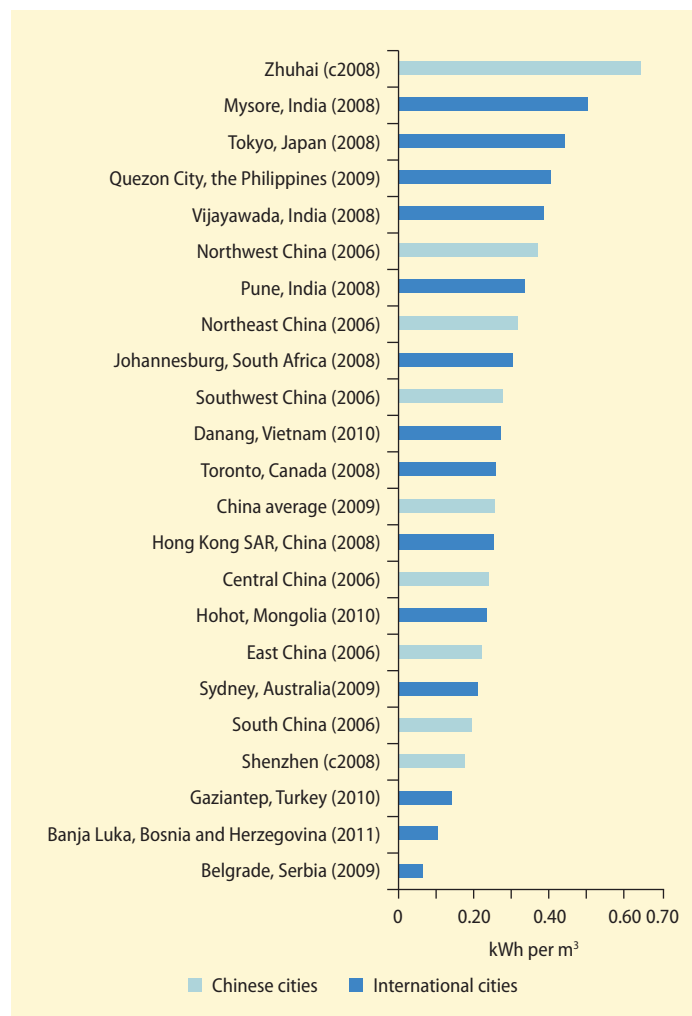
to improve energy efficiency in industries—and this system has achieved large reductions in energy intensity—the ability of the system to continue to deliver energy savings will depend on how well it can match the growing sophistication and diversity of the enterprises in it. The current approach has relied heavily on administrative targets and regulations. The system can be strengthened by rebalancing administrative measures with more market-based approaches to motivate enterprises to plan, manage, and implement energy efficiency measures as a part of their own business self-interest.

Two broad areas where the national government and cities can focus their efforts are rebalancing the current mix of incentives toward the increased use of market-based tools, backed by ambitious regulations and targets; and enabling companies, through supporting policies, to improve access to suitable technical and financial services for

energy efficiency. Provinces and local city governments play an instrumental role in industrial energy efficiency policy. They are on the front lines of implementing policies and have the most direct contact with enterprises. They are often the pioneers of new policies, which are piloted locally and later scaled up.

The dominance of industry—its contribution to GDP, jobs, energy demand, and emissions—is a distinguishing feature of Chinese cities. In 2010, the secondary sector (composed of industry and construction) produced 49 percent of economic output and 48 percent of jobs in China's urban areas.<sup>31</sup> Even with a structural shift toward services, industry is expected to remain a mainstay of China's urban economy for decades to come.<sup>32</sup> It will also likely continue to be the largest end user of energy (Fridley and others 2012; Zhou and others 2011) and a major contributor to local air pollution. Reining

**FIGURE 7.30** Energy use per unit of water treated by municipal water utilities, various years



Source: International city data from World Bank ESMAP TRACE database; China data from Wang, Song, and Bai 2013; Liu and Jiang 2012; Yang and others 2008; and Zhao and others 2010.

Note: Chinese city data includes electricity use only, which typically represents 60–90 percent of total energy use by wastewater treatment plants in China (Liu and Jiang 2012); international city data includes total energy use, in kilowatt hour equivalents.

in industrial energy consumption is crucial to the resource security and environment of Chinese cities.

Reducing energy needs will also be a key element in the competitiveness of industry. In some sectors such as cement, China's leading firms are nearing or have already reached best-practice levels for energy efficiency, but behind these leaders is a long tail of much more inefficient plants. Projected lower rates of growth in fixed assets and demand for

industrial commodities over the next 10–20 years will start to unmask these inefficiencies, putting greater pressure on inefficient firms in energy-intensive subsectors such as iron and steel, cement, and aluminum (Fridley and others 2012; Zhou and others 2011). Firms will have fewer opportunities to grow out of their inefficiencies by increasing production capacity. The ability to capture cost savings from energy efficiency can contribute to competitive advantages.

China's 11th Five-Year Plan produced solid results of a reported 19.1 percent reduction in energy intensity (NDRC 2011), but perhaps more importantly, it laid the foundation of policies and programs for long-term energy savings: a legal and regulatory system with energy conservation offices or groups and supervisory offices set up at provincial and most prefecture levels of government. Cities acquired considerable experience with the design and implementation of major programs. When planning low-carbon and energy-efficient programs, cities can tap these lessons and help to introduce improvements and innovations. China's 12th Five-Year Plan expanded and improved the programs, and, while there are serious efforts to introduce more market-based tools and mechanisms, delivery largely continues to depend on this, still relatively new, administrative system.

While this system and its suite of evolving policies and programs will serve China well into the future, many policy makers and energy efficiency experts are asking whether enterprises and local city governments are fully seizing energy efficiency opportunities under the current mix of regulations, incentives, and financing options. Both enterprises and local city governments face challenges. Enterprises are offered little flexibility in meeting government-mandated targets for energy savings, which may be poorly matched to actual company potentials—leading to a passive mentality and little effort beyond meeting minimum requirements. A lack of high-quality energy audits and accurate benchmarking has limited the ability of enterprises to identify realistic or cost-effective efficiency improvements (see Yang 2010, for example). Flexibility in meeting targets has been limited by the hard timetable set for

enterprises to achieve a certain level of savings each year during the 12th Five-Year Plan. While hard and binding targets do spur action, there are limitations if compliance is too prescriptive. Tight political time-tables may conflict with longer-term business planning by enterprises and narrow the scale of energy efficiency investments. Local city governments, meanwhile, often lack the technical expertise and experience required for monitoring and reviewing energy use by industries and may not be able to effectively shoulder the burden of enforcing policies and targets.

A more balanced mix of incentives and supporting measures for industrial energy efficiency can help relieve constraints on enterprises and local city governments in pursuing energy efficiency improvements. With the right combination of incentives and supporting programs, enterprises may become more proactive, lightening the administrative burden on local city governments of meeting policy objectives. Local city governments meanwhile can play an important but more indirect role in helping enterprises do better by facilitating access to technical and financial services, monitoring the process, and supervising results.

#### *Rebalancing administrative measures with greater use of market-based incentives*

The government-enterprise agreements that set mandatory energy savings targets for enterprises and establish the mutual responsibility of the government and enterprises in fulfilling these targets are a cornerstone of China's industrial energy efficiency policies and should continue. An extensive institutional infrastructure has been built up at all levels of government to implement the agreements, with the provinces playing a lead organizing role and local city governments assuming responsibility for day-to-day supervision.<sup>33</sup> The agreements delivered huge energy savings in the 11th Five-Year Plan, and savings targets have been ramped up for the 12th Five-Year Plan. Nearly 17,000 enterprises are now covered by agreements under national and local programs, representing as much as 60 percent of China's total

energy use. Still, these programs need to be strengthened to ensure that they continue to deliver results in the 13th Five-Year Plan and beyond. Key issues are maintaining the coverage, ambitiousness, and motivational power of the agreements while also introducing greater flexibility for enterprises in meeting their targets.

At the national level, the government should continue to set ambitious targets for limiting energy use. In principle, useful targets for limiting energy use could be denominated in total energy, coal, or carbon. While each kind of target has pros and cons associated with it, the key issue will be to ensure that these targets are coordinated in order to avoid policy dilution or loss of regulatory coverage. Box 7.12 illustrates how obligations to reduce energy intensity might interact with a cap on carbon emissions under an emissions trading system. Both kinds of obligations, in addition to renewable energy targets, can and do co-exist in the United Kingdom and other European countries, but interactions between overlapping targets must be assessed carefully. New targets to limit carbon emissions and energy use should build on the current energy-savings agreement platform as much as possible to ease the burden of compliance for both industry and local city governments.

While maintaining coverage and ambitiousness of targets, the national government can give enterprises more flexibility in meeting targets for energy use by allowing for trade, giving enterprises the option of purchasing energy savings certificates (or carbon abatement credits if the ETS is implemented) as an additional way for them to meet their targets at lowest cost. A number of provinces and cities are already piloting trading schemes for carbon emissions, and a few exchanges have been established. Other provinces and cities outside the carbon ETS pilot areas could initiate pilots in trading energy savings certificates to build the experience and institutional architecture needed for larger-scale trading. These different pilot schemes would provide the national debate with valuable experience on various policy options for decarbonizing the economy, which include carbon cap and trade, carbon taxes, and green and white certificate

### **BOX 7.12 Maintaining coverage of energy efficiency obligations under the current system with the introduction of a new system of carbon emissions trading**

In linking a nationwide carbon emission trading system (ETS) with the current system of energy savings agreements, two of the key design questions for policy makers will be what facilities will be covered by the two systems and whether a cap will be imposed on Scope 1 (direct greenhouse gas emissions) or Scope 2 (broadly, indirect greenhouse gas emissions from the consumption of electricity, heat, or steam) emissions. Energy savings agreement obligations under the 12th Five-Year Plan cover around 17,000 industrial enterprises, which together account for about 85 percent of industrial energy use or 60 percent of China's total energy use (NDRC 2012). If, hypothetically, the energy savings agreements were replaced with a carbon ETS for which allowances are issued based on Scope 1 emissions, as is the case in the European Union, direct coverage of industrial energy use would be reduced by about 25 percent. The remaining obligations would be shifted to electricity generators.

The effect on industrial energy efficiency would depend on several factors, including the stringency

of the carbon cap, allowance prices, and the ability of power suppliers to pass on costs to consumers in the form of higher prices. If power utilities are not able to raise the price of electricity, caps are not tight enough, and carbon allowance prices are too low, then the incentives for industry to save energy could be severely weakened. Tightening the cap and allowing power utilities to raise tariffs would not necessarily solve the problem of incentives. Absent other reforms, the revenues of power generators and grid utilities would continue to be linked with sales of electricity and investments in expanding capacity. Thus, while power utilities would have an incentive to supply cleaner electricity—and to charge more for that electricity—they would have little motive to reduce demand by industry. Also, despite facing higher energy prices, industries may not invest in energy efficiency without other incentives and enabling policies. Should the accounting method change and include Scope 2 emissions, however, then the coverage could remain largely the same and incentives in place for industry to reduce energy demand.

*Source:* Robert Taylor.

trading. However tradable certificates are denominated—whether in carbon or energy savings—a national system of trading will require an extensive institutional infrastructure to monitor, verify, report, and register savings.

New targets should build on the current energy-savings agreement platform as much as possible to ease the burden of compliance for both industry and local city governments. Local city governments should continue to join national and provincial efforts to improve the collection of data on energy use by key enterprises and building third-party capacity for monitoring and verification (MRV). This system can also support potential trading schemes. Greater use of third-party MRV could also help to alleviate supervision burdens on local governments and help verify energy savings for projects receiving government support. China has taken steps in this area but could enhance it by standardizing qualification requirements

and broadening the currently narrow base of companies in the MRV system. In addition, fixed asset investment appraisals for energy efficiency have been introduced and could play a more prominent role, with enhanced appraisal capacity from use of qualified third parties, in ensuring new investments are technically advanced, meet standards, and are energy efficient.

Adjusting fuel and electricity tariffs to better reflect social and environmental costs of fossil fuel use should continue. Raising prices on energy can provide additional market incentives for industries to improve their energy efficiency. China's national and provincial governments are in the process of reforming existing taxes on the production of fossil fuels including coal, oil, and natural gas. Proposals for a revised coal tax suggest a rate of 2–5 percent, which, based on average coal prices in 2012, would amount to about RMB 10–25 a ton.<sup>34</sup> By comparison, economic studies have placed the average dam-



ages to public health from burning one ton of coal in China at about RMB 156 (in year 2012 prices) (Nielsen and Ho 2007; Ho and Jorgensen 2003). China will need to conclude its debate over the effectiveness and transaction costs associated with ETS and carbon taxes and introduce a clear and consistent policy on carbon pricing so that businesses can plan for it.

Revenues from energy taxes or the sale of tradable allowances could be recycled for energy efficiency and emission reduction programs to provide additional, targeted incentives. Recycling revenues can have a tremendous multiplier effect on efficiency gains. For example, an analysis of household energy use in the United Kingdom shows that recycling the additional revenues from a 3-percent rise in energy prices into efficiency programs produces cumulative energy savings nine times greater than the savings that could be achieved with a price increase alone (Lees 2012). The recycling approach has been an important element in policy discussions and design in major carbon ETS examples in the northeast United States, California, and the European Union.<sup>35</sup> Regardless of how public revenues are recycled, government-funded incentives for energy efficiency should be evaluated regularly to ensure that the greatest amount of additional and verifiable energy savings are being achieved with the least amount of public money. The need for periodic review and adjustment is also needed for existing incentives, such as investment awards for energy efficiency projects and tax rebates for buying energy-efficient equipment.

#### *Enable companies to respond more easily to incentives and regulations*

Evidence has shown that higher energy prices have significantly reduced the energy intensity of Chinese manufacturing, but the impacts of higher prices vary considerably across consumer categories and between industrial sectors (Fisher-Vanden and others 2013; Lin and Liu 2011). Raising energy prices to capture the social costs of pollution alone will not always result in industries making investments in energy savings.

Pricing will need to be packaged with other policies that address persistent barriers to energy efficiency. The barriers include organizational challenges (such as low awareness of technical solutions or managerial bias in favor of investments in production growth); insufficiently developed financial services for energy efficiency investments (because of high transaction costs and small scale, for example); and regulatory shortcomings (such as inflexible or prescriptive compliance requirements that limit ambitions to go beyond government mandates).

A basic element of enhancing the ability of industrial enterprises to pursue energy efficiency projects is ramping up their ability to manage their energy use through accelerated placement of competent enterprise energy managers. Energy managers can also support government-enterprise dialogue on complying with energy efficiency policy. National regulations already require that key energy-consuming enterprises appoint energy managers, but in-house staff in these companies typically only have general knowledge about monitoring energy use and assessing savings opportunities. Local governments can greatly improve specialized, technical knowledge of energy managers by cooperating with provincial and national agencies to arrange for rigorous training, helping to monitor energy manager proficiency by ensuring they meet minimum job and professional criteria, among other things. Energy managers are responsible for establishing energy management systems (EnMS);<sup>36</sup> The government has required key enterprises to adopt these systems based on a national standard, but left it up to the individual provinces to decide whether certification of EnMS should be mandatory. To avoid superficial EnMS adoption, EnMS certification and accreditation standards should continue to be developed at the national level, drawing on local experiences such as an EnMS certification pilot with over 130 enterprises in Shandong province (Zhu 2012).<sup>37</sup> Local authorities could continue to propagate the EnMS concept, experience exchanges among enterprises, mobilize technical assistance, and evaluate and publicize energy savings performance outcomes from adoption of the EnMS.



Ensuring good-quality, competitive technical and financial services is also an enabling factor in which all levels of government play a role. Most enterprises, especially small and medium ones, cannot easily access all needed services alone—from energy audits to developing, financing, and executing projects. The energy efficiency services industry has grown, especially the use of energy savings performance contracting promoted by energy service companies (ESCOs) (Sun, Zhu, and Taylor 2011). However, the capacity of technical service providers still lags behind the practical needs of many enterprises. For most financial institutions operating in the market, energy efficiency financing is at best a niche business. National policy encouragement, from the China Banking Regulatory Commission, for example, would be useful to further motivate Chinese banks to be more active and create and use appropriate new, innovative financial products. A greater diversity of financing mechanisms needs to be available to industries with different financial circumstances, such as financial leasing, equity, and use of off-balance-sheet energy performance contract financing from ESCOs. Local city and provincial governments can support the development of locally active service companies by procuring technical services for supervision of energy efficiency programs, fostering membership in regional and local associations, issuing guidance on common energy efficiency service standards, and facilitating information flow between enterprises demanding and supplying services. Among the many forms of support at national levels, strengthening energy audits by standardizing the procedures and providing good tools and training programs is a top priority because good-quality energy audits are fundamental to realizing opportunities and developing new projects. The key is to help the service industry grow without over-regulating and stifling it.

Encouraging the innovation of new business models for promoting energy efficiency can help both industry and local city governments, particularly in the use of specialized third-party companies to package and deliver their energy savings projects (Taylor 2013). Larger cities can be leaders in policy

experimentation, testing new delivery models that maximize cost-effective energy savings from public investments such as energy efficiency utilities and energy efficiency resource acquisition programs, like those in the United States. In North America, for instance, local governments in about 30 states and provinces have through regulation effectively contracted for electricity distribution utilities or specialized third-party companies to deliver specific amounts of verified energy savings in key subsectors or targeted locations. Use of qualified third parties eases the local government's direct burden because the company is responsible for pursuing and delivering energy savings and receives compensation against verified performance benchmarks. The company has incentives to seek out the maximum amount of energy savings for the least use of public funds. Over time, third-party companies typically become more adept at delivering more savings at lower costs as programs grow, experience is gained, and market knowledge of end users is deepened (see, for example, box 7.9). Such a program could be piloted in China through the national Demand Side Management Pilot Cities program, which allows utilities and cities to experiment with new models for reducing power loads.

### **Leading by doing: Serving the people in more efficient and cleaner buildings**

To achieve deeper and more rapid reductions in energy consumption in new and existing buildings, a core task for China's national and local governments is to harness the business interests of building developers, materials and equipment suppliers, investors, and owners to construct and maintain a greener built environment. For new buildings, spatial planning rules, mandatory building energy efficiency codes (BEECs), green building labels, and financial incentives need aligning. BEECs should be broadened to encompass the main design elements of energy usage, and clear, time-bound targets should be set to progressively raise standards. Better training, technical services, and market awareness of green building designs and materials are needed across the entire supply chain. For

efficiency upgrades of existing buildings, benchmarking can inform mandatory retrofit policies supported with incentives. Reducing exposure to indoor air pollutants will need consistent building material standards and tighter enforcement (see box 7.13). Local governments should lead by example, promoting energy efficiency in public institutions and helping to build a market for technical service providers, such as ESCOs—especially in still underdeveloped parts of China.

Buildings, where people live and work, are critically linked to the environmental sustainability of cities, primarily because of their operational energy use and, in China's case, the large-scale construction of new buildings. The staggering pace of new building construction over the past two decades has transformed China's urban landscape and deepened its energy footprint. Total floor space of residential and commercial buildings in China's cities has increased five-fold since 1995 to 33.3 billion square meters in 2011. As a result, energy resource use has doubled over the past decade for space heating and cooling, lighting, hot water, appliances, and equipment in residential, commercial, and public buildings in cities, reaching about 491 million tons of coal equivalent, or 14 percent of the nation's total primary energy demand (THUBERC 2013) (figure 7.31). This figure does not take into account the amount of embodied energy used in the manufacturing of building materials and appliances of building users. From an urban perspective, the operation of buildings dominates urban energy consumption in modern, service-oriented cities. For example, buildings account for roughly 60–70 percent of overall final energy consumption in Hong Kong SAR, China, and London. Energy consumption is likely to be similar in the urban core of large Chinese cities (such as within the fifth ring road of Beijing).

China has set ambitious goals and put in place a comprehensive policy framework for improving energy efficiency and environmental performance of buildings. By 2015, the country plans to reduce energy use in buildings each year by 45 million tons of coal equivalent (MOHURD 2012), and by 2020, national authorities have established

a target for increasing the share of certified green buildings in new construction to 30 percent (State Council 2013). Policies to meet these goals include mandatory standards, voluntary rating systems and labels, and financial incentives for investing in greener, more energy-efficient buildings and appliances. Still, barriers remain. Even though many design techniques and technologies to achieve significantly higher energy efficiency in buildings have already been commercialized, market incentives for building developers to adopt green building features are weak. Developers typically do not operate the buildings they construct and may not see a direct benefit in reducing energy costs for owners and tenants. Some reports suggest payback periods of up to 10 years for the incremental cost of building to green standards. Conventional design practices rarely use reliable energy simulation modeling, design professionals lack expertise and experience with integrated design approaches, and there are few published green building performance data for monitoring and evaluation (China Greentech Initiative 2012). With uninspired developers, local city governments continue to struggle to monitor BEEC compliance at the torrid pace and massive scale of new construction. More expensive retrofits may be required in the future to meet national targets for curbing energy use in buildings.

#### *Building energy efficiency in new construction*

Mandatory building codes will continue to be the fundamental policy lever for the national and local governments to enforce higher efficiency levels in new buildings. However, BEECs can be strengthened and better aligned with financial incentives and voluntary labeling programs to promote ongoing improvements in environmental performance. Cities have the power, particularly through land use planning and zoning, to facilitate more energy efficient and greener structures (box 7.14).

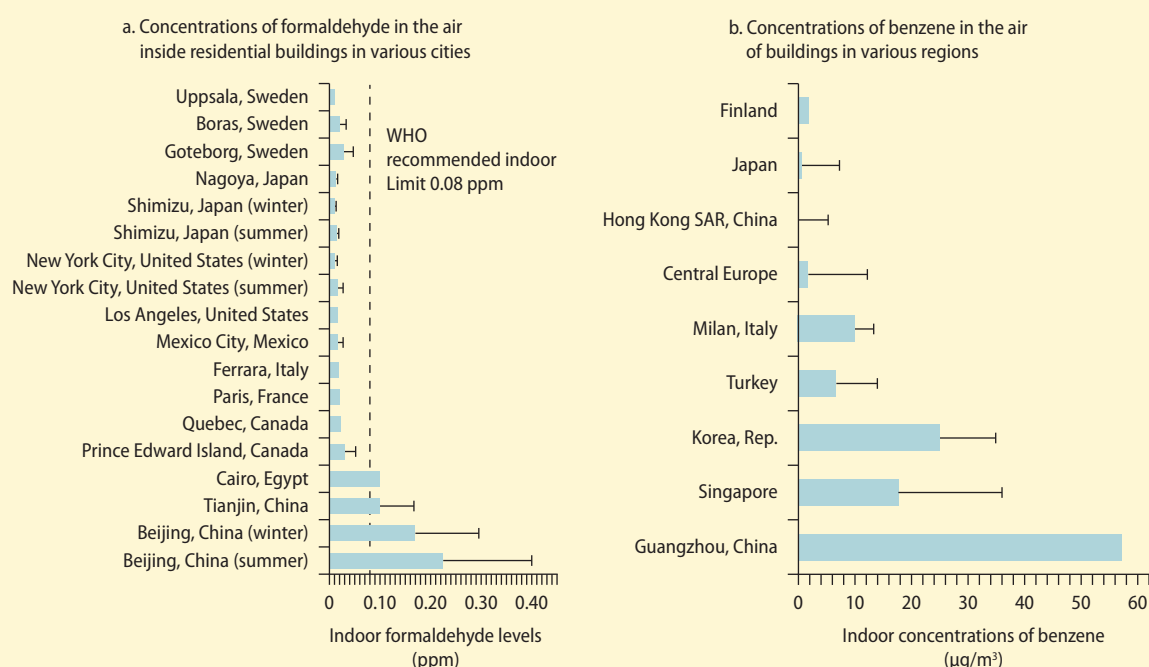
Clear, time-bound targets should be set for tightening design standards for energy efficiency to eventually require “low-energy” buildings. In the Chinese context, low-energy buildings could be clearly defined in terms

### BOX 7.13 Cleaning the air indoors: The other air pollution

As the rapid pace of construction has transformed the urban landscape, the indoor environment of buildings over the past 20 years has also undergone transformational changes. Increased use of plastics, polymeric floor and wall coverings, synthetic wood products and cleaning agents, and air conditioning in closed spaces have significantly increased people's exposure to indoor air pollutants such as vola-

tile organic compounds (VOCs). Medical studies in China suggest a possible link between birth defects and asthma in children in urban areas and increased exposure to organic pollutants and dust in the indoor air. In China, indoor concentrations of known harmful substances are typically higher than in other countries, so researchers anticipate that the negative health effects are greater (Zhang, Mo, and Weschler 2013).

**FIGURE B7.13.1 Concentrations of formaldehyde and benzene concentrations in buildings**



Source: Liu and others 2012.

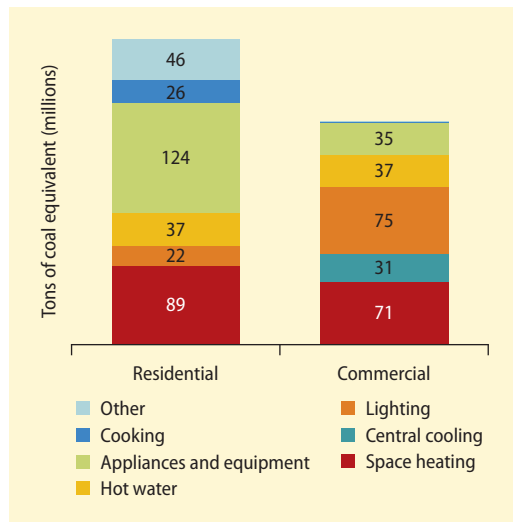
Note: The World Health Organization does not have a guideline standard for benzene because "no safe level of exposure can be recommended" (WHO 2010).

China has issued several standards establishing allowable concentrations of VOCs and other harmful substances. Systematic monitoring in individual buildings is much more difficult than monitoring ambient air quality outdoors, because individual sources of pollution are harder to identify and the regulatory framework for enforcing many standards is lacking. Consistency between standards must also be

improved. For example, exposure periods and allowable levels for VOCs in building design and acceptance standards are not the same (Huang and Wang 2010). In addition, China has introduced mandatory certification requirements for building materials (standards CNCA-12C-049, CNCA-12C-050, and CNCA-12C-051), but certification is limited. Other common materials are exempt. See figure B7.13.1.

Source: Huang and Wang 2010; Li 2010; Liu and others 2012; Zhang and others 2013.

**FIGURE 7.31 Primary energy consumption in China by end use in residential and commercial buildings, 2010**



Source: Fridley and others 2012.

Note: Includes both urban and rural buildings, measured in million tons of coal equivalent.

of maximum allowable design loads (that is, energy requirements for space conditioning, lighting, and ventilation), achievable cost-effectively through a broad range of techniques for different climate zones. The targets would provide a clearer signal to investors and direct the building market toward realizing longer-term targets for efficiency, allow-

ing for BEECs to be raised progressively. Both the European Union and the United States have set time-bound policy goals for new buildings to achieve low-energy building status. By the end of 2020, new buildings in EU member countries will have to achieve nearly zero-energy building status. This type of long-term signaling can also have a strong influence on infrastructure planning in cities. For example, dramatically reduced heating loads may make district heating in some less densely populated, peri-urban areas uneconomical or require a higher degree of innovation in heating supply.

National BEECs should also be updated regularly on the basis of robust, whole-building life-cycle cost analysis, and they should be expanded gradually to include green building design elements like waste and material use. A three- to five-year cycle is appropriate to keep pace with the changing technologies and economics of energy efficiency improvement. A fixed cycle of revisions also improves the alignment of BEEC updates with the time-bound energy efficiency target. Underpinning the revision of BEECs with life-cycle cost analysis would help to determine the most cost-effective improvements to the codes. To this end, greater and more transparent use of building energy simulations are needed to help evaluate alternative building design approaches. BEEC design-based energy sav-

### **BOX 7.14 Münster, Germany: Low-energy building standards through sale of city-owned land**

By mandating low-energy building standards in sales contracts of city-owned land, the City of Münster in Germany encouraged the local real estate market to embrace energy efficiency. The standard, locally known as *Niedrig Energie Haus*, imposes stringent thermal performance requirements for any building envelope that exceeds the existing German federal building regulations by 30 percent. Between 1997 and 2010, the standard was implemented in constructing over 5,600 low-energy housing units and 85 energy-efficient commercial buildings in the city. By 2010,

80 percent of all new buildings—even those not built on city-owned land—were following the city's energy efficiency requirements. The standard has saved the city 13 million kilowatt hours in annual energy use. The benefit-cost ratio to the city was more than 6 to 1 and the estimated incremental cost to homeowners was, on average, about €2,600 a house (about 1.4 percent of construction costs). Riding the momentum of positive market reactions, Münster's City Council has since proposed a passive house standard to raise the bar for efficiency even higher.

Source: Energy Sector Management Assistance Program, World Bank, <http://www.esmap.org/node/1170>.

ings estimates can have “simulation gaps” because conventional design practices do not necessarily use energy simulation models.

As discussed, revisions to urban spatial planning regulations are needed to create urban forms that optimize the overall energy efficiency of the built environment. Over the past thirty years, China has created an urban fabric where buildings stand farther apart from each other, creating a broken urban “fabric.” In cold climate zones, this broken pattern leads to higher energy requirements for heating than a continuous urban fabric consisting of buildings clustered together along the perimeter of street blocks. A comparative analysis done in Europe found that in a temperate climate, in a 1.44 square kilometer area, a continuous urban fabric consisting of 21-meter-high buildings requires four times less energy for heating than a broken urban fabric consisting of 60-meter-high, freestanding towers (Salat 2012). In warmer climates, buildings in densely populated urban areas can be spatially organized to create better ventilation and shading and reduce air conditioning requirements.

A main task for provincial and city governments will be to improve enforcement of BEECs throughout the entire construction cycle to reduce the risk that buildings will not be in compliance when they are completed, when they can be costly and difficult to fix. Local city authorities also play a crucial role in piloting and implementing new standards and are directly responsible for ensuring compliance. According to MOHURD’s officially reported statistics, at the design stage, compliance rates with BEECs in prefecture-level cities rose from 5 percent in 2001 to a reported 99.5 percent in 2010 (Levine and others 2012).<sup>38</sup> Yet, especially at the county level, there is significant gap between large and small cities in BEEC compliance during implementation. In China’s third-party compliance enforcement system, the construction supervision companies are held accountable for BEEC compliance inspection and reporting. Small cities often do not have sufficient resources to support the necessary government oversight of the third-party inspections. Such issues could be collectively addressed at the prefecture or province level, so that ade-

quate training is provided for the construction trades in county cities, which are administrative subordinates of the prefecture cities.

Local governments can also play an instrumental role in encouraging broader market uptake of voluntary building labeling programs, including the three-star Green Building Evaluation Standard (GBES) and the five-star Building Energy Efficiency Labeling (BEEL) systems. Currently under revision, the GBES was established by MOHURD in 2007 and covers a broader scope, and is more stringent, than the national BEECs.<sup>39</sup> Both the GBES and BEEL are in an early phase of market adoption, although they are required for all large commercial buildings and public offices with an area greater than 20,000 square meters. By the end of 2012, just under 800 buildings had received green labels, and fewer than 300 BEEL buildings had been certified. Although national and local authorities are setting hard targets for new buildings to meet green standards, at this early stage, the profusion of multiple, overlapping rules and ratings can create confusion in the market (Levine and others 2012).

Compliance with more aggressive BEECs and uptake of voluntary rating systems for green building can be improved through a more strategic alignment of financial incentives with policy goals. Existing financial incentives for new buildings have mainly focused on integrated renewable energy systems, including rooftop solar photovoltaic capacity and solar hot water systems—although in 2012, new incentives of RMB 45–80 per square meter were announced for buildings achieving two- or three-star GBEL ratings. Given the speed and scale of desired market adoption for new green building standards, additional incentives and support, such as preferential tax treatment and assistance in completing the certification process, are needed. Perhaps most important, public incentive programs should seek ways of leveraging financial awards with improving access to commercial financing and project services. (Levine and others 2012). Piloting coordinated financing incentives with mandatory building codes and voluntary ratings can test such an approach, as in Singapore’s Green Mark scheme (box 7.15).

### BOX 7.15 Singapore's Green Mark scheme

Singapore's Green Mark scheme, run by the Building Construction Authority, was launched in January 2005 with a strong focus on energy efficiency. It provides a meaningful differentiation of buildings in the real estate market and has had a positive effect on the industry's corporate image and on the leasing and resale value of buildings.

The distinctive aspect of the Green Mark scheme is that it is used to support the government's green building master plan as the basis for technical capac-

ity building and as a measure for determining government financial incentives for new constructions or retrofits. By purposely integrating mandatory requirements, voluntary ratings, and financial incentives for high achievers under a strategic plan for scaling up green buildings, Singapore demonstrates an effective way for transforming the building sector toward green and sustained energy efficiency improvement.

*Source:* Building and Construction Authority, Singapore, "About BCA Green Mark Scheme," [http://www.bca.gov.sg/greenmark/green\\_mark\\_buildings.html](http://www.bca.gov.sg/greenmark/green_mark_buildings.html) (accessed December 2014).

In accelerating adoption of green building standards and given the high variability in capacities in design, supervision, and inspection of buildings nationally, China will need a large-scale training and knowledge building effort across the entire supply chain. The concept of green buildings is rooted in an integrated approach to design, encompassing not just energy efficiency but also other environmental objectives, which may clash with traditional zoning regulations and overly prescriptive building codes. For instance, local design institutes may be more accustomed to traditional urban planning and building design approaches or may be concerned about transgressing codes and regulations. With the ambitious pace at which national and local governments are seeking to increase the share of green buildings in cities, there is a risk of "green washing"—the superficial and incomplete application of standards (Draugelis and Li 2012, 186). The success of the U.S. Green Building Council in promoting the LEED (Leadership in Energy and Environmental Design) standard in the United States, for example, is owed in large part to its efforts to reach out to all parts of the building community, including developers, property managers, materials suppliers, architects, and engineers.<sup>40</sup> An accreditation system similar to the LEED Accredited Professionals program could gradually increase the pool of qualified professionals in China. Training will also be needed for buildings authorities in local city

governments. Flexible, holistic approaches to applying green design standards aimed at reducing the overall energy footprint of buildings can be further piloted in those cities that already possess a high level of competence and experience. Finally, as a part of knowledge-building efforts, the national and local governments should also work with industry associations and stakeholders to expand the scope, increase the credibility, and improve market awareness of green building materials labeling. Developers interviewed have cited lack of credible information on materials and suppliers as one of the main barriers to green building (China Greentech Initiative 2012).

#### *Building energy efficiency in existing buildings*

Focusing on efficiency in new buildings is not enough. Most buildings of pre-2005 vintage were constructed without accompanying BEECs. Especially in cold regions, upgrades of existing residential and commercial buildings will be critical for meeting targets for reducing building energy use. The government has initiated a large thermo retrofit program in northern China with significant subsidy support (15 to 20 percent of retrofit cost). During the 11th Five-Year Plan, 150 million square meters of residential buildings in cold and severe cold region were reportedly retrofitted. In the 12th Five-Year Plan, an additional 400 million square meters of residential thermal retrofit is planned for



this region. Yet, these buildings only account for a small fraction of the pre-2005 urban residential building stock in the region (estimated at about 5 billion square meters). The main challenges to pursuing efficiency upgrades in existing buildings are less technical and more financial and organizational. Home and property owners need both incentives and effective local organization to stimulate interest in retrofitting. For instance, the current practice of flat fees or area-based billing for heating does not give residents incentive to save energy on space conditioning. Implementing consumption-based billing for heating in the northern provinces would allow homeowners to gain financial benefits from energy cost savings, while retrofits would increase comfort levels for people living in cold flats. How retrofits and billing are sequenced matters a great deal. Currently, retrofits are typically required before consumption-based billing for heating is begun to avoid saddling owners and occupants with high energy bills for poorly performing buildings that were constructed long ago. However, postretrofit billing lowers the motivation and interest of consumers. In principle, government subsidies for retrofits can provide incentives, but the level needed to accelerate renovations is likely to be very high. Any financial constraints could create an impasse that can slow down both consumption-based billing and the retrofits. Several countries in Eastern Europe facing similar problems in the 1990s started with consumption-based billing first and started various support programs, including lines of credit, to help stimulate homeowner interest in renovation. In China, the government could mandate a deadline for implementing consumption-based billing after retrofitting to make the link between retrofits and energy savings clear and it could allow cities to implement the billing before the retrofits if they choose to do so.

To address organizational barriers, many East European countries have promoted retrofits of existing building through vigorous public awareness initiatives involving homeowners, condominium associations, building managers, and NGOs. Major retrofits required homeowner consent and financial

contributions. Energy audits needed to be translated into clear investment proposals and communicated in ways occupants could understand. While there are some standard approaches, a degree of customization in technical measures and financing is usually required. Buildings with similar types, uses, and vintages might have significant structural and operational differences—and owners and occupants might have different preferences and financing capacities. It is advisable to introduce a degree of flexibility in government support programs that set clear metrics for energy consumption reductions but allow for greater customization to reflect local building conditions.

For commercial buildings, building operators might not find energy bills sufficiently high enough to concern themselves with retrofits, so additional motivation is needed. Shanghai is experimenting with establishing energy consumption benchmarks that building operators are required to meet, while extending dedicated lines of credit to support retrofits. There is ample experience and successful examples of national loans for building retrofits in EU countries, providing long-term, low-interest loans through commercial banks for residential retrofits based on a standard set of criteria and procedures, sometimes combined with additional capital subsidies for specific energy savings level achieved.

#### *Promoting building energy efficiency in public institutions*

Although the largest share of the building stock in China is privately owned, the public sector has a significant role to play in leading the move to buildings that are more energy efficient.<sup>41</sup> Public buildings represent about 6.2 percent of final energy demand in China and like other end-using sectors are dependent mainly on coal and coal-fired electricity. Upgrading of existing public buildings and better construction of ones will have an important demonstration effect and will create a larger market for green building products, resulting in lower costs and better access to services for private building owners as well. The benefits of improved energy efficiency in the public sector make a com-

elling case for local city governments to lead by doing. The local governments should institute consumption-based district heating metering and billing for all the facilities they own or control, for instance. A precondition for improving efficiency in the public sector is development of technical expertise and clarification of responsibilities for promoting energy conservation. That will be a major and multiyear undertaking because of China's size and diversity in public facilities. Among the highest priorities is the establishment of good statistics on energy use. Metering is fundamental to energy data collection and diagnostics but is far from universal. Better collection of energy use data through online monitoring systems, some already in place, should be supported by better public disclosure.

The use of awards can harness the natural interest of local leaders and managers of public entities for recognition. Award systems require unbiased data on energy use and environmental performance to be publicly available. Rating systems are another way to bolster enthusiasm for improving energy savings performance, including scorecards such as those issued each year to rate the performance of U.S. federal agencies in reducing greenhouse gas emissions, energy efficiency, and water conservation. Piloting the use of publicly disclosed scorecards in a subset of institutions, such as municipal office buildings, would recognize achievements, maintain accountability, and compel actions to improve their buildings' performance. Public facilities could also be allowed to retain the savings from reduced energy use in building retrofits, as laid out under the State Council's Order 531 (2008). Detailed local budget and accounting regulations are needed, and some cities, such as Beijing, have already developed them. Absorbing energy cost savings back into general funds is a strong disincentive. Instead, regulations should explicitly allow for various expenditures, including small upgrades or new equipment, that directly benefit the facility. Retrofits in schools can have multiplier effects when combined with classroom lessons on energy efficiency and sustainability that students then share at home (World Bank 2012b).

Capital budgets for public institutions are hardly ever sufficient in most countries, and China is no exception. Continued use of China's national- and provincial-level special funds to cofinance capital budgets for public institutions is encouraged. Budget support for project preparation costs, metering, and establishing statistics systems could also be shouldered by general funds to remove further transaction costs. China has just embarked on a power utility based demand side management program that could make special efforts to target public institutions, as is done in many countries. Revolving funds could be managed at local levels to help leverage capital budgets and subsidies. Careful analysis of these schemes would be needed to avoid crowding out commercial financing, where available.

Energy service companies offer an opportunity for public-private partnership schemes and provide an alternative source of financing for public institutions. ESCOs in China have started working in buildings but, unlike the ESCO market in the United States, industrial energy efficiency projects dominate the market. The State Council in 2010 issued a decree identifying ESCOs as a major market mechanism for promoting energy efficiency investments. Accelerating penetration of the public building market will require defining accounting rules for energy savings performance contracting and for selecting ESCOs through public procurement procedures, including prequalification criteria public institutions can use. It will also require strengthening measurement and verification to ensure efficient use of taxpayer funds. The European Union and the United States offer examples of different ESCO schemes, which local governments could study. For instance, the SuperESCO model experience in the United States Federal Energy Management Program provides opportunities to streamline procurement for energy efficiency retrofits across different public institutions. An ESCO could be competitively selected for a multiyear performance-based contract and allowed to approach departments with investment proposals without further selection procedures. Some transactions could be subcontracted to smaller ESCOs in the local market, further

facilitating their development. The details are complex and need to be studied carefully to ensure transparency and efficiency. It is recommended local governments identify a specific unit that can provide technical assistance for facilitating use of ESCOs.

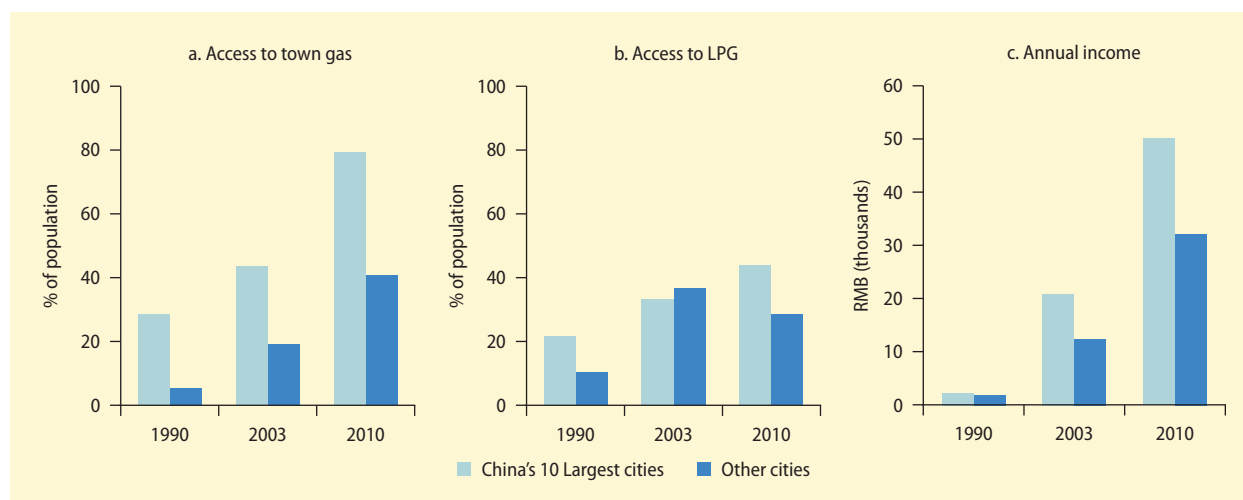
### Securing clean energy sources

No modern cities rely on coal as much as Chinese cities still do. Because coal is a major contributor to air pollution and CO<sub>2</sub> emissions, reducing the use of coal must be a centerpiece of urban energy strategies. Coal use can be reduced in cities by expanding access to piped natural gas, scaling up local production of renewable energy, and “importing” from outside city boundaries supplies of energy that are as clean as possible. Natural gas is currently limited in China, but domestic production and imports are increasing. Given current supply constraints, gas usage should be prioritized in the residential and commercial sectors, where it can have the largest environmental and economic benefits. Because cities rely more on electricity and power generators and large industries will rely on coal for some time to come, emissions control standards must continue to be tightened and enforced in those sectors and efficiency improved. While natural gas can be an important fuel to transition away

from coal in the near term, cities need to rely more on electricity and renewable sources of energy over the long term. Initially, most renewable energy will be produced outside city limits, which will require the removal of barriers related to pricing and grid access for commercial renewables and stricter emission controls on thermal power generation. Over time, distributed generation and production of renewables from municipal sources such as landfill gas, wastewater gas, and municipal solid waste within cities can contribute to meeting energy demand where feasible. China can adapt the most appropriate models for regulation, metering, and financing of small-scale renewable production based on experience gained elsewhere.

Cities around the world have tended to gravitate toward cleaner fuels as incomes rise and cities develop. In China’s cities, however, the transition away from coal has not happened quickly enough or on a large enough scale to keep up with the rapid urban growth and avoid persistently bad air quality. Millions of urban dwellers continue to rely on dirty fuels for cooking and heating (figure 7.32). Although cities are actively taking steps to rein in the most harmful uses of coal (box 7.16), incomplete reforms in the gas, power, and heating sectors have posed additional barriers to expanding the market for cleaner energy alternatives. Completing these

**FIGURE 7.32** Access to natural gas in China’s 10 largest cities compared with other cities



Source: NBS 1991b–2011b.

### BOX 7.16 Cities take active measures to reduce harmful burning of coal

In Taiyuan, the capital of China's largest coal-producing province, city officials have been reducing coal use by shutting down small heat-only boilers and expanding the district heating network, supplying gas to small and medium enterprises, and eliminating direct use of coal for cooking and heating in the city center and in peri-urban areas near the city. Beginning in the early 2000s, Shenyang removed 1,000 heating plants over the course of three years, reducing the number of heating enterprises from 1,062 to 410 (many operating small dispersed boilers) and increasing the share of centralized heating supply from 55 to 80 percent.

Urumqi has promoted the use of combined heat and power plants, larger district heating networks,

and, since 2012, gas-fired heating supplies as a part of its plan to reduce severe winter air pollution. Heating in Urumqi was estimated to contribute 16 percent of total annual average concentrations of  $\text{SO}_2$ , and 8 percent of  $\text{PM}_{10}$  and  $\text{NO}_x$ . Since the 1980s, Beijing has led the trend in Chinese cities toward increasing the use of natural gas and phasing out direct combustion of coal by small-scale residential and commercial consumers. Many large district heating plants in the city were converted to gas, the most polluting factories were relocated, and a coal ban has been enforced in the central downtown area. The ban was extended to the fourth ring road by the end of 2013. The city also recently announced a hard target of capping its total annual coal consumption at 15 million tons by 2015.

*Source:* World Bank 2012a, 2011a, 2011b; World Bank, Shanxi EPB, and Xinjiang EPB 2012; World Bank–MEP 2012.

reforms will be necessary to accelerate efforts to reduce the burning of coal and improve access to cleaner fuels in densely populated urban areas.

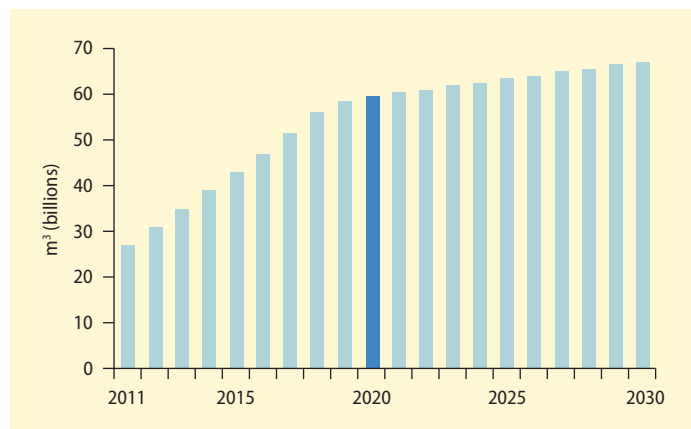
#### *Increasing the supply of natural gas to priority consumers in urban areas*

The potential benefits to urban air quality of expanding access to gas are enormous, but gas supplies are limited, and certain end-using sectors should be given priority to maximize social benefits. Highest priority should be given to households—as cities worldwide have done. Once infrastructure for piped natural gas (or “town gas”) is in place, small commercial users such as stores, hotels, and restaurants can gain more access to gas. Replacing coal with natural gas in the household and commercial sectors is especially important because end-of-pipe emissions controls are usually either too expensive or not technically feasible. After residential and commercial users, centralized heating facilities should be the next priority for supply. A few cities, such as Beijing and Urumqi, have already converted a large amount of district heating capacity to gas-fired capacity. Supply constraints make it important for each city to evaluate the most efficient configuration

for gas-based heating (for example, whether to supply base load or peak load for district heating or distributed generation), taking into account potential renewable heat sources and existing sources from combined heat and power and waste heat sources. In distributed systems, natural gas units are able to meet multiple demands of cooling, heating, and power, and can reduce the transmission and conversion losses associated with heat-only systems with lower heat load densities, which is an important consideration as buildings become more energy efficient. Use of gas for electricity generation and industry, which currently account for 60 percent of gas use nationwide, should be carefully compared with the uses outlined above. Nevertheless, increasing gas supplies to China's power sector could provide important efficiency benefits if used for meeting high peak loads or it could provide additional flexibility to the power system, including easier accommodation of intermittent renewable electricity supply (Kahrl and others 2013).

Because residential consumers are a top priority for scaling up natural gas supplies, achieving universal access to piped natural gas for urban households would require the supply of gas to increase from around 30 billion cubic meters in 2011 to nearly 70

**FIGURE 7.33** Supply of piped gas to urban households needed to achieve universal access to piped gas by 2020



Source: Team's calculations.

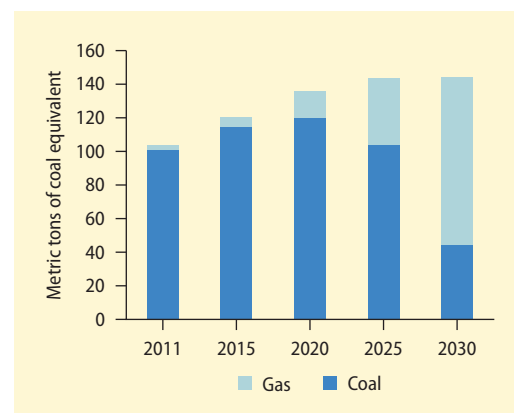
billion cubic meters in 2030 (figure 7.33).<sup>42</sup> Urban population serviced by piped gas would increase from around 500 million in 2013 to about 850 million in 2020 and reach 960 million in 2030. Total investment required between 2014 and 2030 is estimated at RMB 154 billion, including RMB 16 billion in annual investment between 2014 and 2020. The bulk of the investment would be needed in the 2010s should China decide to make access to piped natural gas for households a priority, replacing the use of costlier fuels such as LPG and dirtier fuels such as coal. Up to 75 billion cubic meters would be needed to shift about 65 percent of district heating to gas (figure 7.34), dramatically reducing the use of coal for heating in northern urban areas and resulting in significant economic benefits from reducing local and global pollution.

While the available resources of natural gas can be expanded considerably, accommodating demand by urban users will depend largely on reforms to pricing and market structure. China is piloting pricing schemes that would help address price differentials between domestic and imported gas. Because imports may meet about 50 percent of China's demand for gas in 2020, narrowing this price gap is important.<sup>43</sup> Another needed pricing reform is to address incentives to develop the residential gas market, for which prices are very low compared with those in

other sectors, particularly industry. Beyond adjusting prices, if China is to increase gas penetration, ultimately it should develop a gas law that creates a competitive gas wholesale market and clearly defines the rights, responsibilities, and obligations of operators and government entities. A wholesale competition model could focus on bulk supplies of gas sold to large industrial customers and urban distribution companies. Prices could be determined by negotiated contracts and competitive spot markets; transmission and distribution tariffs could be determined according to a method approved by concerned authorities and regulated. While creating such a model is a medium-term goal, in the short term, it is critical that China allow third-party access to the market. Without third-party access, it will be difficult to increase competition because of the dominance of the three oil companies in upstream development and transmission.

Greater urban access to gas requires more investment in distribution networks and storage (especially for dealing with seasonal peaks). In addition to pricing, it will be necessary to address financing, regulation, and access to these facilities. Incentives and reasonable returns should be provided for investors and operators in domestic and upstream gas supplies, liquefied natural gas cargoes,

**FIGURE 7.34** Estimated fuel required to supply 65 percent of district heating with natural gas by 2030



Source: Team's calculations.

Note: Fuel use is estimated based on projections for the expansion of heated floor area in the more than 300 cities currently serviced by district heating, assuming continued improvements in the energy efficiency of buildings and supply units.

pipelines, terminals, storage facilities, and distribution networks. Upstream market players also must have a reasonable expectation that price-setting mechanisms will be stable and fair—a task that many developed countries have fulfilled by creating an independent gas regulatory body.

### *Removing barriers to renewable energy in cities*

In addition to maximizing energy efficiency and optimizing use of natural gas in cities, China's cities can expand use of renewable energy.<sup>44</sup> Most cities in the world might be indifferent to receiving electricity generated from renewables or electricity generated from fossil fuels, since both are “clean” at the user end, in China's case renewable generation has added value by directly offsetting the amount of electricity that would be generated by coal. That can reduce air pollution regionally and lower the carbon intensity of the economy. Diversifying urban energy resources by introducing more renewable-based energy has the added benefit of enhancing cities' energy security through the “portfolio effect.” Besides receiving more renewable-based energy produced from beyond city limits, cities can also increase their share of self-generated renewable production or distributed forms of energy, where feasible. Completing power sector reforms that began over a decade ago is a top priority for scaling up clean energy in cities. In 2002, the State Council issued Decree No. 5, which outlined comprehensive power sector reforms to introduce fair competition (starting with generation) and develop an open, well-regulated electricity market.<sup>45</sup> Although there have been many achievements in the sector, progress has stalled.

China's government can take four actions to support even greater development of renewables. As a first step, it can introduce a two-part generation tariff. Currently, generation tariffs of coal-fired power plants are given based on China's dispatching approach, which ensures a certain number of operating hours for each plant. Coal-fired power producers may incur losses when dispatch centers ask them to reduce their generating to accommodate more wind and other inter-

mittent sources of renewable power. World-wide experience demonstrates that this situation can be rectified by structuring two-part generation tariffs: one charge for available generating capacity (a capacity charge) and one charge for kilowatt hours generated (an energy charge). The capacity charge would allow generators to maintain their current annual repayments of their investments and fixed costs, while the energy charge would allow them to recover the cost of fuel and other variable costs. Such a reform could be implemented relatively rapidly and would need to be complemented by changes in dispatching practices (RAP 2013). Second, transparent and cost-recovering transmission pricing should be implemented to allow grid companies to recover all costs incurred in safely and reliably delivering power to consumers, including the additional costs of accommodating intermittent renewable electricity. Without such pricing, grid companies will continue to resist bringing more renewables online, and curtailment generation losses of renewables will become more severe. In fact, about 12 percent of wind power generated in the Three-North Region in 2010 was wasted because of curtailment. Because this reform will be based on the future structure of the power sector, it will need to be undertaken in a broader context of electricity pricing reform in China.

A third action is to consider adjusting incentives to guide wind developers to build closer to load centers (Song and Berah 2013). Planning and coordination of grid development to accommodate major wind developments in resource-rich northern China will take time and should be supported by comprehensive studies that would aim to optimize connection size and connection circuit layout in consultation with stakeholders. Shifting the focus to central and eastern regions could lower overall incremental costs of wind power development. The fourth action would be to discourage local governments from imposing additional fees or harmful local sourcing requirements on wind developers that many have introduced as a result of value added tax reforms and rebates on wind power equipment. At higher levels of development, VAT from wind gen-



### **BOX 7.17 The Beijing Sunshine Schools program: Linking green policy, pedagogy, and people**

Under the umbrella of China's national Golden Sun Program, Beijing will install 100 megawatts of rooftop photovoltaic (PV) systems in schools and other educational institutions in Beijing Municipality. It is the largest such initiative in China to date. Most projects under the Golden Sun Program involve large PV installations in a single location. By contrast, the Sunshine Schools program will involve distributed PV capacity in about 800 facilities. The capacities of most systems are expected to range from 50 to 200 kilowatts. The program will test the renewable energy service company (RESCO) business model for distributed rooftop solar PV systems, whereby investments are financed by the service provider, which also provides maintenance and other after-sale service. The project is also expected to pilot two-way metering and net metering for rooftop PV systems. If proven successful, the project would provide valuable experience and demonstration effects for China's growing solar PV market.

In addition to policy replication, the program launched a parallel effort to educate students in the schools about environmental sustainability. It includes a competition with awards given out by both Beijing and central government officials as well as school administrators. Online monitors showing the amount of renewable energy generated and carbon dioxide avoided are displayed in the schools. Linking faculty, students, and parents with sustainability initiatives in schools should reinforce green lifestyle concepts both at school and at home.

The World Bank is providing a \$100 million loan for the installation of the solar PV systems, as well as a grant from the Global Environment Facility to establish online monitoring by the city of the renewable energy generation of the schools and to conduct technical studies on grid connection issues. The hope is that the Beijing project can be replicated in other Chinese cities developing similar schemes.

eration could be higher than pre-reform levels (Song and Berrah 2013).

Additional reforms are needed for regulating, financing, and metering distributed generation of renewable energy in cities. Worldwide, there is a trend toward consumers becoming generators of energy, which is transforming energy markets. In China, too, solar photovoltaic (PV) capacity has been growing rapidly, but the development of grid-connected solar PV has been inhibited by a combination of low retail prices for electricity and prohibitions by grid companies against installing distributed generation systems. Recent policy breakthroughs have helped break down some of these barriers to distributed generation and should be aggressively followed through with implementing regulations. In 2013, the State Grid began providing limited grid access to distributed energy, with support from the State Council, and the government announced that it would be shifting from capacity-based subsidies to feed-in tariffs (FITs) based on generation. These new initiatives should be complemented by efforts

to develop new and appropriate models for advancing commercial renewables in Chinese cities, such as in the "Sunshine Schools" program in Beijing (box 7.17).

While power sector reforms entail action at the national level, local city governments can also take proactive measures to introduce more renewable energy into their supply mix. Because most Chinese cities import the majority of their energy from outside the city, they are dependent on regional sources of supply, which are mostly outside their control. Still, they can leverage their position in the energy commodity markets as large centers of demand to influence the types of energy they receive. Several options exist for cities to "import" more renewable energy by covering the additional cost for renewable energy until parity with traditional energy supplies is achieved. One is capacity-based, where consumers in a city pay a marginal fee on their utility bills to install a specific amount of renewable energy capacity. Another is energy-based, where consumers pay a small premium for units of renewable

energy they purchase (for example, as a fixed percentage of the electricity they use each month). The Shanghai Jade Electricity Program, started in 2005, experimented with the energy-based approach. Three important lessons were learned in Shanghai: the local government needs to play a very active role in promoting the initiative and, ideally, to link up with national efforts; public education and awareness is critical in achieving buy-in for both nonresidential and residential consumers; and financial incentives are needed to stimulate participation (Peng 2012).

### *District heating sector reform*

District heating is one of the last vestiges of the welfare state in China.<sup>46</sup> District heating reforms offer some of the clearest and most direct opportunities for improving environmental quality in northern cities. In more than 300 cities where centralized heat in the winters is legally required, over 90 percent of the heat supply is fueled with coal. Most Chinese heating utilities continue to bill consumers for heating based on a flat rate per square meter, removing any end-use efficiency incentives. Old district heating systems in northern cities are often highly inefficient and have historically had poor pollution controls. As a result, ambient PM<sub>2.5</sub> concentrations of cities north of the Huai River were estimated to be about 55 percent higher between 1981 and 2000, and to have reduced average life expectancy by about 5.5 years, compared with cities where heating is not legally required (Chen and others 2013). The district heating sector has grown about 12 percent a year in the past five or six years and is about 50 percent larger in floor area coverage than in 2005 (World Bank 2012a). Achieving a greener district heating sector will require a broad range of technical innovations, pricing, and institutional reforms, including modernizing regulations. It will also require a major effort in building technical and managerial capacities in the utilities and regulators to usher in modern management techniques. Since the government issued guidelines for heating reforms in 2003, there have been many pilots and lessons learned that can be used to accelerate reforms.

Mandatory heat metering should be implemented at least at the building level with a binding timetable for introducing consumption-based billing and two-part heat pricing. Metering enables heating companies to understand energy consumption patterns and allows consumers to pay according to use. While apartment-level metering is preferable, building-level metering should be allowed to avoid expensive and disruptive internal pipe retrofits and accelerate metering. Two-part heat tariffs include charges for variable and ordered capacity costs, and thus are incentives for end-user efficiency while covering justified fixed costs. The popular practice to set the fixed part on a flat square meter basis should be changed to a capacity-based charge, creating incentives for consumers with energy-efficient buildings to reduce ordered capacity, freeing it up for new connections. Incentive-based tariff regulation would also encourage heat suppliers to improve their operating efficiency. Ensuring adoption of commercial accounting principles based on uniform guidelines from the Ministry of Finance by heat companies would help get tariffs right. The central government could clarify tariff methodologies for combined heat and power plants to improve transparency and consistency across cities. In addition, general subsidies to households, including low tariffs, should be replaced with more targeted assistance and extended also to poor households just above the current threshold for public welfare programs. A World Bank survey conducted in Liaoning Province in 2007 found that in RMB terms, heating subsidies for the richest households were similar to those for the poorest households, so that in the end, out-of-pocket spending on heating bills amounted to 2 percent of income for the richest households and 7–10 percent of total income for the poorest households (World Bank 2009).

China could consider issuing a national district heating regulation to address the lack of a strong legal mandate for related institutions to undertake reform and issue national district heating planning guidelines to ensure consistent planning approaches that incorporate energy- and carbon-intensity reduction goals. The regulation could, for instance, establish licensing of operators as a key reg-

ulatory tool to force suppliers to meet their obligations (including for environmental performance and financial reporting). A broader provincial role in monitoring sector development, facilitating knowledge exchange, and supervising the regulation, if issued, would help with the supervision of district heating in the 15 provinces and over 300 cities where heating is mandated. With sufficient capacity, provincial authorities could take on licensing responsibilities and participate in dispute resolution. The lack of an autonomous regulator with clearly a defined role, budget, and enforcement authority is a key reason for uneven and relatively limited modernization of the sector. A national regulation could create such an institution, perhaps even at the provincial level. The guidelines would establish principles and approaches for least-cost planning as well as dispatching guidance. Because cities are very involved in the utilities' investment decisions, the city has important responsibilities in investment approval. The planning function, combined with the investment approval process, should not only aim to ensure heat supply security but also protect consumers from unreasonable costs.

The use of coal for heating should be deliberately avoided. Coal should be switched to gas where supply can be secured, renewable resources integrated where feasible, and strict emission controls imposed on remaining coal heating sources. Gas is more expensive than coal, but a package of demand-side management measures, together with modernizing district heating systems, pricing reform, and targeted social assistance could help address affordability concerns. As a first step, gas should replace coal-fired heat-only boilers for peak loads, connected to cogeneration units. Gas boilers are more efficient and flexible and can open doors to more economic dispatch of heat sources, renewables integration, tri-generation technologies, and value-added services such as district cooling. Alternatives need to be carefully analyzed because heating is influenced by local conditions. Generally, over the longer term, the estimated economic benefits of switching to gas-fired district heating are significant and appear to outweigh the incremental costs (box 7.18).

## **Integrating water resources and pollution management**

China's urban water sector faces two severe and interrelated problems. One is to supply a sufficient amount of water to a growing urban population, while also providing for the needs of the industrial and agricultural sectors as well as ecological requirements. Water scarcity has become one of the greatest threats to China's continuing urbanization process, especially in the north and west, and problems could become even worse in some regions under plausible climate change scenarios. The other challenge is to ensure the quality of water entering the city water system and of the treated wastewater returned to natural water bodies. Urban wastewater, industrial emissions, and agricultural runoff compromise water quality; poor water quality in turn threatens health and leads to higher treatment costs downstream. Water scarcity and pollution interact. Reduced river flow leads to higher pollutant concentrations because there is insufficient water for dilution.

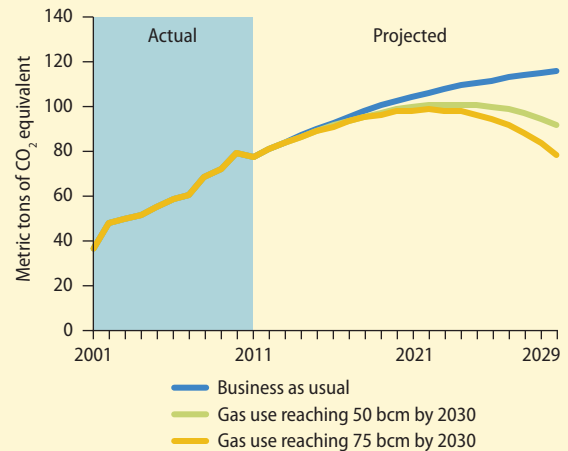
China has addressed these problems in the water sector by improving the legal basis for managing water resources and by investing in water supply and treatment infrastructure. Further progress can be made in three areas. First, water supply can be improved by increasing the efficiency of water use, especially in industry and agriculture, and by encouraging a more flexible allocation of water rights across sectors. Underpricing of water currently discourages use efficiency. Insufficient information about water resource flows hinders good decision making but could be addressed using new technologies such as satellite remote sensing. Second, improving water supply quality requires reducing industrial pollution and addressing nonpoint source pollution in the rural sector. Besides better enforcement of regulations, instruments such as payments for ecological services can be helpful where urban water users support actions elsewhere in the watershed that protect water quality. Since one city's waste water becomes the water supply of another city downstream, further investments in waste water treatment will also be

### BOX 7.18 Phasing out coal in district heating provides significant environmental and social benefits

As China's cities expand in the coming years, centralized heating will also expand. In a business-as-usual scenario, heated floor space in China's provincial, prefecture, and county-level cities currently serviced by district heating is expected to nearly triple from 4.7 billion square meters in 2011 to 13.1 billion square meters in 2030. Heat supply meanwhile is projected to rise from 96 million tons of coal equivalent (Mtce) in 2011 to 149 Mtce in 2030. Assuming that the share of heat supplied by burning coal continues to hover around 90 percent, coal use for heating is projected to increase from 101 Mtce in 2011 to 120–151 Mtce in 2030, with carbon emissions increasing from 78 million tons of CO<sub>2</sub> to 116 million tons.

If the current share of centralized heating supplied by burning natural gas (about 3 percent) remains unchanged, total gas use is projected to be only 2.7–3.4 billion cubic meters by 2030 in a business-as-usual scenario (figure B7.18.1). If the share of gas-fired heating were to increase to about 45 percent of total heat supply by 2030, gas use would reach 39.9–50.0 billion cubic meters, requiring total additional investment of RMB 34.0–39.2 billion from 2014 to 2030 beyond business as usual (in year 2011 renminbi). Increasing the share of gas-fired heating to about 65 percent would require gas supply to increase to 59.8–75.0 billion cubic meters and total additional

**FIGURE B7.18.1 Carbon emissions under different scenarios of increasing gas use for heating**



investment of RMB 47.0–54.4 billion from 2014 to 2030 beyond business as usual. Cumulative benefits of reducing coal use and increasing gas use net of additional investment required are estimated at RMB 11.8–14.2 billion between 2014 and 2030 in the scenario where gas-based heating increases to 45 percent and RMB 17.3–21.0 billion where gas-fired heating increases to 65 percent.

Source: Team calculations.

Note: Estimates are based on projections for the expansion of heated floor area in 316 cities currently serviced by district heating.  
BCM = billion cubic meters of natural gas.

a high priority. Finally, and perhaps most importantly, better water resources management requires institutional reforms. Water utility governance reform could improve cost recovery and coordination mechanisms such as municipal water boards. And because urban and rural water issues are highly interdependent, regional and cross-sectoral water management approaches will be needed to reform water rights allocation and pollution control at a watershed level. Effective reforms will promote sustainable water management and help Chinese cities achieve a “water saving society,” a longstanding concept in China that is in need of a strong boost from local governments.

#### *Improving water supply by strengthening demand management*

With 20 percent of the world's population but only 7 percent of its freshwater, China has water scarcity as a major problem for sustainable urban development.<sup>47</sup> Although China has the fifth-largest endowment of freshwater resources (Moore 2013), its annual per capita resources of 2,100 cubic meters are about one-third the global average. There are strong spatial differences: 81 percent of China's water resources are concentrated to the south of the Yangtze River, where 60 percent of the population lives—only 19 is therefore available to the 40 percent of the population in the

north, where most of the major grain production is located, and in the west. Annual per capita water availability in the north is only about 900 cubic meters (World Bank 2013b). About two-thirds of China's cities—420 cities—are water short; 110 of those face severe shortages, with a total deficit of 10.5 billion cubic meters. For instance, Beijing's and Tianjin's per capita water resources were less than 120 cubic meters, well below the benchmark for serious water shortage of 1,000 cubic meters (Wen and Zhu 2013). Eleven provinces overall fall below this level and are drier than Iraq or Lebanon. These shortages have led to severe overexploitation of groundwater resources, which provide about one-third of northern China's water supply and as much as two-thirds in places like the Hai River Basin, which is home to Tianjin and Beijing. Nationally, more than 160 groundwater overdraft areas cover 190,000 square kilometers, and each year overextracted groundwater exceeds recharge by 22 billion cubic meters. In the Hai River Basin, shallow water tables have dropped by up to 50 meters and deep ones by up to 90 meters.

The main driver of water demand is increasing consumption by a growing population, by agriculture, and by expanding water-intensive industries in the water-short north and west, although declining precipitation, possibly due to climate change, is probably also contributing to water shortages in some regions. By 2030, under current policies, China's total water demand is projected to rise by 61 percent over 2005 levels (2030 Water Resources Group 2009). Urban municipal and domestic use is expected to rise from about 12 percent of total demand in 2005 to 16 percent. However, the total amount of water use in China will be limited to 670 billion cubic meters by 2020 and 700 billion cubic meters by 2030, according to the National Water Resource Master Plan approved by State Council in December 2010. The water use sectors are expected to take reduction measures. Although average urban residential per capita water use is lower than in high-income countries, it is growing as living standards rise. In the southeast and coastal areas, per capita daily water use is about 190 liters, while in the northwest

and upper Yellow River areas, it is only 70 liters. Industrial water use intensities remain high at 131 cubic meters per RMB 10,000 of industrial value-added. This is about twice the average for high-income countries and ten times that of the best performers such as Japan. Some of the most water-intensive industries are among the worst performers, with steel, oil refineries, paper, synthetic ammonia, and beer production having water use intensities about 10 times greater than those of advanced international competitors. The energy sector, dominated by fossil fuel use, is one of the biggest water users, and some of China's largest coal-producing regions are in the arid north. Fresh water use for mining, processing, and consuming coal accounts for a considerable portion of water consumption in industry (ADB 2008). Agricultural water productivity is also low. According to the Food and Agriculture Organization, crop water productivity was \$3.60 per cubic meter in 2009, compared to an average of \$4.80 for middle-income countries and \$35.80 for high-income countries.<sup>48</sup>

The response to water shortages is usually to increase supply—digging deeper wells or building reservoirs or diversion infrastructure. But these are often no more than stop-gap measures in the face of rising demand. The first priority therefore must be to create incentives for greater water conservation and for implementation of water-saving production technologies. Water prices have gradually increased but are still low by international standards. In Beijing costs are less than a tenth of those in Berlin or Copenhagen, for instance (figure 7.35). These low residential tariffs are offset in large measure by high industrial tariffs. In many developed countries, industrial water tariffs are usually lower than residential water tariffs. Berlin's urban residential water tariff is \$6.67 a cubic meter, while its industrial water tariff is \$2.16. The current industrial water tariff in Beijing of RMB 6.21 and in Tianjin of 7.85 RMB are higher than those in Canada, the United States and other developed countries. Agricultural water prices are also very low, as is common in many countries. China's agricultural irrigation water use charges consist of fees paid to state-owned water manage-

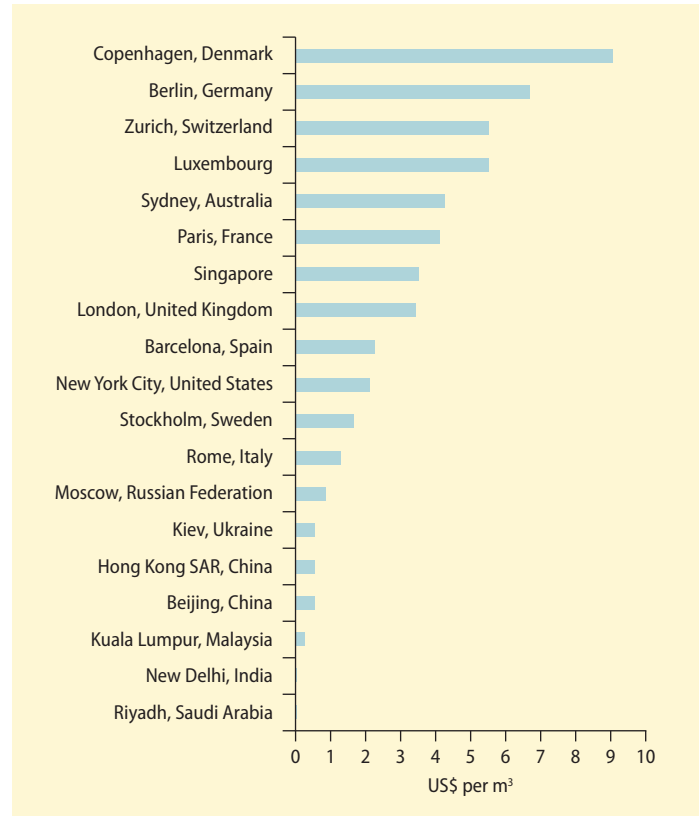


ment agencies and end canal system water fees, and can vary widely. There appears to be room for water tariff adjustments that can better incentivize all water consumers to conserve water and to use it more efficiently in industrial and agricultural production.

Raising water use efficiency is critically important, especially in the large agricultural and industrial water-using sectors where water productivity remains low. Increasing water productivity can help address the needs of growing urban population by reallocating water resources from rural or industrial use to municipal water supply. In some countries, that involves market-based trading of water rights between rural and urban users. A prerequisite for such reallocations and for reducing overextraction is better information about available resources and current consumption within a given watershed. Within any given watershed, water is extracted from surface or groundwater sources and used for urban, industrial, or agricultural purposes; some of it then returns to rivers or seeps back into the ground. Only a share is actually consumed, mostly as evapotranspiration (ET) during plant growth. Allocation of water rights requires information on the amount that may be withdrawn; the amount that may be consumed (ET from irrigation); and the amount that must be returned to the local water system at a level of quality suitable for downstream users and ecological needs. If only extraction is monitored, as is common practice today, there is a severe risk of overexploitation of water resources. New methods using satellite remote sensing have made it much easier to monitor ET as a good approximation to actual water consumption that could be the basis of an enhanced water withdrawal permitting system and in the future, potentially for water rights trading between sectors (World Bank 2013b).

In the medium term, a better understanding of virtual water flows—water that is embedded in traded goods—also helps identify opportunities for improving urban water supply. For example, water-scarce Shanxi Province exports large quantities of virtual water to water-rich eastern China through trade of water-intensive products such as coal, metals, thermal power, and manufac-

**FIGURE 7.35** Water and wastewater tariffs in Chinese cities compared to other cities around the world



Source: Global Water Intelligence, "Global Water Market 2011-Meeting the World's Water and Wastewater Needs Until 2018" (2011), <http://www.giiresearch.com/report/gwi108050-lob-water-wastew.html> (accessed December 2013).

tured items (Li, Liu, and Liu 2011). At the same time, Shanxi imports virtual water in the form of agricultural products (153 million cubic meters in 2007, equivalent to over 2.5 percent of total water use), but unfortunately these come from even more water-scarce provinces such as Hebei, Shaanxi, and Xinjiang. In the Yellow River basin, in contrast, food for water trade between downstream provinces like Shandong and upstream provinces such as Ningxia presents win-win opportunities. Optimizing such flows, for instance by moving water-intensive agricultural production to water-rich areas or relying more on importing virtual water embedded in food products from international markets, would help increase water use efficiency and free up water resources for high-value urban uses.

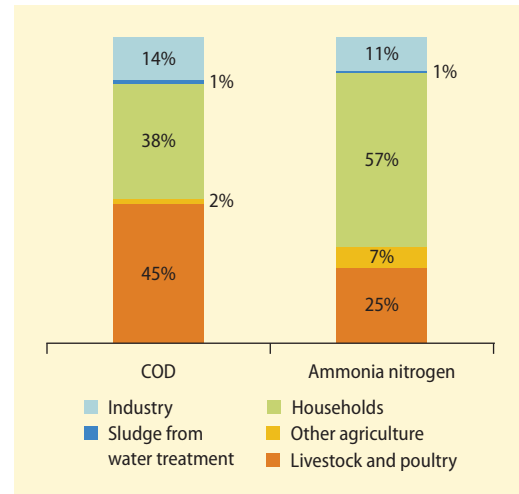


### Ensuring the quality of the water supply

Water scarcity compounds the problem of water quality, which is at the core of China's water-related challenges. As rivers and groundwater reservoirs shrink, pollution becomes less diluted and concentrations of effluents, and their impacts, rise. Problems include severe pollution incidents that may be causing "cancer villages" near polluted waterways, but also lower-level chronic pollution that affects health and increases urban water treatment costs. By some measures, water quality in China's major river basins actually shows small but steady improvement since 2001, thanks to investments in end-of-pipe controls for industry, although water quality continues to be far worse in the northern basins. Industrial pollution accounted for about 19 percent of chemical oxygen demand (COD, an indirect measure of organic pollutants in water) in 2010, declining to 14 percent in 2011. Discharges of wastewater from urban households, meanwhile, are growing and now account for 38 percent of COD in 2011 (figure 7.36). Yet, the largest share of COD comes mainly from nonpoint sources upstream of cities—mostly agricultural (also domestic)—and this share will likely increase (Guo and others 2012). Forty percent of Chinese rivers were seriously polluted and unfit for drinking water in 2010, and in 2011 the groundwater quality in more than half of 200 cities surveyed was rated "bad" (40.3 percent) or "extremely bad" (14.7 percent).<sup>49</sup> Groundwater pollution is especially worrying because it takes decades for polluted aquifers to recover. Also, there are now concerns in major urban centers about new kinds of pollutants such as medicine residues, micropollutants, and odor and taste pollutants (World Bank 2012c).

Treatment of water entering urban water supply systems is the most immediate way to ensure safe water, but with growing pollution loads accumulating upstream, that becomes increasingly more difficult and costly. Current utility charges are typically too low to fund the upgrading and operations of comprehensive water treatment. Reducing pollution of upstream water resources is thus an effective way to keep costs down and achieve

**FIGURE 7.36** Sources of main water pollutants, 2011



Source: MEP, "Total Emissions of Main Pollutants" (June 2012), [http://jcs.mep.gov.cn/hjzl/zkgb/2011zkgb/201206/t20120606\\_231039.htm](http://jcs.mep.gov.cn/hjzl/zkgb/2011zkgb/201206/t20120606_231039.htm); MEP, "Waste Water," Environmental Statistics Report 2011 (March 2013), [http://zls.mep.gov.cn/hjtj/nb/2011nb/201303/t20130327\\_249978.htm](http://zls.mep.gov.cn/hjtj/nb/2011nb/201303/t20130327_249978.htm); MEP and MOA, 12th Five-Year Plan for Controlling Pollution from Livestock and Poultry Industry (全国畜禽养殖污染防治"十二五"规划) (November 2012).

Note: Share of livestock and poultry in total emissions is assumed to be the same in 2011 as in 2010.

COD = chemical oxygen demand, a waste quality measure.

greater water quality. Regulations of agricultural practices and industrial emissions such as technology and effluent standards will remain the main policy instruments. Market-based approaches can also be effective, although pollution rights trading is even more difficult to implement for water than for air, in large part because both the pollutants and the impacts are more varied (Olmstead 2010a, 2010b). Damages depend considerably on local conditions such as how quickly pollutants mix and disperse with large quantities of water.

Downstream water users such as municipalities can also compensate upstream areas for maintaining higher water quality by preserving forests and wetlands or reducing agricultural runoff. Such payments for ecological or environmental services (PES) can often achieve water quality targets at lower costs than additional treatment. Famously, New York City saved \$6 billion in construction costs and \$300 million in annual operating costs for a new water filtration plant by investing \$1.5 billion over 10 years in con-

### BOX 7.19 Examples of cost-effective water treatment services provided to cities by natural ecosystems

*Western Cape, South Africa:* Removing thirsty invasive pine species from the Western Cape can reduce the unit costs of supplying water from facilities by \$0.03 per cubic meter (2010 prices). Removing invasive species that used large amounts of scarce water was two to seven times cheaper than augmenting water supplies by treating effluence or desalinizing water (van Wilgen, Cowling, and Burgers 1996).

*Bogota, Colombia:* The city has saved \$19.6 million in avoided costs for water filtration facilities thanks to wetlands above the city, which filter out contaminants and sediment in the city's water supply so well

that only a chlorine treatment is needed for disinfection (Jones, Hole, and Zavaleta 2012).

*Vientiane, Laos:* Flood attenuation and wastewater treatment services provided by That Luang Marsh next to the capital city have saved an estimated \$1.5 million in construction costs for sewage treatment infrastructure (Gerrard 2004).

*Poyang Lake, China:* Located in the heavily populated Yangtze River basin, the lake filters excess nutrients from the water, reducing sewage treatment costs by RMB 4.31 million each year (Zhao and others 2004).

*Source:* Sall and Brandon, forthcoming.

servation of the upstream Catskills watershed, where it sources 90 percent of its water. Stakeholders included state and federal agencies, environmental groups, and some 70 towns and villages. It reportedly took about 150 meetings to achieve agreement (Postel and Thompson 2005; Salzman 2009). Many such schemes have now been introduced, including in China (box 7.19), but they are difficult to implement under the current fiscal system. PES requires transfers across municipal boundaries and to stakeholders who in turn must use the funds for intended purposes. This process requires competent and transparent monitoring. Nevertheless, PES programs represent an innovative strategy to rectify market failures and also to help address financial constraints faced by rural areas.

While maintaining the quality of upstream water sources for cities remains a major challenge, China has made significant progress in improving urban waste water treatment. Coverage improved from 46 percent in 2004 to 84 percent in 2011 according to NBS data, and the 12th Five-Year Plan includes RMB 380 billion for investing in urban wastewater treatment and expanding water quality monitoring stations.<sup>50</sup> Those central government transfers should be accompanied by a

greater emphasis on cost recovery. Low tariffs weaken incentives to achieve the government's widely publicized water saving objectives. Even in better-performing cities like Beijing where the wastewater treatment tariff has already been increased to about 26 percent of the water price, the fee barely covers the cost of treatment and weakens incentives to decrease wastewater. Cost savings could be achieved in smaller municipalities by aggregating water treatment services into a competitive concession or lease arrangement where one utility serves multiple cities. This is a longstanding practice in many countries. Likewise, wastewater should be managed as a network utility business by integrating drainage and treatment management and charging users for drainage services rather than considering them as a public service. About two-thirds of the investment costs and about half of the operational costs for wastewater systems come from increasingly complex pipe networks and pumping stations across the city. Currently, wastewater utilities also have no control over industrial discharges into the municipal system, which can lead to overloading the drainage network and the treatment process. Incorporating drainage infrastructure as a part of a commercial or quasi-commercial operation of the

treatment system can create the incentives to control and charge for industrial discharges.

Better cost recovery in the water sector would also support implementation of tightened standards that could “leapfrog” to match those common in high-income countries. While many cities have the resources and capacity to achieve high water quality and treatment standards, some do not. China adopted ambitious new drinking-water standards, following WHO guidelines, in July 2012, but many cities do not have the technical means to monitor water quality according to those standards.<sup>51</sup> In addition, requirements issued in 2005 for expensive tertiary treatment for all municipal wastewater treatment plants (SEPA Circular No. 110) remain beyond the technical and financial capacity of many cities. Transitional arrangements for water treatment and wastewater standards could be introduced in cities with weaker capacities specifically to ensure full and efficient collection of wastewater. Cities and towns that cannot afford the Class 1 or 2 discharge standards (the top standards) could start by ensuring full collection of wastewater and low-cost treatment, with many technologies now available to come close to meeting Class 2 standards. Although this approach does lower standards, it can help to treat wastewater that would otherwise go untreated. Such arrangements need to be carefully monitored and understood to be part of the transition to full compliance.

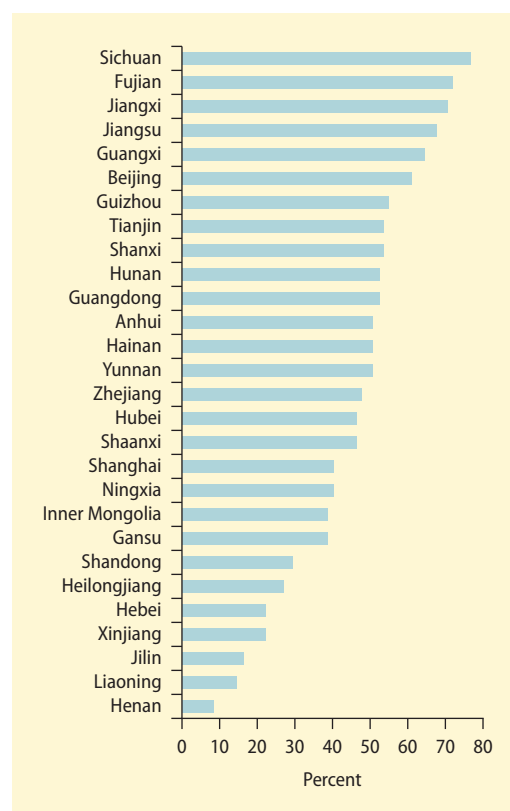
#### *Strengthening water sector institutions*

In addition to continuing large investments in water infrastructure, achieving sustainable water supply for China’s growing cities will also require institutional reforms. One priority is the reform of utility governance to strengthen the institutions that deliver urban water and treat wastewater and sewage. The other priority is the establishment of regional coordination mechanisms that can manage water allocations and implement measures to ensure water quality at the watershed or river basin level.

One aspect of utility governance, improved cost recovery by raising prices, has already been mentioned as an effective way to encour-

age water use efficiency. A World Bank analysis of China’s urban water utilities from 2004 to 2009 showed weak cost recovery and difficulties with achieving greater self-financing of capital investments.<sup>52</sup> Only 44 percent of urban water utilities generated positive net margins, although this share varied by province (figure 7.37). Even the better performing utilities were operating at just above the breakeven point with only 10 percent generating net margins of over 10 percent (a healthy financial performance benchmark is 20 percent). The analysis also showed significant variations in utility financial performance across provinces and within provinces, suggesting that local government interventions do affect utility financial health. In addition, performance was not correlated with size in the sample. Smaller utilities can perform well with supportive tariff policies and competent

**FIGURE 7.37** Share of utilities with net positive margins, by province, 2009



Source: World Bank analysis and China Urban Water Statistical Yearbook 2009. No data available for Chongqing, Tibet, and Qinghai.

management. Finally, while most utilities (84 percent) generated operating revenues that covered cash requirements for operations and maintenance, the ratios are razor thin and leave little surplus for capital investment. Further analysis of 27 utilities in 9 provinces between 2004 and 2009 showed that utilities' unit production costs rose on an annually compounded basis at least 5 percent and much more in some cases, so raising prices will be necessary to provide a predictable and sufficient source of revenue for utilities and make them less reliant on support from general revenue.

If urban utilities become more commercialized and autonomous, they will have incentives to solve some longstanding problems in the sector (Browder and others 2007; World Bank 2013b). Governance of the water sector is currently fragmented across different offices. To improve coordination, cities in some countries have created municipal "water boards" that coordinate and regulate their water sector. For instance, wastewater tariffs are currently often included in the water bill and collected by municipal water companies, which do not always make efforts to collect the wastewater bills. That also makes it difficult to collect wastewater charges from industries with their own water source. These two issues could be supervised by a water board—a mechanism that could be piloted in more advanced cities first. Members of these boards are typically appointed by city governments and have the power to make autonomous decisions or recommendations on key issues such as tariffs, budget transfers, and capital improvements.

As with air pollution, water supply and quality cannot be successfully managed at the level of an individual city or county only. Pollution and overextraction in the upper watershed affect downstream users. Between 1995 and 1998, for instance, the Yellow River did not reach the sea because of excessive water extraction and as recently as 2009, 30 percent of the water in the Yellow River basin was unfit for human consumption, according to MEP. One regional coordination mechanism is an integrated water and environment management approach, which establishes a strategic framework at the river basin level

for both water resources and environmental management. It brings together relevant ministries, local governments, major water users, and polluters. A pilot of the approach has been successfully tested in the Hai River Basin. It established a "joint decision-making conference" as a multistakeholder platform for debate and decision making among water users. These processes can reach consensus on water use targets and pollution controls, which are then allocated to the local administrations within the watershed. Without such an inclusive process and appropriate incentives, there may be less interest in staying within the targets as experienced in the Yellow River case, among others.

Finally, institutional reforms are also required at the administrative level. Water and environment management are split, with the water department in charge of water supply and water infrastructure in general, while the environment department is responsible for pollution control in general. Both have overlapping areas of responsibility for water quality control. A further problem is that each department has its own institutional and monitoring system and there is no culture of data sharing. No data sharing among related government departments can lead to disagreements and misunderstandings. Streamlining of responsibilities and greater incentives for cooperation and collaboration and information exchange, piloted in some parts of China, would contribute to achieving national water sector objectives.

#### *Improved solid waste management*

As incomes rise and more citizens join the urban consumer society, waste volumes in Chinese cities are growing rapidly. The estimated solid waste volume generated in China, including recyclables that are separately collected, was 346 million tons in 2011 (table 7.3), about twice the amount in 2000. Urban residents make up about 55 percent of the population but generate about 80 percent of the total waste amount, or 1.1 kilogram of waste a day, compared with 0.3 kilogram for rural citizens. The average of 0.7 kilogram is similar to other large world cities at comparable incomes. Waste volumes will likely double

**TABLE 7.3** Estimated waste generation levels and main outlets in China, 2011

Population	Total waste generated by households (ton/y)	Total waste formally collected & transported (ton/y)	Total waste not collected (ton/y)	Total waste separately collected (=recyclables) (ton/y)	Total waste disposal in harmless manner (sanitary landfill/incinerator/composted) (ton/y)	Total waste not properly collected/disposed (ton/y)	Kilograms of waste generated/person/day
<b>Urban</b>							
722 million (55%)	281 million	219 million	14 million (50% of waste in towns)	48 million (20%)	177 million <sup>1</sup>	56 million	1.07
<b>Rural</b>							
578 million (45%)	65 million	18 million	41 million	6.5 million (10%)	9 million (no data, estimate 14% of total; 50% of waste collected)	49.5 million	0.31
<b>Total</b>							
1.3 billion	346 million	237 million	55 million	54.5 million	186 million (cities 131; counties 46; towns+villages 9)	106 million	0.73

Source: NBS 2011a; statistical data from cities and county towns, estimates for towns, and calculations by the authors.

again by 2030. To ensure a sustainable waste management sector in China's growing cities, collection fees need to rise to full coverage everywhere, waste segregation and recycling must be improved, and safe disposal of the remaining waste ensured.

Achieving these objectives will also require changing the way waste management is financed. Municipal waste management has high marginal operating costs and is therefore different from other services such as water supply and sewage collection, which have high fixed up-front costs but relatively lower operating costs (Hoornweg and Bhada-Tata 2012). Comparable costs in China vary widely. For example, in Shanghai rates are RMB 120 a ton for collection and transport and RMB 90 a ton for disposal in landfill or RMB 240 a ton for incineration. In Kunming, rates are RMB 90 a ton for collection and transport and RMB 90 a ton for incineration.

Despite high operational costs, households are typically not charged for formal waste removal. Instead, costs are covered through general spending. Waste management is therefore underfunded in many cities, leading to poor performance. For example, incinerators with insufficient gate fees often operate with low temperatures and bad flue gas treatment, leading to environmental problems.

Total national waste management fees were only RMB 4.4 billion in 2011, while national investment in fixed assets for waste treatment was RMB 19.9 billion and—assuming overall management costs (collection, transfer and transport, final disposal) of at least RMB 250 a ton—total municipal solid waste costs were likely no less than RMB 40 billion in 2011 for formal cities. These costs are expected to increase tenfold by 2030. A more sustainable financing model would follow international practice in high-income countries and charge households and firms the full cost of waste management, even if charges are combined with those for other utilities to ease administration. Such explicit charges would also encourage reduction of waste generation.

#### *Improving the efficiency of municipal solid waste management*

About 70 percent of the waste is currently formally collected in China, and an estimated 54 percent of the total waste is adequately disposed of in sanitary landfills, incinerators, or composting plants. Average waste collection coverage ranges widely, from approximately 20 percent in rural areas to nearly full coverage in many big cities. The volume of waste incinerated (26 million tons in 2011) has increased rapidly. Another 15 percent is



recycled. The remaining waste (about one-third of the total amount generated) that is not disposed of properly or collected as recyclables, is burned, dumped, or disposed of without special environmental controls.

Formally segregation of waste at source organized by local authorities is still rare, but a large informal sector collects and processes valuable recyclables (such as metals, plastics, paper, and appliances). This sector provides income for low-skilled city dwellers, but makes formal recycling of collected waste less profitable. Cities that seek to formalize these systems could integrate currently informal systems or aid informal waste collectors in finding alternative livelihoods. In the longer term, China could adapt European models of product stewardship at both national and local level. In such schemes, manufacturers consider the waste implications along the full life-cycle chain of their products, including the use of packaging materials and the final disposal of the product at the end of its useful life. The government could collaborate with industrial sector organizations and introduce voluntarily schemes and incentives that could eventually lead to mandatory regulations.

Besides raising the collection and recycling rates, better overall planning and management will boost sector efficiency. First, adopting international practices for master planning of integrated solid waste management systems will avoid overbuilding some parts of the waste management chain and neglecting others. To properly function, the various parts of the waste management chain (collection, transfer, transport, final disposal) need to be well matched and synchronized. Second, introduction of international data monitoring and financial accounting practices for solid waste management would better reveal the true costs of the waste management chain. About 50 percent of waste volumes are estimated simply by truck counting, meaning that large volumes of waste streams are poorly recorded, and tools for analysis at the national level are inadequate. Accounting practices are also often insufficient. Even at the local level there is generally little insight into the capital and operating costs of all the components in the waste management chain. As a consequence, costs are routinely under-

estimated. Finally, better planning could yield greater economies of scale. Smaller cities, where geographically possible, could cooperate with adjacent jurisdictions to develop more efficient and well-operated waste management facilities such as landfills or incinerators. Unfortunately, despite the potential cost savings, such cooperation is still uncommon in China.

#### *Reducing pollution impacts from municipal solid waste disposal*

More efficient management can greatly reduce, but not eliminate, the amount of waste produced in China that requires disposal. Municipal waste disposal is a challenge for many local governments because volumes are rising and land is scarce. To improve the waste disposal system and reduce its environmental impacts, the national and local governments need to implement improvements across the entire waste chain—many of which have already been outlined in the 12th Five-Year Plan. One priority is to streamline administration by introducing greater independence and accountability for local EPB staff charged with oversight, clarify the roles between the Ministries (or Bureaus at local level) of Housing, Urban and Rural Development and of Environmental Protection, and reform technical standards and sector guidelines. As an example of the need for better standards and enforcement, during incinerator operation there is often no proper testing, treatment, or disposal of fly and bottom ashes, which causes local pollution problems. Beijing provides a good model for an improved waste disposal system. The city has invested in greater supervision of landfill and incineration operations with an institution responsible for monthly inspections. It developed standards for inspection and assessment of operational performance, which have resulted in improved environmental performance.

Cities should also integrate waste management facilities into land use planning. In the planning process, environmental impact assessments and permitting are currently treated as a formality rather than a regulatory tool. China currently also lacks hydrogeological information and know-how of



contaminant hydrogeology, and these factors are therefore not sufficiently considered in landfill site selection and design. Finally, local governments need to properly rehabilitate or close unsanitary landfills in a way that minimizes long-term environmental impacts and allows eventual return of the land to productive uses. Some cities, such as Beijing and Wenzhou, have completely removed old waste disposal sites by excavating the waste, sorting it, and then transporting the light portion to a newly built sanitary landfill or incinerator. The remaining soil with some organic humus can then be used in gardens and parks. The cost of this restoration could be paid for from the increased land value of the site after it has been cleaned up for redevelopment.

#### *A more sustainable waste management sector*

At current growth projections, proposals for continued investments of RMB 264 billion for solid waste management are in line with the ambitions to reach satisfactory levels of waste collection, develop sufficient waste disposal outlets that meet international good practice standards, and introduce waste minimization and recycling schemes. The key challenge will be to match the investments with the operational budgets needed to manage these waste systems and to gradually move toward greater cost recovery through user charges for these services. Fees currently make up only about 10 percent of the RMB 40 billion needed to run waste operations, and these costs will further increase substantially due to the planned investments, the growth in GDP, and the urbanization process.

### **Cities where a billion people want to live and work**

Three decades of economic growth brought great welfare improvements to China, but at the cost of unsustainable resource consumption and pollution. China's leaders have recognized that resource depletion and pollution have become a costly barrier to further development. And with rising prosperity, China's urban residents expect a future that includes clear water and blue skies. The ultimate causes of China's environmental prob-

lems are institutional rather than technical. The main problems are inadequate resources, ineffective organization, limited channels for public participation, and insufficient incentives for environmental management. China's leaders can strengthen green governance by focusing on the following reforms that have been discussed in this report:

- Increase resources and enhance authority for environmental management to support more staff who promote greening and enforce environmental rules. Strengthen data collection and widely disseminate information to better monitor compliance, which is necessary regardless of the policy instruments used.
- Revise the cadre evaluation system, so local leaders have a greater incentive to pursue environmental objectives and focus on quality of life of their citizens, while allowing some flexibility to adapt green goals to local conditions.
- Allow greater public participation in holding polluters to account. Citizens, non-governmental environmental groups, and the media can all assist the government in ensuring that ambitious environmental rules are followed. Public disclosure of environmental performance shames companies into cleaning up. And the legal system can complement government enforcement if current experiments with environmental courts and tribunals are expanded and formalized.
- Rebalance environmental policy instruments toward more market-based tools such as taxes and trading systems, possibly for carbon and energy use if appropriate measurement and verification systems can be established and new mechanisms calibrated with existing policies—while enforcing well-designed regulations where price signals are insufficient.

Without strengthening green governance, necessary changes in resource- and pollution-intensive sectors will be difficult, if not impossible, because it is the application of green governance principles in sector policies that will encourage cleaner and resource-efficient growth. As this chapter has shown,

local environmental agencies need greater resources to encourage greening and to ensure compliance with environmental rules in the energy, transport, buildings, water, and waste management sectors. In particular, water resource and air pollution management need regional management mechanisms. Public participation and stronger legal mechanisms are most important in holding polluters to account but will also help gain greater acceptance for efficiency investments.

Across all sectors, the basic principle for environmental policy design is to rely as much as possible on market or price instruments, which provide the incentives for firms and households to seek efficient ways to go green. China has raised some resource prices, but must also do so for others such as water. China is also exploring carbon taxes and carbon trading, and similar mechanisms could also work for water. Regulations will be effective where price instruments are not sufficient, for instance where harmful pollution must be urgently stopped or where behavioral issues blunt price instruments. Finally, in some cases, the government will need to provide investments or financial support, for instance to finance pilots and to collect and disseminate information about what works in resource efficiency and pollution control; or more directly to make public transit an attractive alternative or to make building energy investments financially viable.

Technical measures across the sectors that make firms and households more resource efficient and reduce pollution are known. The core message is that sustainable sector practices are compatible with green sector policies. Although there are important non-financial barriers, investments in efficiency

tend to be financially cost-effective even when ignoring broader ecological and health benefits, but deeper efficiency improvements to achieve greener ambitions will need smart incentives and mandates. Pollution abatement is a cost to firms that essentially must pay for a service—removal of harmful byproducts into air, water, or soils—that they previously received for free. Nevertheless, many barriers still prevent these measures from happening, and a combination of both enforced regulation as well as market-based approaches is needed. But the high social benefits justify the imposition of stricter emission standards, and firms can often achieve pollution reductions most cheaply through efficiency improvements or productivity enhancing capital upgrading.

China could also find it easier to make needed sector investments than many other emerging and developing countries that face severe environmental problems. It has the technical expertise among academics and professionals and a growing green industrial sector that can supply the needed technology. As *China 2030* report pointed out, there are large business opportunities in an ambitious green transformation. Countries such as Germany have shown that rising environmental standards encourage domestic industries to innovate, developing clean technology that is now exported around the world. Despite the needed rebalancing of the economy away from low-value industries, China will retain a large manufacturing sector. The examples of Germany, Switzerland, and Sweden, but also the Republic of Korea, for instance, shows that this rebalancing can be compatible with becoming a green growth leader whose cities top quality-of-life rankings.

## Annex 7A Smart Greening

The foundation of green governance is credible, transparent, and publicly available data. With China's cities collectively growing by about 15 million people a year, traditional city management methods are being challenged. This report proposes some new approaches, but the lifeblood of new management methods will be data and how it is used. Improved data collection, management and dissemination should be able to improve the carrying capacity of cities' growing populations. There is no universal definition of a "smart" city, but greater use of information technology (IT) can benefit cities in the following ways:

*Promoting a more service-oriented government, moving away from traditional command and control approaches.* Smart infrastructure moves information in both directions between government and its citizens. Two-way communication improves interaction and proactivity, and develops greater understanding. For instance, applications of smart technologies could reduce traffic congestion by providing greater logistical information and knowledge to travelers. Social media can help disseminate information in the public's interest and promote environmental awareness, while at the same time allowing for feedback in near real time.

*Stimulating innovation in high-tech and information technologies.* Information technologies as simple as metering and information systems can transform an industry like district heating through consumption-based billing or distributed generation in the power sector.

*Enhancing public services and people's quality of life.* Because the market still does not deliver many public services, information asymmetry is prevalent. Applying e-commerce principles to e-government can deliver public services more efficiently to a large and growing urban population. Greater public disclosure of pollution discharges and air and water quality can support market-based approaches by raising people's awareness and stimulating demand for green lifestyles, ser-

vices, and products. Vulnerable groups like the growing number of elderly residents will also stand to benefit from information on pollution to help them protect their health. Medical specialists could also be accessed through remote service models.

There are many examples of smart city applications. For instance, Singapore has relieved traffic congestion despite having nearly two cars per resident by implementing an electronic pricing system for traffic congestion. When the system was first put in place in 1998, data collection was done by person. Now, traffic is monitored by sensors and infrared equipment installed on roadways. With this real-time data, citizens can check traffic conditions using their mobile phones or on-board global positioning systems in vehicles. Average vehicle traffic dropped by about 25,000 vehicles during rush hours and traffic flow improved by 20 percent.

Cities worldwide have used different approaches to constructing smart technologies for cities ranging from government investment and operation to outsourcing. Full funding by government has applied mainly to services such as fire prevention and emergency warning systems that are supplied exclusively by public entities (as in New York). For other services such as video monitoring, some cities, such as Singapore, Hong Kong SAR, China, and Shenzhen, have handed over operations to commercial companies. In these cases, the government typically finances the capital investment and part of the operating costs while the operator's price is negotiated through a competitive bidding process. Cities vary as to how much risk and control of operations they pass onto commercial companies.

Because China is still far behind in collecting basic data for many public services, leapfrogging to a big-data, smart-city concept is still an ambitious prospect. At this initial stage, Chinese cities should study the experience of other cities—both at home and abroad—with big data systems. But there are some areas in which immediate action can and should be taken, for example in metering district heating and water use. Government guidance should be developed to

avoid impractical applications of data and plan ahead for how different systems might be integrated in the future. Currently, the highly fragmented nature of data collected for public services is a major challenge for Chinese cities. Planning for better integration can help cities realize synergies in realizing cross-sector objectives such as the integrated management of the environment and water resources. It also makes it possible to use a more complete set of indicators for assessing the progress of city management. Beyond data collection, investing in smart applications in public services can help to unleash efficiencies—but with technologies comes a need to ensure public service managers actually use these enhancements and act on them.

As they build smarter cities, local governments in China will need to walk a fine line between providing public oversight of e-services and data systems and constricting a highly innovative IT market. In many cases, the market has solved problems on its own. Value-added services such as mobile Inter-

net apps to hail taxis or map current traffic have boomed without government support, reducing wait times and traffic congestion. Yet, even with greater use of IT technologies, the government will continue to play a very important role in traditional public services, especially to ensure appropriate data and reporting for regulated services. Incentives will be needed for adopting smarter systems especially in utilities such as heating and water, which tend to be more conservative and face financing constraints. Strict public oversight will be needed for services involving the use of sensitive information such as personal medical records. The government should ensure norms and standards for information security are clear and enforced while guarding against creating roadblocks where the disclosure of information is in the public interest, for example, in monitoring pollution or assessing environmental impacts of projects. With the right balance, local governments in China can create smart cities that are greener, more efficient, and better serve the people.

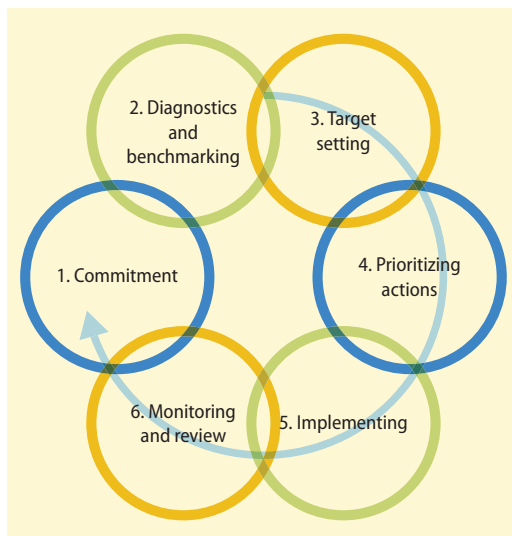
## **Annex 7B Illustrative framework and analytical tools for urban energy and emissions reduction planning**

While traditional energy sector planning is essential, leading cities around the world have started to coordinate these traditional sectors to achieve specific, ambitious emission reduction objectives. As major consumers of both benefits of energy use and its environmental consequences, cities have an interest in least cost paths to accelerated greening. While there are many similar approaches, this annex illustrates a model framework for planning, drawing on the Sustainable Energy and Emissions Planning (SUEEP) process that was developed by the World Bank through its experience working with cities in its East Asia and Pacific Region (World Bank 2012) (figure 7B.1). It also highlights some methods and tools Chinese municipal authorities could use in managing their cities' energy use and associated emissions of pollution. It concludes by demonstrating the need for cross-sector approaches and identifying and overcoming challenges.

### **Securing commitment**

A key piece of advice for the ambitious mayor preparing to set out on the energy and emissions planning process is to focus on creating the enabling conditions for planning (box 7B.1). As experts experienced in urban energy and emissions planning have noted, securing commitment by city leaders at the beginning of the planning process is another key to success. What this means is making sure relationships can be built across agencies and across sectors, which would not normally interact. Establishing trust between municipal stakeholders—including energy, transportation, construction, and environmental protection agencies—is needed to encourage them to share their data, time, and resources. Involving these stakeholders at an early stage is also important because they will eventually be responsible for carrying out recommended actions.<sup>53</sup>

**FIGURE 7B.1** An example of the energy and emissions planning process



Source: Based on World Bank 2012.

### Diagnostics and benchmarking

Diagnostics entail an assessment of how well the city is currently doing and where it could do better. Elements of conducting a baseline assessment include selection of indicators, a bottom-up inventory of energy use and GHG emissions, and benchmarking to identify under-performing sectors and potential opportunities for improvement.

Hundreds of cities around China have put forward goals for becoming green, low carbon, or eco-friendly (*sheng tai*), but what it actually means to be a green, low-carbon, or eco-city is much less clear in practice (Price and others 2013; Zhou and Williams 2013).<sup>54</sup> Indicators bring operational clarity to goals and provide a concrete basis for cities to measure baseline performance, compare their performance against that of peer cities or best-practice standards, evaluate their potential for improvement, establish targets, and assess their progress over time.

Aggregated indicators such as energy use per unit of GDP and per capita CO<sub>2</sub> emissions are commonly used to evaluate provincial and local city governments in reducing their energy use and emissions. While these top-down, macro-level indicators give a sense of a city's overall progress, they do not provide a detailed picture of which sectors are most

responsible for energy end use and emissions by the city. Also, overall measures may be biased by the structure of the urban economy, population, climate conditions, and other factors, creating the need for bottom-up, sector-level indicators of energy end-use and emissions (Price and others 2013; Zhou and others 2012). Examples of bottom-up indicators for the urban transport sector and proposed benchmarks are shown in (table 7B.1).

### Target setting and prioritizing actions

Once reliable data and measurements are obtained, and key problems identified, strategic objectives and goals can be determined. Understanding the technical feasibility and incremental costs of abatement measures will help establish the technical and affordable abatement potential cities can strive for. Do cities promote micro-turbines or rooftop solar PV, or do they place their efforts more on importing green electricity? These questions can be answered through this process, but with strong technical support from sector specialists who understand the specific resource potential for cities.

Changning District in Shanghai offers an example of priority setting for energy planning based on strong analytics (box 7B.2; World Bank ESMAP 2013). Having identified potential energy savings and measures for reducing carbon emissions, experts grouped options into three categories:

- “Do it now” or “no-regret” options that are low-cost and are easy to implement
- Options to “start now, then accelerate” that are either low-cost but difficult to implement or higher-cost but easy to implement and that can be piloted now and then scaled up over the medium term as technologies mature
- Options to “develop now, and capture over time” that come with high costs and significant implementation challenges but have high abatement potential, which can be studied and possibly piloted

With these options, scenarios were developed to assess how far the city could “stretch” to achieve carbon emission reduc-



### BOX 7B.1 New York PlaNYC 2030 case study: Integrated centralized planning relying on decentralized delivery

The population of America's largest city, New York City, is expected to grow by 1 million people by 2030 and will place additional stress on existing infrastructure and resources, including energy. Faced with this challenge, the city embarked on a long-term planning process called PlaNYC 2030 to devise strategies to reduce material and energy use, improve natural spaces, plan for and mitigate the effects of climate change, and create a more equitable and engaged society. Strategies were designed and are being executed by a joint task force, led by a specially designated mayoral office and comprised of 25 city departments and stakeholders from state and federal agencies, businesses, and non-profit groups. To strengthen local ownership of the plan, the task force has engaged in media outreach efforts and offered incentives and support to encourage active participation by local business owners and residents, including grant programs and changes in zoning codes intended to create new development opportunities (ICLEI-NYC 2010). The plan is now in its fourth year of implementation.

The energy and emissions strategy for PlaNYC is focused on achieving a goal of reducing city-wide GHG emissions by 30 percent in 2030 compared to 2005. Because buildings contribute to 75 percent of the city's total carbon emissions, PlaNYC has kick-started a number ambitious programs and policies to improve energy efficiency in the city's building stock.

This buildings effort has two major elements: the promulgation of new laws (together called the Green, Greater Buildings Plan [GGBP]) and the formation of the 200-person Green Codes Task Force (GCTF) to recommend code and other reforms to reduce a number of environmental impacts of buildings (i.e., not just energy use) (NYC 2011). The GGBP requires regular energy audits, retro-commissioning, and data sharing for large public and private buildings; lighting upgrades; and sub-metering of government buildings and commercial tenant spaces. These measures will impact more than half of the space in 16,000 buildings in the city. To ensure compliance, procedural incentives exempt from retro-commissioning and audits buildings that adopt measures early or comply with LEED for Existing Buildings, a revolving retrofit loan fund has been created with federal stimulus funds, and the City is forming a large ESCO.

So far, the city is making notable progress in implementing the GGBP and PlaNYC. The city estimates that nearly 70 percent of private building owners have submitted energy use data (Levine and others 2012), energy-efficiency program funding has increased six-fold in recent years, and 10 percent of the city budget is now committed to energy efficiency. The city plans to further increase energy efficiency investments through public contracting (ICLEI-NYC 2010; NYC 2011) and to roll out new programs for efficiency improvements in small and medium buildings.

Source: Adapted from Zhou and Williams 2013.

**TABLE 7B.1 “Green” and “low-carbon” indicators for the transport sector in Chinese cities**

Indicator	Benchmark	Source
Public transit network penetration (km of network per km <sup>2</sup> of city area)	4 km/km <sup>2</sup>	Upper end of China national target for transport planning (Code GB 50220-95)
Share of public transit trips in total passenger trips (%)	60%	12FYP for Transport System target for cities with 10 million people or more
Access to public transportation (share of built area within 500 meters of public transit)	90%	MOHURD public transportation demonstration project
Municipal fleet improvement ( <i>portion of electric, hybrid, biofuel, and compact &lt;1.6 L cars in public vehicle and taxi fleet</i> )	100%	Lawrence Berkeley National Laboratory expert team assessment

Source: Drawn from indicators included in the ELITE Cities benchmarking tool for Chinese cities (He and others 2013).

tions beyond baseline targets in the current Five-Year-Plan and become a leader for low-carbon city development.

Critically, stakeholder consultations are especially important to establish needed

buy-in from citizens, businesses, and other concerned parties whose understanding and support will be needed for implementation. Feedback on targets, program design, affordability, implementing arrangements and so



## BOX 7B.2 Heat cascading in the Rotterdam Energy Approach and Planning

The Rotterdam Energy Approach and Planning (REAP) is part of the Rotterdam Climate Initiative, which aims to halve the level of CO<sub>2</sub> emissions in the city by 2025, compared to 1990 levels. This is an ambitious plan which requires ambitious actions in terms of urban energy planning. REAP rests upon a simple concept based on re-using waste flows such as wastewater, household and agricultural waste, and residual heat, whilst using renewable energy to satisfy remaining demand.

REAP incentivizes urban planners to search urban areas for opportunities to exchange energy. For instance, in the area of Rotterdam near the World Trade Centre, many new homes, offices and a second shopping mall and supermarkets are all forthcoming. All of these buildings have their own heating and cooling needs and produce residual energy flows that can be “exchanged.” For instance, supermarkets must continually operate cooling systems which produce huge amounts of heat that, if not reused, simply disappears into the atmosphere. Within the REAP framework, heat pumps transfer this residual heat to nearby homes and buildings. This principle of heat cascading also allows for the exchange of heat between offices and homes. On hot days, for instance, office air conditioning units roar into action, yet the heat that is produced in this process is wasted. Within the REAP framework, this heat is stored, for instance in underground aquifer layers (heat and cold storage) for inter-seasonal exchange (and then used to heat homes during the winter months) or in tanks for covering diurnal or weekly differences.

REAP strategy was applied in Hart van Zuid, an existing district in Rotterdam, where urban planning calls for homes (to be built near a shopping center) that can use the residual heat generated by a local supermarket. The Ikazia Hospital, which is located nearby and consumes huge amounts of energy, is

also being modified to be energy self-dependent by reclaiming heat from residual hot air and water, while also becoming much better insulated by means of an overarching climate façade which resembles a huge greenhouse covered in vegetation.

REAP framework requires a substantial amount of infrastructure changes. For instance, small communal facilities must be built to store and redistribute energy. Moreover, heat pumps and heat storage systems are needed for counter-balancing daily and seasonal temperature changes.

The following steps are implemented:

Step 00. Make an inventory of the current energy consumption.

Step 01. Reduce consumption. New functions will be added: 20,000 square meters shops, 6,000 square meter supermarket. Theatre Zuidplein and the infrastructure intersection will be renewed. Better insulation of the existing shopping centre will in itself already significantly improve the situation.

Step 02. Reuse waste streams. The addition of housing will create a better heat-cold balance. The use of the waste heat generated by the supermarket and the typical morning and evening energy consumption in homes means that the match is perfect: A one square-meter supermarket can heat seven square meters of housing. If 665 apartments are added, the heat-cold ratio becomes 1:1.08, assuming that use is made of heat and cold storage.

Step 03. Renewable energy generation. The remaining demand for heat can be solved by the addition of greenhouses on the first floor, which could be public areas (or greenhouses for growing tomatoes), or by the addition of PV-panels. PV panels could also be installed on the roof to supply electricity for the whole shopping centre. The remaining energy required could be sustainably generated at a higher scale level.

Source: Salat 2013.

on can be extremely valuable in obtaining buy in to especially ambitious agendas.

### Implementing, monitoring and reviewing

The quality of the monitoring and reporting process will largely depend on the quality of the data and indicators chosen. Periodic

monitoring and reporting can sound mundane but it is essential to providing feedback and calibrating decisions. Cities should establish a mechanism that is suitable to local conditions and mobilizes timely action using the information that is gathered. Online monitoring tools and public disclosure of progress helps to provide needed information that is in the public interest and develops and under-

standing, shoring up support for the abatement measures.

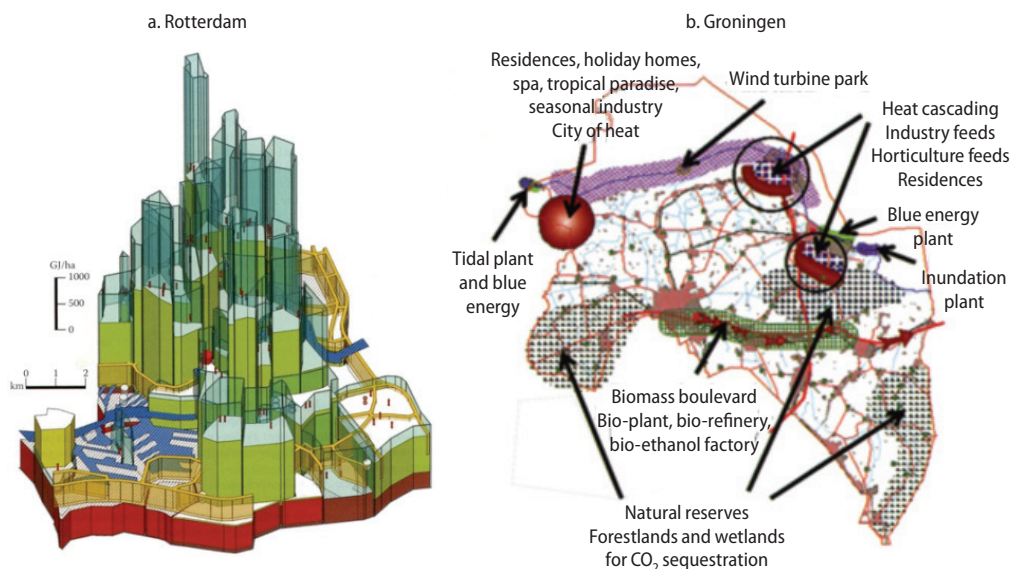
### *Tools to assist in the planning process*

A variety of tools have been developed to assist city leaders in the process of urban energy planning. Diagnostic tools which help cities evaluate their performance include the Urban RAM and ELITE Cities tools. Urban RAM (Urban Rapid Assessment Model) evaluates final energy use by consumers in the transportation, residential, and commercial buildings sectors, as well as the embodied energy use in urban infrastructure and consumer goods (Fridley and others 2012). The tool's explicit accounting of energy embodied in consumer goods reveals the importance of purchasing habits and behavioral changes in shaping a city's energy and carbon footprint; however, it does not cover energy use and GHG emissions by industry, the dominant urban sector. Urban RAM has been piloted in Suzhou City. ELITE Cities (Eco and Low-Carbo Indicator Tool for Evaluating Cities) is a light-touch benchmarking tool that, like Urban RAM, was also developed specially for use by Chinese cities (He and others 2013). ELITE Cities is built on a system of indica-

tors for climate, water, air waste, mobility, economic health, land use, and social health that enable cities to compare their performance against national standards, targets, and best-practice levels of cities in China and abroad.

Energy mapping for neighborhood and city-level spatial plans is another example of a cross-sector methodology. Energy mapping enables cities to identify opportunities for harvesting local energy supplies and utilizing flows of “waste” energy. For example, to assist the Hart van Zuid District of Rotterdam in realizing goals for becoming carbon neutral, energy planners used heat mapping to evaluate the possibility of recycling streams of waste heat from a new ice skating rink to supply a nearby swimming pool (box 7B.2). By reducing the pool's heating demand, planners found that it was possible to supply the residual demand for heat in the neighborhood by installing rooftop solar collectors on buildings (van den Dobbelsteen and others 2012). Additional examples of district-scale energy mapping by Dutch cities are illustrated in figure 7B.2. In the left panel, columns are filled according to the potential for local energy supplies in Rotterdam, including geothermal energy, biomass

**FIGURE 7B.2** Examples of energy potential mapping from the Netherlands, Rotterdam and Groningen



Source: Broersma and others 2010 (left), and van den Dobbelsteen, Broersma, and Fremouw 2013 (right).

### BOX 7B.3 Benchmarking and energy saving tool for low-carbon cities (BEST-Low Carbon Cities)

The Benchmarking and Energy Saving Tool for Low Carbon Cities (BEST-Low Carbon Cities), developed by the Lawrence Berkeley National Laboratory, is a decision-support tool designed to help city authorities in China identify and rank strategies that they can pursue improve city-wide energy efficiency and reduce carbon emissions.

Adapted from TRACE, BEST-Low Carbon Cities is intended to synthesize, package, and delivery best practices from around the world in a way that is relevant for Chinese city leaders. The BEST-Low Carbon Cities process begins with a quick assessment of a city's local energy use and carbon emissions in nine sectors: industry, public and commercial buildings, residential buildings, transportation, power and heat, street lighting, water & wastewater, solid waste, and urban green space. The addition of industry (which

was not included in TRACE) is particularly important for China because industries account for 70 percent of urban energy use on average. Performance on key indicators is benchmarked against that of peer cities with similar climate conditions, populations, and levels of development, both inside and outside China, to identify sectors with the greatest potential for saving energy and reducing CO<sub>2</sub> emissions. As with TRACE, BEST-Low Carbon Cities then allows city authorities to choose energy and carbon reducing measures from a “playbook” of proven options and to evaluate their appropriateness. By ranking strategies that yield the greatest reductions and are most suited to local circumstances, the tool helps local government officials to develop a low carbon city action plan that can be implemented in phases, over a multi-year timeframe.

*Source:* Adapted from Lawrence Berkeley National Laboratory description of BEST-Low Carbon Cities and World Bank author's interview with Zhou Nan and Lynn Price, 1 August 1, 2013.

and solar energy, to satisfy heat demand. This method of energy mapping allows for city planners to incorporate local energy supply strategies into spatial planning for urban development, as shown for Groningen in the right panel.

Other tools link diagnostics with target setting and prioritizing actions, as does TRACE (Tool for Rapid Assessment of City Energy).<sup>55</sup> Developed by the World Bank's ESMAP, TRACE is intended to assist cities with developing a portfolio of strategies for reducing energy use in six municipal sectors: passenger transport, municipal buildings, water and wastewater, public lighting, solid waste, and power and heat. TRACE enables cities to identify under-performing sectors, evaluate their potential for improvement, and select priorities for action among a menu of proven, cost-reducing measures for improving energy efficiency. Twenty-three cities around the world have deployed TRACE so far, including Rio de Janeiro, which is hosting the 2014 FIFA World Cup and 2016 Olympics, and Belo Horizonte, which is also hosting the 2014 FIFA World Cup. Outputs from TRACE have provided grounding for

a US\$ 100-million energy-efficiency investment program by the World Bank in the two cities. The Lawrence Berkeley National Laboratory is tailoring a new tool, built on the framework of TRACE, designed specifically for Chinese cities (box 7B.3).

Like TRACE and BEST-Low Carbon Cities, the MACTool (Marginal Abatement Cost Tool) assists cities with baseline diagnostics, setting targets, and prioritizing actions.<sup>56</sup> MACTool compares the CO<sub>2</sub> abatement potentials and costs of deploying a suite of mitigation technologies, allowing users to construct a marginal cost curve for CO<sub>2</sub> emissions reductions. National and subnational governments have used MACTool for estimating break-even carbon prices in setting up carbon ETS schemes. Shanghai City's Changning District has piloted and adapted the underlying methodology behind the MACTool for use in China. Other innovative examples of tools being tailored specifically for Chinese cities include the development of a simplified city-level GHG accounting methodology and redesigned Long-range Energy Alternative Planning System (LEAP) by researchers at Renmin University, which

**TABLE 7B.2** Illustrative examples of tools to assist city leaders in developing low-carbon plans

Energy and Emissions Planning Tools	Process guide	Benchmarking		Scenarios	Target setting	Develop options for action			Implementation support
		Energy	CO <sub>2</sub>			Identify	Cost/Impacts	Prioritize	
MAC Tool World Bank Energy Services Management Assistance Program (ESMAP)		•	•	•	•	•	•		
TRACE World Bank ESMAP	•	•			•	•	•	•	
BEST-Low Carbon Cities Lawrence Berkeley National Laboratory, U.S.	•	•	•		•	•	•	•	
EFFECT World Bank ESMAP		•	•	•			• [b]		
Urban RAM Lawrence Berkeley National Laboratory, U.S.		•	•						
SUEEP World Bank	•	•	•	• [a]	•	•	•	•	•
MCA4climate UNEP	•							•	
Climate Compass Compendium of Measures Climate Alliance						•			
A Guidebook for Low-Carbon Development at the Local Level Lawrence Berkeley National Laboratory, U.S.	•					•	•		
Sustainable Energy Planning handbook UNHABITAT, ICLEI	•								•
ELITE Cities Lawrence Berkeley National Laboratory, U.S.		•	•						

Notes: [a] scenario modeling is not one of the tools in the toolkit, although the guidance document offers advice on considerations for creating scenarios; [b] marginal abatement costs analyzed for major energy using sectors under different scenarios, MAC curves can be created for technologies in industry sub-sectors.

they used to help Qingdao City craft a low-carbon development strategy (Wang Ke 2012). The above is not an exhaustive list and other tools may suit specific circumstances (see table 7B.2 for illustrative examples of tools). Further tailoring China-specific tools can help improve the perceived credibility of these tools among city leaders and increase the likelihood that they are utilized.

#### *Cross-sector approaches and methodologies for energy and emissions planning*

Currently, there is a need for cross-sector planning approaches, methodologies, and tools that account for the interrelated effects of policy choices on energy, water, land, air, and waste in urban systems. Such tools can improve coordination of urban energy plans with master spatial plans and sector policies in industry, buildings, transport,

health, water, and environmental protection. This section highlights two cross-sector approaches and methodologies that can be incorporated into urban energy and emissions planning: climate-friendly air quality management and spatial energy mapping.

“Climate-friendly” air quality management (AQM) aims to improve air quality and prevent dangerous climate change by pursuing concurrent reductions in traditional air pollutants and greenhouse gases (James and Schultz 2011, 1). Evidence from around the world supports that designing and implementing coordinated strategies for reducing local air pollution and greenhouse gases is more cost-effective and yields greater economic benefits than pursuing isolated strategies for controlling single pollutants. First, it is usually much cheaper for local governments and businesses to meet regulatory requirements for controlling criteria pollutants such as

### BOX 7B.4 Climate-friendly air quality management planning in the San Francisco Bay Area

The Clean Air Plan issued by California's Bay Area Air Quality Management District (BAAQMD) in 2010 is the first AQM plan developed by a local public authority in the United States to take an integrated approach to air quality and climate change. The plan targets four categories of pollutants: ozone, PM<sub>2.5</sub>, toxics, and greenhouse gases. The plan aims not only to meet federal and state air quality standards, but also sets long-term goals for reducing greenhouse gas emissions in the district to 1990 levels by 2020 and to 40 percent below 1990 levels by 2035. In developing the plan, the BAAQMD estimated public health

impacts from air pollution in recent years and compared the health and climate protection benefits (expressed in dollar terms) of measures to reduce targeted pollutants under different scenarios. The analysis of abatement options included an evaluation of potential trade-offs for control measures that could reduce some pollutants while increasing others. In all, the district estimated that a 1 percent reduction in targeted pollutants would yield \$202 million in health benefits, including \$158 million in health benefits from avoided PM<sub>2.5</sub> and \$29 million in climate protection benefits from avoided greenhouse gases.

Source: BAAQMD 2010.

SO<sub>2</sub> and NO<sub>x</sub> by investing in climate-friendly measures such as improvements in energy efficiency than focusing solely on end-of-pipe controls. The UNDP estimates that China can reduce the costs of meeting its air quality objectives by 60 percent and reduce local air pollution by an even greater margin if it integrates investments in energy efficiency, co-generation, and renewable power generation into local AQM programs (UNDP 2010). Second, accounting for both greenhouse gas mitigation and local AQM impacts can amplify the expected economic benefits of policy choices that may not appear to be cost-beneficial if impacts on local pollutants or greenhouse gases are considered in isolation. The United Kingdom's environmental agency estimated that measures to increase uptake of low-emission vehicles by consumers would cost around 72 million per year and provide annual benefits of 61 million from avoided air pollution. If avoided CO<sub>2</sub> emissions were also considered, however, total benefits would be around 163 million, a much better deal (UK DEFRA 2007, 12).

China's central government has already embraced the basic principles of climate-friendly AQM in calling for an integrated, multi pollutant approach to reducing air pollution in key regions (James and Schultz 2011).<sup>57</sup> The main tasks for outline cities in the 12th Five-Year Plan for Prevention and Control of Air Pollution include measures with significant climate change co-benefits,

such as expanding clean energy supply, limiting direct coal use, eliminating small and inefficient boilers, and encouraging cogeneration of heat and electricity (State Council 2012). New requirements for cities to develop AQM plans in the 12th Five-Year Plan—and mandatory targets for local governments to reduce their carbon intensity—thus present an opportunity. As they formulate their plans, cities in the key air pollution regions should seek to maximize co-benefits by beginning to consider the impacts of climate change mitigation as part of a multi-pollutant strategy. This requires a city greenhouse gas emissions inventory and an explicit accounting of climate co-benefits as part of the evaluation of abatement options. The accounting of climate co-benefits would in effect be an extension of the cost-benefit or cost-effectiveness analysis recommended by the World Bank and MEP for strengthening the AQM planning process under current ministry guidelines (see World Bank-MEP 2012). California's San Francisco Bay Area offers an example of how local governments may take a multi-pollutant, climate-friendly approach to AQM planning (box 7B.4).

#### Identifying and overcoming challenges to urban energy and emissions reduction planning

Data availability is one of the main challenges preventing Chinese cities from using



tools to develop low-carbon action plans.<sup>58</sup> Tools such as Urban RAM and MACTool have been piloted in larger Chinese cities with extensive resources and analytic capabilities, but may be more difficult to employ in smaller cities. Investing in technical capacity, including better data collection, monitoring, and reporting, is absolutely critical for cities to be able to manage their energy use and emissions and make informed decisions about reduction strategies. In addition, most local city governments—both small and large—will probably not develop their energy and emissions plans entirely on their own. They will likely seek outside help or outsource some of the key analytic tasks to experts. Thus, energy and emissions planning also depends on building up China's technical service industry and expanding public assistance programs for cities completing energy and emissions action plans

During implementation, finding champions of multi sector solutions and then identifying financing to implement them are some of the challenges for getting actions off the ground. Examples presented in this report such as in New York City or Stockholm offer ideas for how city leaders could facilitate conversion of plans into actions. Public information of the plan and the objectives also helps to keep the agencies accountable for implementation. As in the case of Changning District in Shanghai, retrofitting commercial buildings would not happen on its own. A specific set of policy measures including targets and provision of financing through a World Bank loan were organized as a package of measures that are intended to facilitate implementation. Understanding the financial viability and nonfinancial barriers of the measures is critical for targeted and effective government support.

## Notes

1. "Polluted" or "seriously polluted" water is Grade IV or below, according to China's Environmental Water Quality Standard (GB3838-2002).
2. One reason for these higher estimates is that they include both rural and urban areas, making use of satellite data available for the entire country. Another is that they use a new

dose-response function more appropriate for China's very high pollution concentrations and a lower minimum threshold between air pollution exposure and health effects.

3. [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Environmental\\_protection\\_expenditure](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Environmental_protection_expenditure).
4. <http://www.nytimes.com/2013/03/30/world/asia/cost-of-environmental-degradation-in-china-is-growing.html>; <http://www.cleanbiz.asia/news/chinas-revived-green-gdp-program-still-faces-challenges>.
5. Information was provided by MEP. See also Kaiser and Liu (2009).
6. Information was provided by MEP. This total includes 46,000 provincial, municipal, and county EPB staff plus 146,000 staff in affiliated institutes at each administrative level.
7. Xiao Xiang Morning Post (潇湘晨报), "Media Investigation Finds Polluting Industries are Income Source for Local EPBs" (媒体调查基层环保局: 污染企业成为其收入来源), Xinhua News online, April 16, 2013, [http://news.xinhuanet.com/youqing/2013-04/16/c\\_124587694.htm](http://news.xinhuanet.com/youqing/2013-04/16/c_124587694.htm) (Chinese).
8. The management of pollution fees has been revised over the past few years so that salaries are paid out of a "basic fund" that is separate from a "project fund." Pollution fees are sent to the local finance bureau. EPBs can then apply to get back part of that money to finance particular environmental projects but not salaries. But, as indicated in the Xinhua article, this practice may not be followed by all EPBs.
9. This includes agencies such as the economic commission, and the land resources, transportation, and construction bureaus, which through their decisions and actions have a large influence on environmental quality.
10. <http://www.chinadialogue.net/article/show/single/en/5438-Officials-struggling-to-respond-to-China-s-year-of-environment-protests-> and <http://blogs.cfr.org/asia/2013/05/20/chinas-environmental-politics-a-game-of-crisis-management/>.
11. "China's Proposed Revisions to Environmental Protection Law Draw Mixed Reviews," Bloomberg/BN, July 17, 2013, <http://www.bna.com/chinas-proposed-revisions-n17179875568/>.
12. "The 10 most secretive cities were Zaozhuang in Shandong, Datong and Yangquan in Shanxi, Xiangyang in Hubei, Karamay in Xinjiang, Changchun and Jilin city in Jilin, Zhangjiajie in Hunan, Jinzhou in Liaoning and Ordos in Inner Mongolia. Forty cit-



- ies scaled back their information disclosure last year, with Wuhu in Anhui, Foshan and Shantou in Guangdong, Baoding in Hebei, Taizhou in Zhejiang, Changzhou in Jiangsu, Anshan and Dalian in Liaoning, Weifang in Shandong and Yinchuan in Ningxia the most regressive.” Stephen Chen, “Most Chinese Cities Hiding Vital Pollution Data from Public,” *South China Morning Post*, March 29, 2013, <http://www.scmp.com/news/china/article/1202211/most-chinese-cities-hiding-vital-pollution-data-public>.
13. Barbara Finamore, “A Step Forward for Environmental Transparency in China,” SWITCHBOARD, Natural Resources Defense Council Staff Blog, 29 March 2013, [http://switchboard.nrdc.org/blogs/bfinamore/a\\_step\\_forward\\_for\\_environment.html](http://switchboard.nrdc.org/blogs/bfinamore/a_step_forward_for_environment.html).
  14. The average spot price at China’s northern seaports in 2012 was around RMB 650. Estimates of tax burden were based on a look at the financial reporting of 12 large publicly listed firms (China Energy Network, June 20, 2013, [http://www.cmen.cc/2013/coal\\_0620/49560.html](http://www.cmen.cc/2013/coal_0620/49560.html)).
  15. National Energy Administration, “Establishing a Modern Tax System for Coal” (建立现代煤炭税费制度), reposted from Economic Daily (经济日报), March 21, 2013, [http://www.nea.gov.cn/2013-03/21/c\\_132251142.htm](http://www.nea.gov.cn/2013-03/21/c_132251142.htm); Xinhua, “Reducing Burden on Coal Industry by Clearing Up Fees and Reforming Taxes” (煤炭行业减负 重在“清费”“正税”), reposted from Economic Daily (经济日报), March 21, 2013, [http://news.xinhuanet.com/energy/2013-03/21/c\\_124485886.htm](http://news.xinhuanet.com/energy/2013-03/21/c_124485886.htm).
  16. Xie Jiu, “Difficulties and the Way Forward in a World of RMB 8.00 Gasoline” (油价“8元时代”的困局与出路). *Life Week* (三联生活), March 28, 2012, <http://www.lifeweek.com.cn/2012/0328/36802.shtml> (accessed December 2013).
  17. Other studies, such as the Stern Review (Stern 2007), come up with higher estimates.
  18. Kang Sun, “Atmospheric Ammonia and the Air Quality of the North China Plain,” Princeton University, China Energy Group, [http://www.princeton.edu/~puceg/perspective/Atmospheric\\_Ammonia.html](http://www.princeton.edu/~puceg/perspective/Atmospheric_Ammonia.html) (accessed December 2013).
  19. An example of a method of nesting different levels of resolution is the RAINS and GAINS models of the International Institute for Applied Systems Analysis (see, for example, “The RAIS 7.2 Model of Air Pollution: General Overview,” [http://webarchive.iiasa.ac.at/Research/TAP/rains\\_europe/intro.html](http://webarchive.iiasa.ac.at/Research/TAP/rains_europe/intro.html), accessed December 2013). The GAINS model can also be applied to combine co-benefits between local air pollution and greenhouse gas reductions (Liu, F., and others 2013).
  20. This section draws extensively from Salat (2013).
  21. This section draws from Ollivier and others (2013).
  22. Wu Hongpo, “Wuhan trapped in public parking lots: 45 out of 70 are facing delays” (武汉公共停车场陷困局 70个项目45个“难产”), *Chutian Jin Bao* (楚天金报), 7 March 2013, <http://hb.qq.com/a/20130703/003378.htm> (accessed June 2013).
  23. Li Shaoyi, “With Traffic Jams in Beijing Comes High Levels of Pollution from Vehicular Exhaust” (北京汽车尾气污染严重: 首堵伴随着首毒). *Di Yi Caijing Ribao* (第一财经日报), <http://finance.sina.com.cn/china/dfjj/20130116/011014295729.shtml>. Jing Bao, “Vehicular Exhaust Accounts for 30% of Shenzhen’s PM2.5 Emissions” (汽车尾气占深圳PM2.5来源三成), [http://news.sznews.com/content/2012-01/11/content\\_6383292\\_2.htm](http://news.sznews.com/content/2012-01/11/content_6383292_2.htm).
  24. North Central Texas Council of Governments, “Regional Emissions Enforcement Program,” <http://www.nctcog.org/trans/air/hevp/reeptx.asp> (accessed December 2013).
  25. European Automobile Manufacturers’ Association, “ACEA Tax Guide 2012—More Governments Introduce Incentives,” 2012, [http://www.acea.be/news/news\\_detail/tax\\_guide\\_2012\\_incentives\\_increase\\_further/](http://www.acea.be/news/news_detail/tax_guide_2012_incentives_increase_further/) (accessed December 2013).
  26. Hunts Point Clean Trucks Program, “Frequently Asked Questions,” <http://www.huntspointctp.com/faq.html#overview> (accessed December 2013).
  27. U.S. Green Building Council, “LEED for Neighborhood Development,” <http://www.usgbc.org/neighborhoods>.
  28. Averages are based on reported performance statistics for 269 utilities in the International Benchmarking Network for Water and Sanitation Utilities (IB-NET) database, <http://www.ib-net.org/en/> (accessed August 9, 2013).
  29. China’s cities treat an average of 108 million cubic meters of wastewater a day, as estimated according to the total volume of municipal wastewater that MOHURD reported being treated during the first quarter of 2012 (MOHURD 2012). Average

- electricity consumption per cubic meter of wastewater treated is 0.254 kilowatt hours, based on a survey of more than 1,800 facilities conducted in 2009 (Liu and Jiang 2012). Assuming an average electricity price of RMB 0.78 per kWh (the average for industrial users in 36 medium and large sized cities in 2012 as reported by the NDRC's Pricing Bureau). Cost savings are a gross, order-of-magnitude estimate intended to illustrate potential, not necessarily actual, room for improvement. Savings do not account for annualized costs of investments required to improve efficiency or for variations in climate, city, or plant characteristics that influence energy use per unit of wastewater treated.
30. This section draws from Taylor, Sall, and Draugelis (2013).
  31. The "secondary sector" corresponds to ISIC divisions 10-45 in the International Standard Industrial Classification system (ISIC Revision 3) and is composed of mining; manufacturing; construction; and electricity, water, and gas utilities. GDP is reported on a value-added basis. Urban industrial GDP and employment numbers reported here are for the 287 municipalities at the prefecture level. An "urban area" is the downtown area directly under the jurisdiction of the municipality and excludes outlying areas within the administrative boundaries of the municipality (NBS 2011b). The share of industry in GDP for urban areas in 2010 was slightly higher than the national average, which was 47 percent (NBS 2011a, 2011b).
  32. Total industrial energy demand is projected to rise from around 1,500 million tons of coal equivalent (Mtce) in 2010 to around 2,500 Mtce in 2030, with industry continuing to be the largest end-user of energy in China's economy (Fridley and others 2012; see also Zhou and others 2011).
  33. From an administrative point of view, China has many different kinds of cities. The role of cities in the system of policies for industrial energy efficiency varies with their administrative rank. For the sake of discussion, the term "local city governments" is used in this section to refer mainly to cities at the prefecture level.
  34. Xinhua, "Drawing the Bow on Coal Resource Tax Reform" (煤炭资源税改革箭在弦上), June 9, 2013, [http://news.xinhuanet.com/energy/2013-06/09/c\\_124835728.htm](http://news.xinhuanet.com/energy/2013-06/09/c_124835728.htm) (accessed December 2013).
  35. Recommendations on policy coordination of carbon ETS, revenue recycling to finance energy efficiency, and energy-related targets and caps benefited from written contributions by Max Dupuy, Regulatory Assistance Project, Beijing, May 2013.
  36. See Goldberg, Reinaud, and Taylor (2011) for an analysis of policies adopted in different countries to promote EnMS.
  37. Institute for Industrial Productivity, "China: Energy Management System Requirements under the Top-10,000 Program," Industrial Efficiency Programs Database, <http://www.iipnetwork.org/databases/programs/energy-management-system-requirements-under-top-10000-program> (accessed August 7, 2013). See also Zhu (2012).
  38. Despite the apparent improvements, Levine and others (2012, 103) note "there are uncertainties about the accuracy and representativeness of MOHURD's officially reported compliance rates."
  39. An alternative and competing green building rating system relative to the GBES in China is the Leadership in Energy and Environmental Design (LEED), an internationally recognized rating system originated in the United States. A comparison of the two rating systems indicates more similarities than differences and finds the GBES to be more rigorous (Levine and others 2012).
  40. Team interview with U.S. Green Building Council senior staff, October 1, 2013.
  41. This section draws on World Bank (2012b).
  42. Supplying gas for individual space and water heating units in residences would require a larger supply. Estimates assume that per capita usage for households connected to gas remains about the same as in 2010. It is also assumed that once households are connected to piped town gas, they will stop using liquified propane gas (LPG). The number of households with access to LPG represents a substantial portion of the urban population in some southern cities in China, although LPG is typically more expensive and households tend to favor piped natural gas. An annual growth rate in the percentage of the urban population with access to piped gas is assumed at 6 percent, slightly faster than the average rate of 3 percent observed between 2004 and 2010.
  43. "Breaking the Ice on Natural Gas Pricing Reform" (天然气价改破冰), *Caijing Magazine* (财经杂志), January 3, 2012, <http://magazine.caijing.com.cn/2012-01-03/111587947.html> (accessed December 2013).
  44. This section is derived from recent policy notes and other contributions from Xia-

- odong Wang, Senior Energy Specialist, World Bank; Ximing Peng, Senior Energy Specialist, World Bank; Yanqin Song, Energy Specialist, World Bank; and Nourredine Berrah, retired World Bank staff and senior consultant.
45. See the Green Growth Chapter of *China 2030* (World Bank–DRC 2013).
  46. This section draws on Draugelis and Li (2012) and World Bank (2012a).
  47. This section draws from Jiang and Li (2013).
  48. FAO, AQUASTAT, “China,” [http://www.fao.org/nr/water/aquastat/countries\\_regions/china/index.stm](http://www.fao.org/nr/water/aquastat/countries_regions/china/index.stm) (accessed December 2014).
  49. “China’s underground water in poor condition,” Gov.CN (Chinese Government’s Official Web Portal), May 10, 2012, [http://english.gov.cn/2012-05/10/content\\_2134183.htm](http://english.gov.cn/2012-05/10/content_2134183.htm).
  50. This paragraph draws on Moore (2013) and World Bank (2012b).
  51. See Qu and others 2012.
  52. The analysis was based on national statistical data, individual utility financial statements, data provided by the China Water Supply Association, and previous analysis for up to 699 utilities. Because of data constraints, not all findings covered all these utilities.
  53. Author’s interview with Zhou Nan and Lynn Price, Lawrence Berkeley National Laboratory, August 1, 2013; interview with Pedzi Makumbe, World Bank ESMAP, July 29, 2013.
  54. Indeed, this problem is not unique to China, as Zhou and Williams (2013) have written in their extensive review of eco-city and low-carbon city concepts and indicators. For words of caution on the need to clarify low-carbon city goals in China, see Zhang Xuan, “200 Cities Propose Establishing Low-Carbon City Targets, Blind Development of Targets is a Risk” (200城市提出建设低碳城市目标 或陷盲目发展误区). *People’s Daily* (人民日报), June 11, 2012, <http://npc.people.com.cn/GB/18138478.html> (accessed December 2013); and “Li Xun: Concept Unclear, Many Low-Carbon Cities Are Only Low-Carbon in Name” (李迅: 概念模糊 低碳城市多为伪低碳), *Caijing Magazine* (财经杂志), September 2, 2011, <http://www.caijing.com.cn/2011-09-02/110838876.html> (accessed December 2013).
  55. World Bank ESMAP, “Tool for Rapid Assessment of City Energy: Helping Cities Use Energy Efficiently,” <https://www.esmap.org/TRACE> (accessed December 2013).
  56. World Bank ESMAP, “Modeling Tools and E-Learning,” <http://esmap.org/MACTool> (accessed December 2013).
  57. The State Council’s Approval of the 12th Five-Year Plan for Air Pollution Prevention and Control in Key Regions calls for “coordinated actions to control multiple pollutants” and “strengthening holistic management of multiple pollutants” (State Council 2012).
  58. Zhou Nan and Lynn Price, Lawrence Berkeley National Laboratory, interview with author, August 1, 2013.

## References

- 2030 Water Resources Group (The Barilla Group, The Coca-Cola Company, IFC, McKinsey & Co., Nestlé S.A, New Holland Agriculture, SABMiller, Standard Chartered Bank, and Syngenta AG). *Charting Our Water Future: Economic Frameworks to Inform Decision-Making*. [http://www.mckinsey.com/App\\_Media/Reports/Water/Charting\\_Our\\_Water\\_Future\\_Full\\_Report\\_001.pdf](http://www.mckinsey.com/App_Media/Reports/Water/Charting_Our_Water_Future_Full_Report_001.pdf).
- ADB (Asian Development Bank). 2008. Project Completion Report, Scoping Water and Energy Pollution Nexus in Urumqi and Qingdao for Preparing PRC’s Ministry of Environmental Protection Co-Control Program, Asian Development Bank, [http://www.adb.org/sites/default/files/Water-Energy-Nexus-Final\\_Report\\_5.pdf](http://www.adb.org/sites/default/files/Water-Energy-Nexus-Final_Report_5.pdf).
- Bell, M. L., D. L. Davis, and T. Fletcher, T. 2004. “A Retrospective Assessment of Mortality from the London Smog Episode of 1952: The Role of Influenza and Pollution.” *Environmental Health Perspectives* 112 (1): 6.
- Bell, R. G., A. McDermott, S. L. Zeger, J. M. Samet, and F. Dominici. 2004. “Clearing the Air: How Delhi Broke the Logjam on Air Quality Reforms.” *Environment* 46: 22–39.
- Berrah, N., F. Feng, R. Priddle, and L. Wang 2007. *Sustainable Energy in China: Closing Window of Opportunity*. Washington, DC: World Bank.
- Bourdic, Loeiz. 2011. “Urban Density and Private Transport Energy Consumption: From Global Trends to Local Solutions.” MSc thesis, Imperial College, London.
- Browder, G., S. Xie, Y. Kim, L. Gu, M. Fan, and D. Ehrhardt. 2007. *Stepping Up: Improving the Performance of China’s Urban Water Utilities*. Washington, DC: World Bank.
- Cackette, Tom. 2013. “Commercializing ZEVs Based on California’s Experience.” Background note for *China: Efficient, Inclusive,*

- and Sustainable Urbanization, DRC and World Bank, Beijing.
- Carbon Disclosure Project. 2012. "Measurement for Management: CDP Cities 2012 Global Report." London, <https://www.cdproject.net/cdpresults/cdp-cities-2012-global-report.pdf>.
- Chen, Y., A. Ebstein, M. Greenstone, and H. Li. 2013. "Evidence on the Impact of Sustained Exposure to Air Pollution on Life Expectancy from China's Huai River Policy." *PNAS Proceedings of the National Academy of Science*, <http://www.pnas.org/cgi/doi/10.1073/pnas.1300018110>.
- Cheng, Zhen, Jingkun Jiang, Oscar Fajardo, Shuxiao Wang, and Jiming Hao. 2013. "Characteristics and Health Impacts of Particulate Matter Pollution in China (2001–2011)." *Atmospheric Environment* 65: 186–94.
- Chien, Shiuh-Shen. 2013. "New Local State Power through Administrative Restructuring: A Case Study of Post-Mao China County-level Urban Entrepreneurialism in Kunshan." *Geoforum* 46: 103–12.
- China Electric Power Yearbook Committee. 2011. *China Electric Power Yearbook 2011* (中国电力年鉴2011). Beijing: China Electric Power Press.
- China Greentech Initiative. 2012. "The China Greentech Report 2012: Faced With Challenges, China Accelerates Greentech Growth." Beijing, China, <http://www.china-greentech.com/report>.
- City of London. 2011. "Core Strategy: Development Plan Document, Delivering a World Class City." City of London Corporation, Local Development Framework. <http://www.cityoflondon.gov.uk/services/environment-and-planning/planning/planning-policy/local-development-framework/Documents/The%20Core%20Strategy%20September%202011.pdf>.
- CNEMC (China National Environmental Monitoring Center). 2013. "2013 Nian Shangban Nian Jingjini, Changsantiao, Quyu Ji Zhehashi, Shenghui Chengshi He Jihua Danlie Shi Kongqi Zhiliang Baogao." July 9, 2013. <http://www.cnemc.cn>.
- Creutzig, Felix, and Dongquan He. 2009. "Climate Change Mitigation and Co-benefits of Feasible Transport Demand Policies in Beijing." *Transportation Research, Part D* 14: 120–31.
- Currie, J., and M. Neidell. 2005. "Air Pollution and Infant Health: What Can We Learn from California's Recent Experience?" *Quarterly Journal of Economics* 120 (3): 1003–30.
- Currie, J., and T. Vogl. 2012. "Early-Life Health and Adult Circumstance in Developing Countries." Working Paper w18371, National Bureau of Economic Research, Cambridge, MA.
- Dickinson, J., J. Khan, D. Price, S. Caputo, Jr., and S. Mahnovski. 2012. "Inventory of New York City Greenhouse Gas Emissions, City of New York." Mayor's Office of Long-Term Planning and Sustainability, New York.
- Draugelis, Gailius, and Shawna Fei Li. 2012. "Energy Efficiency in Buildings." In *Sustainable Low-Carbon City Development in China*, edited by Axel Baeumler, Ede Ijjasz-Vasquez, and Shomik Mehndiratta, 179–205. Washington, DC: World Bank.
- Eaton, S., and G. Kostka. 2013. "Does Cadre Turnover Help or Hinder China's Green Rise? Evidence from Shanxi Province." In *Chinese Environmental Policy: Dynamics, Challenges, and Prospects in a Changing Society*, edited by Ren Bingqiang and Shou Shuisheng. London: Palgrave Macmillan Publishers.
- . 2014. "Authoritarian Environmentalism Undermined? Local Leaders' Time Horizons and Environmental Policy Implementation." *China Quarterly*, forthcoming.
- Ebenstein, Avraham. 2012. "The Consequences of Industrialization: Evidence from Water Pollution and Digestive Cancers in China." *Review of Economics and Statistics* 94 (1): 186–201.
- EC (European Commission). 2011. "Roadmap to a Single European Transport Area: Towards a Competitive and Resource Efficient Transport System." EC White Paper, COM(2011) 144 final, Brussels.
- Economy, Elisabeth. 2010. *The River Runs Black: The Environmental Challenge to China's Future*. Ithaca, NY: Cornell University Press.
- Feng, Kuishuang, Steven J. Davis, Laixiang Sun, Xin Li, Dabo Guan, Weidong Liu, Zhu Liu, and Klaus Hubacek. 2013. "Outsourcing CO<sub>2</sub> within China." *Proceedings of the National Academy of Sciences*. <http://www.pnas.org/cgi/doi/10.1073/pnas.1219918110>.
- Fisher-Vanden, Karen, Yong Hu, Gary Jefferson, and Michael Rock. 2013. "Factors Influencing Energy Intensity in Four Chinese Industries." Policy Research Working Paper WPS6551, World Bank, Washington, DC.
- Fisher-Vanden, Karen, and Sheila Olmstead. 2013. "Moving Pollution Trading from Air to Water: Potential, Problems, and Prognosis." *Journal of Economic Perspectives* 27 (1): 147–72.
- Francis, J. A., and S. J. Vavrus. 2012. "Evidence Linking Arctic Amplification to



- Extreme Weather in Mid-latitudes." *Geophysical Research Letters* 39 (6). doi:10.1029/2012GL051000.
- Fridley, David, Nina Zheng, Nan Zhou, Jing Ke, Ali Hasanbeigi, Bill Morrow, and Lynn Price. 2012. "China Energy and Emissions Paths to 2030." 2d ed. Report LBNL-4866E, Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, California.
- Fung, Freda, Hui He, Benjamin Sharpe, Fatumata Kamakaté. 2010. "Overview of China's Vehicle Emission Control Program: Past Successes and Future Prospects" (中国机动车排放控制措施评估——成功经验与未来展望). International Council of Clean Transportation, Beijing. [http://www.theicct.org/sites/default/files/publications/Retrospective\\_final\\_bilingual.pdf](http://www.theicct.org/sites/default/files/publications/Retrospective_final_bilingual.pdf).
- Gayer, Ted, and Emily Parker. 2013. "Cash for Clunkers: An Evaluation of the Car Allowance Rebate System." Brookings Institution, Washington, DC.
- Gerrard, P. 2004. "Integrating Wetland Ecosystem Values into Urban Planning: The Case of That Luang Marsh, Vientiane, Lao PDR." IUCN-The World Conservation Union Asia Regional Environmental Economics Programme and WWF Lao Country Office, Vientiane. [http://www.mekongwetlands.org/Common/download/WANI\\_economics\\_That-Luang%20Marsh.pdf](http://www.mekongwetlands.org/Common/download/WANI_economics_That-Luang%20Marsh.pdf).
- GIZ (German Agency for International Cooperation). 2013. "International Fuel Prices 2012/2013." Federal Ministry for International Cooperation and Development, Eschborn.
- Goldberg, Amélie, Julia Reinaud, and Robert Taylor. 2011. "Promotion Systems and Incentives for Adoption of Energy Management Systems in Industry." Institute for Industrial Productivity, Washington, DC.
- Graff Zivin, J., and M. Neidell. 2012. "The Impact of Pollution on Worker Productivity." *American Economic Review* 102: 3652–73.
- Grubb, Michael. 2012. "Strengthening the EU ETS: Creating a Stable Platform for EU Energy Sector Investment." Climate Strategies, London. <http://www.climatestrategies.org/research/our-reports/category/60/343.html>.
- Grubler, Amulf, and David Fisk, eds. 2013. *Energizing Sustainable Cities: Assessing Urban Energy*. New York: Routledge.
- Guo, Maxia, Fang Yu, Dong Cao, and Kunyu Niu. 2012. "Calculation of Agricultural Non-Point Source Pollution Emissions in China and Long-Term Forecast (中国农业面源污染排放量计算及中长期预测)." *Acta Scientiae Circumstantiae* (环境科学学报) 32 (2): 489–97.
- HEI (Health Effects Institute). 2013. "Outdoor Air Pollution among Top Global Health Risks in 2010: Risks Especially High in Developing Countries in Asia." Press release, December 13, HEI, Boston. <http://www.healtheffects.org/International/GBD-Press-Release.pdf>.
- Hildebrandt, Timothy. 2011. "The Political Economy of Social Organization Registration in China." *China Quarterly* 208: 970–89.
- Ho, Mun S., and Dale Jorgenson. 2003. "Air Pollution in China: Sector Allocation of Emissions and Health Damages." <http://people.hmdc.harvard.edu/~mho/CCICED.report1.pdf>.
- Hong, Lixuan, Jinshe Liang, Jianming Cai, and Li Zhuang. 2011. "Growth of Industrial Energy Consumption in China's Prefecture-Level Cities Based on Data from 2001–2006" (中国地级以上城市工业能源消费的增长——基于 2001–2006 年的数据分解). *Geographical Research* (地理研究) 30 (1): 83–93.
- Hoornweg, Daniel, and Perinaz Bhada-Tata. 2012. "What a Waste: A Global Review of Solid Waste Management." Urban Development Series Knowledge Paper 15. World Bank, Washington, DC.
- Huang, Shukui, and Jiawu Wang. 2010. "Some Discussion on Problems about Standard of Civil Building Indoor Environment Pollution Control and Standard of Indoor Air Quality." (《民用建筑工程室内环境污染控制规范》及《室内空气质量标准》有关问题的探讨). *Construction Quality* (工程质量) 28 (5): 61–63.
- Hutchinson, David, Yutaka Tonooka, Akiyoshi Kannari, Yuko Nishida, and David Vowles. 2004. "Air Quality in London and Tokyo: A Comparison." 13th World Clean Air and Environmental Protection Congress and Exhibition, London, August 22–27.
- ICLEI USA (Local Governments for Sustainability USA) and City of New York. 2010. "The Process Behind PlaNYC: How the City of New York Developed its Comprehensive Long-term Sustainability Plan." Report for The Mayor's Office of Long-Term Planning and Sustainability, City of New York. [http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/iclei\\_planyc\\_case\\_study\\_201004.pdf](http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/iclei_planyc_case_study_201004.pdf).
- James, Chris, and Rebecca Shultz. 2011. "Climate-Friendly Air Quality Management: Strategies for Control." Policy note, Regulatory Assistance Project (RAP), Montpelier, VT.
- Jiang, Liping, and Xiaokai Li. 2013. "Water Resources and Pollution Issues and Recommendations." Background note for *China: Efficient, Inclusive, and Sustainable Urbanization*, DRC and World Bank, Beijing.

- Jin, Yanhong, Hua Wang, and David Wheeler. 2010. "Environmental Performance Rating and Disclosure: An Empirical Investigation of China's Green Watch Program." Policy Research Working Paper 5420, World Bank, Washington, DC.
- Jones, Holly, David Hole, and Erika Zavaleta. 2012. "Harnessing Nature to Help People Adapt to Climate Change." *Nature Climate Change* 2: 504–09.
- Kahrl, F., Junfeng Hu, Gabe Kwok, and James Williams. 2013. "Strategies for Expanding Natural Gas-fired Electricity Generation in China: Economics and Policy." *Energy Strategy Reviews*. <http://dx.doi.org/10.1016/j.esr.2013.04.006>.
- Kaiser, Todd, and Rongkun Liu. 2009. "Taking the Pulse: The One-Year Anniversary of China's Open Government Information Measures." China Environmental Health Project Research Brief, China Environment Forum and Western Kentucky University.
- Kostka, Genia. 2013. "Barriers to the Implementation of Environmental Policies at the Local Level in China." Background note for *China: Efficient, Inclusive, and Sustainable Urbanization*, DRC and World Bank, Beijing.
- . 2014. "China's Evolving Green Planning System: Are Targets the Answer?" Working Paper 202, Department of Economics, Frankfurt School of Finance and Management, Frankfurt, Germany.
- Kostka, Genia, and William Hobbs. 2012. "Local Energy Efficiency Policy Implementation in China: Bridging the Gap between National Priorities and Local Interests." *China Quarterly* 211: 765–85.
- Kostka, G., and X. Yu. 2014. "Career Backgrounds of Municipal Party Secretaries: Why Do So Few Municipal Party Secretaries Rise from the County Level?" *Modern China*, forthcoming.
- Larsson, S. 2008. "Data and Indicators for Road Freight Transport." Presentation at New Energy Indicators for Transport conference, Paris, January 28–29.
- Lees, Eion. 2012. "Energy Efficiency Obligations—The EU Experience." European Council for an Energy-Efficient Economy, Stockholm.
- Lei, Y., Q. Zhang, K. B. He, and D. G. Streets. 2011. "Primary Anthropogenic Aerosol Emission Trends for China, 1990–2005." *Atmospheric Chemistry and Physics* 11 (3): 931–54.
- Levine, M., S. de la Rue de Can, N. Zheng, and C. Williams. 2012. "Building Energy-Energy Efficiency Best Practice Policies and Policy Packages." Lawrence Berkeley National Laboratory report LBNL-6006E, Berkeley, California, [http://eaei.lbl.gov/sites/all/files/GBPN\\_Final\\_Oct\\_2012.pdf](http://eaei.lbl.gov/sites/all/files/GBPN_Final_Oct_2012.pdf).
- Li, Fangyi, Weidong Liu, and Hongguang Liu. 2011. "Interregional Virtual Water Trade Model and its Application in Shanxi Province." (区域间虚拟水贸易模型及其在山西省的应用). *Resources Science* (资源科学) 34 (5), doi: CNKI:11-3868/N.20111202.1026.009.
- Li, Jia, Voravate Tuntivate, Lan Wang, and Feng Liu. 2009. "Energy Efficiency Policy in the Cement Sector: A Study of the Impacts of Vertical Shaft Kiln Plants Closings." Report for Asia Sustainable and Alternative Energy Program, World Bank, Beijing.
- Li, Jing-guang. 2010. "Discussion on Construction of Chinese Indoor Air Quality Standard System" (我国室内空气质量标准体系建设的思考). *Building Science* (建筑科学) 26 (4): 1–7.
- Li, Shanjun and Chao Wei. 2013. "The Cost of Greening Stimulus: A Dynamic Discrete Analysis of Vehicle Scrappage Programs." Working paper, George Washington University, Washington, DC. [http://home.gwu.edu/~cdwei/GreenStimulus\\_Li&Wei\\_2013.pdf](http://home.gwu.edu/~cdwei/GreenStimulus_Li&Wei_2013.pdf).
- Li, Terry H. Y., S. Thomas Ng, and Martin Skitmore. 2012. "Public Participation in Infrastructure and Construction Projects in China: From an EIA Based to a Whole-cycle Process." *Habitat International* 36 (1): 47–56.
- Li, W., and P. Higgins. 2013. "Controlling Local Environmental Performance: An Analysis of Three National Environmental Management Programs in the Context of Regional Disparities in China." *Journal of Contemporary China* 22 (81): 409–27.
- Lin, Boqiang, and Zhujun Jiang. 2011. "Estimates of Energy Subsidies in China and Impact of Energy Subsidy Reform." *Energy Economics* 33: 273–82.
- Lin, Boqiang, and Jianghua Liu. 2011. "Principles, Effects and Problems of Differential Power Pricing Policy for Energy Intensive Industries in China." *Energy* 36: 111–18.
- Lin, Tun, Canfa Wang, Yi Chen, Trisa Camacho, and Fen Lin. 2009. "Green Benches: What Can the People's Republic of China Learn from Environment Courts of Other Countries?" Asian Development Bank, Manila.
- Liu, F., Z. Klimont, Q. Zhang, J. Cofala, L. J. Zhao, H. Huo, B. Nguyen, W. Schöpp, R. Sander, B. Zheng, C. P. Hong, K. B. He, M. Amann, and C. Heyes. 2013. "Integrating Mitigation of Air Pollutants and Green-



- house Gases in Chinese cities: Development of GAINS-City model for Beijing." *Journal of Cleaner Production* 58: 25–33.
- Liu, Jiuling, and Wenju Jiang. 2012. "Analysis of Energy Consumption of Municipal Sewage Plant and Measures of Energy Saving" (城市污水处理厂能耗分析及节能措施). *Journal of Green Science and Technology* (绿色科技) (November): 136–37.
- Liu, W. W., Y. P. Zhang, Y. Yao, and others. 2012. "Indoor Decorating and Refurbishing Materials and Furniture Volatile Organic Compounds Emission Labeling Systems: A Review." *Chinese Science Bulletin* 57: 2533–43.
- Liu, X., Y. Zhang, W. Han, A. Tang, J. Shen, Z. Cui, and others. 2013. "Enhanced Nitrogen Deposition over China." *Nature* 494: 459–62.
- Lorentzen, Peter, Pierre Landry, and John Yasuda. 2014. "Undermining Authoritarian Innovation: The Power of China's Industrial Giants." *Journal of Politics* 76(1): 182–94.
- Lu, Z., D. G. Streets, Q. Zhang, S. Wang, G. R. Carmichael, Y. F. Cheng, and Q. Tan. 2010. "Sulfur Dioxide Emissions in China and Sulfur Trends in East Asia since 2000." *Atmospheric Chemistry and Physics* 10 (13): 6311–31.
- Lund, H., R. Cervero, and R. W. Wilson. 2004. "Travel Characteristics of Transit-Oriented Development in California." Report for Bay Area Rapid Transit District and California Department of Transportation, Sacramento.
- Ma, Linwei, Julian Allwood, Jonathan Cullen, and Zheng Li. 2012. "The Use of Energy in China: Tracing the Flow of Energy from Primary Source to Demand Drivers." *Energy* 40: 174–88.
- Mao Yushi, Hong Sheng, and Fuqiang Yang. 2008. "The True Cost of Coal." Greenpeace East Asia, The China Sustainable Energy Program, and World Wildlife Fund, Beijing.
- Mao, L., H. Zhu, and L. Duan. 2012. "The Social Cost of Traffic Congestion and Countermeasures in Beijing." *Sustainable Transportation Systems*, pp. 68–76. American Society of Civil Engineers, <http://dx.doi.org/10.1061/9780784412299.0010>.
- Matus, Kira, Kyung-Min Namb, Noelle E. Selin, Lok N. Lamsal, John M. Reilly, and Sergey Paltsev. 2012. "Health Damages from Air Pollution in China." *Global Environmental Change* 22: 55–66.
- Mayor of London. 2007. "Action Today to Protect Tomorrow: The Mayor's Climate Change Action Plan, Greater London Authority." <http://legacy.london.gov.uk/gla/publications/environment.jsp>.
- MEP (Ministry of Environmental Protection). 2008–13. *Report on the State of the Environment* (环境状况公报). <http://jcs.mep.gov.cn/hjzl/zkgbl/>.
- . 2012b. "MEP Publishes 2012 Annual Report on Vehicular Emissions Control" (环境保护部发布2012年中国机动车污染防治状况). [http://www.mep.gov.cn/gkml/hbb/qt/201212/t20121227\\_244340.htm](http://www.mep.gov.cn/gkml/hbb/qt/201212/t20121227_244340.htm).
- MIT-Tsinghua-EF (Massachusetts Institute of Technology, Tsinghua University, and Energy Foundation). 2011. "Designing Clean Energy Cities: New Approaches to Urban Design and Energy Performance." Joint report for "Clean Energy City" in China project, Cambridge, MA., and Beijing.
- MOHURD (Ministry of Housing and Urban Development, PRC). 2012. 12th Five Year Plan for Building Energy Efficiency (关于印发“十二五”建筑节能专项规划的通知). Jian Ke 72, [http://www.gov.cn/zwggk/2012-05/31/content\\_2149889.htm](http://www.gov.cn/zwggk/2012-05/31/content_2149889.htm).
- Moore, Scott. 2013. "Water Resource Issues, Policy and Politics in China." Brookings Institution issue brief, February 12. [http://www.brookings.edu/research/papers/2013/02/water-politics-china-moore#\\_edn2](http://www.brookings.edu/research/papers/2013/02/water-politics-china-moore#_edn2).
- Moskovitz, David, Lin Jiang, Frederick Weston, Fuqiu Zhou, Shujie Liu, Zhaoguang Hu, and Cong Yu. 2007. "TA 4706-PRC: Energy Conservation and Resource Management Project, Part A Final Report." Report to Asian Development Bank, Beijing, July.
- Müller, D. B., G. Liu, A. N. Lovik, R. Modaresi, S. Pauliuk, F. S. Steinhoff, and H. Brattebo. 2013. "Carbon Emissions from Infrastructure Development." *Environmental Science and Technology* 47 (20): 11739–46.
- NBS (National Bureau of Statistics, China). 2007a–2013a. *China Statistical Yearbook* (中国统计年鉴). Beijing: China Statistics Press.
- . 1991b–2011b. *China Statistical Yearbook of Cities* (中国城市统计年鉴). Beijing: China Statistics Press.
- . 2000c–2012c. *China Statistical Yearbook of Energy* (中国能源统计年鉴). Beijing: China Statistics Press.
- . 2005d–2012d. *China Statistical Yearbook of Prices of Goods* (中国物价统计年鉴). Beijing: China Statistics Press.
- NDRC (National Development and Reform Commission, China). 2011. "Significant Progress Made in Energy Conservation and Emissions Reductions—A Look Back at the Energy Conservation and Emissions Reduction Accomplishments of the 11th Five Year Plan, Part I"

- (节能减排取得显著成效——“十一五”节能减排回顾之一). NDRC news release. Beijing. [http://www.sdpc.gov.cn/xwfb/t20110927\\_435642.htm](http://www.sdpc.gov.cn/xwfb/t20110927_435642.htm).
- . 2012. “List of Enterprises and Energy Savings Targets for Top 10,000 Enterprise Energy Conservation and Emissions Reduction Program” (“万家企业节能低碳行动”企业名单及节能量目标), NDRC public notice 10, May 12.
- . 2013. “National Government Adjusts Refined Petroleum Product Prices Downward and Issues Plan for Improving Pricing Mechanism” (国家下调成品油价格 同步出台价格机制完善方案), March 26. [http://www.ndrc.gov.cn/xwfb/t20130326\\_534062.htm](http://www.ndrc.gov.cn/xwfb/t20130326_534062.htm).
- Nielsen, Chris P., and Mun S. Ho. 2007. “Summary for Policy.” In *Clearing the Air: The Health and Economic Damages of Air Pollution in China*, edited by Ho and Nielsen, 51–66. Boston: MIT Press.
- NRC (National Research Council, United States). 2010. *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use*. Washington, DC: National Academies Press.
- NRC Committee on Air Quality Management in the United States. 2004. *Air Quality Management in the United States*. Washington, DC: National Academies Press.
- Nygaard, J., and U. Deichmann. 2013. “Air Quality Management in China.” Background note for *China: Efficient, Inclusive, and Sustainable Urbanization*, DRC and World Bank, Beijing.
- OECD (Organisation for Economic Co-operation and Development). 2009. *OECD Factbook 2009*. Paris: OECD. <http://dx.doi.org/10.1787/factbook-2009-en>.
- Okubo, Yasushi. 2013. “Mt. Fuji Lovers Get Bonus with More Days to See It from Tokyo.” *Asahi Shimbun*, February 25, [http://ajw.asahi.com/article/behind\\_news/social\\_affairs/AJ201302250003](http://ajw.asahi.com/article/behind_news/social_affairs/AJ201302250003).
- Ollivier, G., B. Reja, Runze Yu, Qu Li, and Yu Qin. 2013. “Sustainable Mobility: How Will China Meet the Transport Demand of a Green and Low Carbon Urbanization?” Background note for *China: Efficient, Inclusive, and Sustainable Urbanization*, DRC and World Bank, Beijing.
- Olmstead, Sheila M. 2010a. “The Economics of Managing Scarce Water Resources.” *Review of Environmental Economics and Policy* 4 (2): 179–98.
- . 2010b. “The Economics of Water Quality.” *Review of Environmental Economics and Policy* 4 (1): 44–62.
- Padula, Amy M., Ira B. Tager, Suzan L. Carmichael, S. Katharine Hammond, Frederick Lurmann, and Gary M. Shaw. 2013. “The Association of Ambient Air Pollution and Traffic Exposures With Selected Congenital Anomalies in the San Joaquin Valley of California.” *American Journal of Epidemiology* 177 (10): 1074–85.
- Parry, Ian W., and Kenneth A. Small. 2009. “Should Urban Transit Subsidies Be Reduced?” *American Economic Review* 99 (3):700–24.
- Peng, Ximing. 2012. “Low Carbon Electricity for Cities.” In *Sustainable Low-Carbon City Development in China*, edited by Axel Baeumler, Ede Ijjasz-Vasquez, and Shomik Mehndiratta, 131–47. Washington, DC: World Bank.
- Peters, G. P., J. C. Minx, C. L. Weber, and O. Edenhofer. 2011. “Growth in Emission Transfers via International Trade from 1990 to 2008.” *Proceedings of the National Academy of Sciences* 108 (21): 8903–08.
- Porter, C. D., A. Brown, R. T. Dunphy, and L. Vimmerstedt. 2013. “Transportation Energy Futures Series: Effects of the Built Environment on Transportation: Energy Use, Greenhouse Gas Emissions, and Other Factors.” Report DOE/GO-102013-3703 by the National Renewable Energy Laboratory, Golden, CO, and Cambridge Systematics, Inc., Cambridge, MA, for the U.S. Department of Energy, Washington, DC.
- Postel, Sandra, and Barton Thompson, Jr. 2005. “Watershed Protection: Capturing the Benefits of Nature’s Water Supply Services.” *Natural Resources Forum* 29: 98–108.
- Proost, Stef, and Kurt van Dender. 2011. “What Long-term Road Transport Future? Trends and Policy Options.” *Review of Economics and Policy* 5 (1): 44–65.
- Qu, Weidong, Weiwei Zheng, Shu Wang, and Youfa Wang. 2012. “China’s New National Standard for Drinking Water Takes Effect.” *Lancet* 380 (9853): doi:10.1016/S0140-6736(12)61884-4.
- RAP (Regulatory Assistance Project). 2013. “Recommendations for Power Sector Policy in China: Practical Solutions for Energy, Climate and Air Quality.” RAP policy report, Beijing, October. <http://www.raponline.org/document/download/id/6869>.
- Ren, Yong. 2000. “Japanese Approaches to Environmental Management: Structural and Institutional Features.” *International Review for Environmental Strategies* 1 (1):79–96.

- Renmin University. 2013. 3E datasets (Economy, Energy and Environment). <http://www.3edata.com>.
- Ruggeri Laderchi, Caterina, Anne Olivier, and Chris Trimble. 2013. *Balancing Act: Cutting Energy Subsidies While Protecting Affordability*. Washington, DC: World Bank.
- Salat, Serge. 2012. *Cities and Forms: On Sustainable Urbanism*. Paris: Hermann.
- . 2013. "Chinese Urban Forms and Energy." Background paper for *China: Efficient, Inclusive, and Sustainable Urbanization*, DRC and World Bank, Beijing.
- Sall, Chris, and Katrina Brandon. Forthcoming. "Developing Policies for Ecosystem-Based Adaptation in China." Sustainable Development Discussion Paper Series, East Asia and Pacific Region, World Bank, Washington, DC.
- Salzman, J. 2009. "A Policy Maker's Guide to Designing Payments for Ecosystem Services." Report for Asian Development Bank, Manila. [http://scholarship.law.duke.edu/faculty\\_scholarship/2081/](http://scholarship.law.duke.edu/faculty_scholarship/2081/).
- Song, Y., and N. Berrah. 2013. "West or East Wind: Getting the Incentives Right." Policy Research Working Paper 6486, World Bank, Washington, DC.
- State Council. 2012. State Council Approval of 12th Five Year Plan for Prevention and Control of Air Pollution in Key Regions (国务院关于重点区域大气污染防治“十二五”规划的批复), Guo Han 146. <http://www.mep.gov.cn/gkml/hbb/bwj/201212/W020121205566730369875.pdf>.
- . 2013. State Council Notice Regarding Circulation of NDRC and MOHURD Green Building Action Plan (国务院办公厅关于转发发展改革委住房城乡建设部绿色建筑行动方案的通知), Guo Ban 1. [http://www.gov.cn/jzwgk/2013-01/06/content\\_2305793.htm](http://www.gov.cn/jzwgk/2013-01/06/content_2305793.htm).
- State Grid Corporation of China. 2011. "2010 China Power Market Electricity Trading Report" (2010年电力市场交易年报). SGCC, Beijing. <http://service.sgcc.com.cn/dljynb/index.shtml>.
- Stern, Nicholas. 2007. *The Economics of Climate Change: The Stern Review*. Cambridge, UK: Cambridge University Press.
- Stern, Rachel E. 2011. "From Dispute to Decision: Suing Polluters in China." *China Quarterly* 206: 294–312.
- Sugar, L., C. Kennedy, and E. Leman. 2012. "Greenhouse Gas Emissions from Chinese Cities." *Journal of Industrial Ecology* 16 (4): 552–63.
- Sun Xiaoliang, Zhu Lin, and Bob Taylor. 2011. "China's ESCO Industry: Saving More Energy Every Day through the Market." <http://ryanschuchard.files.wordpress.com/2011/06/chinas-esco-industry-2010.pdf>.
- Tan, Yelin. 2012. "Transparency without Democracy: The Unexpected Effects of China's Environmental Disclosure Policy." *Governance*. doi:10.1111/gove.12018.
- Taylor, Robert. 2013. "Energy Efficiency Resource Acquisition Programs: A Market-Based Approach for Effectively Using Public Funds for Energy Efficiency." Institute for Industrial Productivity, Washington, DC.
- Taylor, Robert, Gailius Draugelis, Yabei Zhang, and Albert Ang Co. 2010. "Accelerating Energy Conservation in China's Provinces." Report 56416, World Bank, Washington, DC. [http://www-wds.worldbank.org/external/default/WDSCContentServer/WDSP/IB/2010/09/01/000333038\\_20100901232632/Rendered/PDF/564160ESW0whit1in0China1s0Provinces.pdf](http://www-wds.worldbank.org/external/default/WDSCContentServer/WDSP/IB/2010/09/01/000333038_20100901232632/Rendered/PDF/564160ESW0whit1in0China1s0Provinces.pdf).
- Taylor, Robert, Chris Sall, and Gailius Draugelis. 2013. "Industrial Energy Efficiency." Background note for *China: Efficient, Inclusive, and Sustainable Urbanization*, DRC and World Bank, Beijing.
- Taylor, Robert, Dan Trombley, and Julia Reinaud. 2012. "Energy Efficiency Resource Acquisition Program Models in North America." Institute for Industrial Productivity, Washington, DC.
- THUBERC (Tsinghua University Building Efficiency Research Center). 2013. *Annual Report on the Development of Building Energy Efficiency in China 2013* (中国建筑节能年度发展研究报告2013). Tsinghua.
- UBA (Federal Environment Agency, Germany). 2011. *Environmentally Harmful Subsidies in Germany—Update 2010*. Dessau-Roßblau: UBA.
- van Rooij, B., and C. W. H. Lo. 2010. Fragile Convergence: Understanding Variation in the Enforcement of China's Industrial Pollution Law. *Law & Policy* 32 (1): 14–37.
- van Wilgen, B. W., R. M. Cowling, and C. J. Burgers. 1996. "Valuation of Ecosystem Services." *BioScience* 46 (3): 184–89.
- Viard, Brian, and Shihe Fu. 2013. "The Effect of Beijing's Driving Restrictions on Pollution and Economic Activity." Social Science Research Network working paper. [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1917110](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1917110).
- Walsh, Michael. 2006. "How to Reduce Air Pollution with Cleaner Fuels and Cleaner Vehicles." Presentation at 14th Session of UN Commission for Sustainable Development, New York, May. <http://walshcarlines.com/mpwdocs.html>.

- Wang, H., D. Wheeler, and Y. Jin. 2010. "Environmental Performance Rating and Disclosure: An Empirical Investigation of China's Green Watch Program." Policy Research Working Paper 5420, World Bank, Washington, DC.
- Wang, H., R. Zhang, M. Liu, and J. Bi. 2012. "The Carbon Emissions of Chinese Cities." *Atmospheric Chemistry and Physics* 12: 6197–206.
- Wang, X., N. Berrah, and X. Peng. 2012. "Energy Sector Background Note." Background note for *China: Efficient, Inclusive, and Sustainable Urbanization*, DRC and World Bank, Beijing.
- Wang, X.S., L. Song, and R.Y. Bai Runying. 2013. "Energy Consumption Evaluation and Carbon Emission Analysis for Municipal Wastewater Treatment Plants in Hohot City" (呼和浩特市污水厂能耗评价与碳排放分析). *Environmental Science and Technology* (环境科学与技术) 36, no. 2: 196–199.
- Weber, C. L., G. P. Peters, D. Guan, and K. Hubacek. 2008. "The Contribution of Chinese Exports to Climate Change." *Energy Policy* 36: 3572–77.
- Wen, K., and E. Zhu. 2013. *Annual report on Beijing-Tianjin-Hebei Metropolitan Region Development 2013*. Beijing: Social Sciences Academic Press.
- WHO (World Health Organization). 2010. *WHO Guidelines for Indoor Air Quality: Selected Pollutants*. Copenhagen: WHO Regional Office for Europe.
- World Bank. World Development Indicators database. <http://data.worldbank.org>.
- . 1997. *Clear Water, Blue Skies: China's Environment in the New Century*. Washington, DC: World Bank.
- . 2009. "China: Social Analysis of Heating Reforms in Liaoning Province." Asia Sustainable and Alternative Energy Program, Energy Sector Management Assistance Program, World Bank, Washington, DC.
- . 2011a. "China Air Pollution Management Project—Particulate Matter Control: Component 1: Development of a Particulate Matter Compliance Plan for China." Draft final report, World Bank, Washington, DC, July.
- . 2011b. "China Air Pollution Management Project—Particulate Matter Control: Component 2: An Air Quality Management Program for PM10 Reduction in 3 Cities in Shanxi Province." Draft final report, World Bank, Washington, DC, July.
- . 2012a. "China: Enhancing the Institutional Model for District Heating Regulation—Outside Perspectives and Suggestions." Energy Sector Management Assistance Program (ESMAP) report, World Bank, Washington DC.
- . 2012b. "China: Improving Energy Efficiency in Public Institutions." Energy Sector Management Assistance Program (ESMAP) report, World Bank, Washington DC.
- . 2012c. "Towards a More Effective Operational Response: Arsenic Contamination of Groundwater in South and East Asian Countries." World Bank, Washington, DC.
- . 2013a. "China: Accelerating Household Access to Clean Cooking and Heating." East Asia and Pacific Clean Stove Initiative Series, World Bank, Washington, DC.
- . 2013b. "China Country Water Resources Partnership Strategy (2013–2020)." World Bank, Washington, DC.
- World Bank–DRC (World Bank and State Council Development Research Center). 2013. *China 2030: Building a Modern, Harmonious, and Creative Society*. Washington, DC: World Bank.
- World Bank ESMAP (Energy Sector Management Assistance Program). 2013. "Applying Abatement Cost Curve Methodology for Low-Carbon Strategy in Changning District, Shanghai." Asia Sustainable and Alternative Energy Program report, ESMAP, World Bank, Beijing.
- World Bank–MEP (Ministry of Environmental Protection, PRC). 2012. "Integrated Air Pollution Management in China: Developing Particulate Matter Control." World Bank, Washington, DC.
- World Bank–SEPA (State Environmental Protection Agency, PRC). 2007. *Cost of Pollution in China: Economic Estimates of Physical Damages*. Washington, DC: World Bank.
- World Bank, Shanxi Environmental Protection Bureau, and Xinjiang Environmental Protection Bureau. 2012. "Integrated Air Pollution Management in Chinese Cities: Proposed Particulate Matter Control in Taiyuan, Lishi, Xiaoyi and Urumqi," seminar edition. World Bank, Washington, DC, June.
- Wu, F. 2013. "Environmental Activism in Provincial China." *Journal of Environmental Policy and Planning* 15 (1): 89–108.
- Wu, Jing, Yongheng Deng, Jun Huang, Randall Morck, and Bernard Yeung. 2013. "Incentives and Outcomes: China's Environmental Policy." Working Paper 18754, National Bureau of Economic Research, Cambridge, MA.
- Xinhua. 2009 "Full Text of Petroleum Pricing Administrative Rules." May 8. [http://news.xinhuanet.com/fortune/2009-05/08/content\\_11336876.htm](http://news.xinhuanet.com/fortune/2009-05/08/content_11336876.htm).



- . 2013. “Atmospheric Pollution Prevention and Control Action Plan (Authorized Release)” [(授权发布) 大气污染防治行动计划]. September 12. [http://news.xinhuanet.com/politics/2013-09/12/c\\_117349304.htm](http://news.xinhuanet.com/politics/2013-09/12/c_117349304.htm).
- Yang, Lingbo, Siyu Zeng, Ningping Ju, Miao He, and Jining Chen. 2008. “Statistical Analysis and Quantification of China Urban Wastewater Treatment Plant Energy Usage Patterns” (我国城市污水处理厂能耗规律的统计分析与定量识别) *Water and Wastewater Engineering* (给水排水) 34 (10): 42–45.
- Yang, L. X., X. H. Zhou, Z. Wang, Y. Zhou, S. H. Cheng, P. J. Xu, X. M. Gao, W. Nie, X. F. Wang, and W. X. Wang. 2012. “Airborne Fine Particulate Pollution in Jinan, China: Concentrations, Chemical Compositions, and Influence on Visibility Impairment.” *Atmospheric Environment* 55: 506–14.
- Yang, Ming. 2010. “Energy Efficiency Improving Opportunities in a Large Chinese Shoe-Making Enterprise.” *Energy Policy* 38: 452–62.
- Zhang, Hongliang, Jingyi Li, Qi Ying, Jianzhen Yu, Dui Wu, Yuan Cheng, Kebin He, and Jingkun Jiang. 2012. “Source Apportionment of PM<sub>2.5</sub> Nitrate and Sulfate in China Using a Source-Oriented Chemical Transport Model.” *Atmospheric Environment* 62: 228–42.
- Zhang Liang. 2012. “Electricity Pricing in a Partial Reformed Plan System: The Case of China.” *Energy Policy* 43: 214–25.
- Zhang, Minchun, and Bao Zhang. 2012. “Specialized Environmental Courts in China: Status Quo, Challenges and Responses.” *Journal of Energy & Natural Resources Law* 30 (4): 361–90.
- Zhang, Y., A. J. Dore, L. Ma, X. J. Liu, W. Q. Ma, J. N. Cape, and F. S. Zhang. 2010. “Agricultural Ammonia Emissions Inventory and Spatial Distribution in the North China Plain.” *Environmental Pollution* 158 (2): 490–501.
- Zhang Yinping, Jinhan Mo, and Charles Weschler. 2013. “Reducing Health Risks from Indoor Exposures in Rapidly Developing Urban China.” *Environmental Health Perspectives*. <http://dx.doi.org/10.1289/ehp.1205983>.
- Zhao, Tongqian, Zhiyun Ouyang, Liangqing Jia, and Hua Zheng. 2004. “Assessment of the Indirect Value of China’s Grassland Ecosystem Services” (中国草地生态系统服务功能间接价值评价). *Acta Ecologica Sinica* 24 (6) 1101–10.
- Zhao, Y. 2010. “Public Participation in China’s EIA Regime: Rhetoric or Reality?” *Journal of Environmental Law* 22 (1): 89–123.
- Zhao, Zhengquan, Dong Xu, Hao Zhang, Zhengbin Sun, Huihui Yang, and Yuan Zhou. 2010. “Power Consumption of Wastewater Treatment and the Measures of Energy Saving” (中国污水处理电耗分析和节能途径). *Science and Technology Review* (科技导报) 28 (22): 43–47.
- Zheng, Siqu, Matthew E. Kahn, Weizeng Sun and Dangling Luo. 2013. “Incentivizing China’s Urban Mayors to Mitigate Pollution Externalities: The Role of the Central Government and Public Environmentalism.” Research Working Paper 18872, National Bureau of Economic, Cambridge, MA.
- Zhou, Nan, David Fridley, Michael McNeil, Nina Zheng, Jing Ke, and Mark Levine. 2011. “China’s Energy and Carbon Emissions Outlook to 2050.” Lawrence Berkeley National Lab, Berkeley, CA.
- Zhou, Nan, and Christopher J. Williams. 2013. “An International Review of Eco-City Theory, Indicators, and Case Studies.” Lawrence Berkeley National Laboratory report LBNL-6513, Berkeley, CA.
- Zhu, Hui. 2012. “Experience of Shandong Province in Establishing Energy Management Systems.” Presentation at IIP Second International Workshop on Energy Management Systems, Dezhou, Shandong, November 19.

## Annex 7B References

- BAAQMD (Bay Area Air Quality Management District). 2010. “Bay Area 2010 Clean Air Plan.” Plan adopted by BAAQMD, San Francisco, California, United States. <http://www.baaqmd.gov/Divisions/Planning-and-Research/Plans/Clean-Air-Plans.aspx>.
- Broersma S., M. Fremouw, A. van den Dobbels-teen, and R. Rovers. 2010. “Warmtekaarten—Nederlandse warmtekarakteristieken in kaart gebracht.” TU Delft, Faculty of Architecture, Netherlands.
- Fridley, David, Nina Zheng, and Zhou Nan. 2012. “Urban RAM: Assessing the Energy Impact of Having People in Cities.” American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings, Pacific Grove, CA.
- He Gang, Zhou Nan, Christopher Williams, and David Fridley. 2013. “ELITE Cities: A Low-carbon Eco-city Evaluation Tool for China” ECEEE 2013 Summer Study, June, <http://proceedings.eceee.org/visabstrakt.php?event=3&doc=3-399-13>. Hildebrandt, T., 2011. The political economy of social organi-

- zation registration in China, *The China Quarterly*, 208, 970–989.
- ICLEI-NYC (Local Governments for Sustainability USA and The Mayor's Office for Long-Term Planning and Sustainability, City of New York). 2010. "The Process Behind PlaNYC: How the City of New York Developed Its Comprehensive Long-term Sustainability Plan." ICLEI and City of New York, April 2010. [http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/iclei\\_planyc\\_case\\_study\\_201004.pdf](http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/iclei_planyc_case_study_201004.pdf).
- James, Chris, and Rebecca Schultz. 2011. "Climate-Friendly Air Quality Management: Strategies for Control." Policy note, Regulatory Assistance Project (RAP), Montpelier, VT.
- Levine, M., S. de la Rue de Can, N. Zheng, and C. Williams. 2012. "Building Energy-Energy Efficiency Best Practice Policies and Policy Packages." Lawrence Berkeley National Laboratory report LBNL-6006E, Berkeley, CA. [http://eaci.lbl.gov/sites/all/files/GBPN\\_Final\\_Oct\\_.2012.pdf](http://eaci.lbl.gov/sites/all/files/GBPN_Final_Oct_.2012.pdf).
- NYC (City of New York). 2011. "PlaNYC 2011, A Greener, Greater New York." April 2011. [http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc\\_2011\\_planyc\\_full\\_report.pdf](http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf).
- Price, Lynn, Zhou Nan, David Fridley, Stephanie Ohshita, Lu Hongyou, Nina Zheng, and Cecilia Fino-Chen. 2013. "Development of a Low-Carbon Indicator System for China." *Habitat International* 37: 4–21.
- Salat, Serge. 2013. "Chinese Urban Forms and Energy." Background note for *China: Efficient, Inclusive, and Sustainable Urbanization* study, World Bank and DRC, Beijing.
- State Council. 2012. State Council Approval of 12th Five Year Plan for Prevention and Control of Air Pollution in Key Polluting Areas (国务院关于重点区域大气污染防治“十二五”规划的批复). Guo Hang [2012] 146 Hao. [http://www.gov.cn/zwggk/2012-12/05/content\\_2283152.htm](http://www.gov.cn/zwggk/2012-12/05/content_2283152.htm) (accessed December 2013).
- UK DEFRA (Department for Environment, Food and Rural Affairs, United Kingdom). 2007. *Air Quality and Climate Change: A UK Perspective*. London: DEFRA.
- UNDP (United Nations Development Programme). 2010. *UNDP China Human Development Report 2009/2010: China and a Sustainable Future: Towards a Low Carbon Economy & Society*, [http://hdr.undp.org/en/reports/nationalreports/asiathepacific/china/nhdr\\_China\\_2010\\_en.pdf](http://hdr.undp.org/en/reports/nationalreports/asiathepacific/china/nhdr_China_2010_en.pdf).
- van den Dobbelaars, Andy, Siebe Broersma, and Michiel Fremouw. 2013. "Energy Potential Mapping and Heat Mapping: Prerequisite for Energy-Conscious Planning and Design." In *Sustainable Energy Landscapes: Designing, Planning and Development*, Sven Stremke and Andy van den Dobbelaars, eds. Boca Raton, FL: CRC Press.
- van den Dobbelaars, Andy, and Sven Stremke, eds. 2012. *Sustainable Energy Landscapes: Designing, Planning, and Development*. Boca Raton, FL: CRC Press, Taylor & Francis Group.
- van den Dobbelaars, Andy, Nico Tillie, Marc Joubert, Wim de Jager, and Duzan Doepel. 2012. "Towards CO<sub>2</sub> Neutral City Planning—The Rotterdam Energy Approach and Planning (REAP)" in *Cities and Climate Change*, edited by Daniel Hoorweg, Mila Freire, Marcus Lee, Perinaz Bhada-Tata, and Belinda Yuen, 268–89. Washington, DC: World Bank.
- Wang Ke, Cui Xueqin, Fu Sha, and Zou Ji. 2012. "The Role of Cities in Meeting China's Carbon Intensity Goal, Part 3: Methodologies and Analytic Tools for Low-Carbon City Planning," World Resources Institute, February 9. <http://www.wri.org/blog/role-cities-meeting-china%E2%80%99s-carbon-intensity-goal-1> (accessed December 2013 and June 2014).
- World Bank. 2012. *Sustainable Urban Energy and Emissions Planning Guidebook: A Guide for Cities in East Asia and Pacific*. Washington DC: World Bank.
- World Bank ESMAP (Energy Management Assistance Program). 2013. "Applying Abatement Cost Curve Methodology for Low-Carbon Strategy in Changning District, Shanghai." Asia Sustainable and Alternative Energy Program report, ESMAP, World Bank, Beijing, China.
- World Bank-MEP (Ministry of Environmental Protection, PRC). 2012. "Integrated Air Pollution -Management in China: Developing Particulate Matter Control." World Bank, Washington, DC.
- Zhou, Nan, Stephanie Ohshita, Lynn K. Price, and Nina Zheng. 2012. "A Low Carbon Development Guide for Local Government Actions in China." Lawrence Berkeley National Laboratory report LBNL-5576E, Berkeley, CA.
- Zhou, Nan, and Christopher J. Williams. 2013. "An International Review of Eco-City Theory, Indicators, and Case Studies." Lawrence Berkeley National Laboratory report LBNL-6513, Berkeley, CA.



ECO-AUDIT  
*Environmental Benefits Statement*

The World Bank is committed to preserving endangered forests and natural resources. The Office of the Publisher has chosen to print *Urban China: Toward Efficient, Inclusive, and Sustainable Urbanization* on recycled paper with 30 percent post-consumer waste, in accordance with the recommended standards for paper usage set by the Green Press Initiative, a nonprofit program supporting publishers in using fiber that is not sourced from endangered forests. For more information, visit [www.greenpressinitiative.org](http://www.greenpressinitiative.org).

Saved:

- 53 trees
- 23 million Btu of total energy
- 4,515 lbs. of net greenhouse gases
- 24,487 gal. of waste water
- 1,639 lbs. of solid waste



# URBAN CHINA

TOWARD EFFICIENT,  
INCLUSIVE, AND  
SUSTAINABLE URBANIZATION

**DRC**

国务院发展研究中心  
Development Research Center of the State Council



**WORLD BANK GROUP**

ISBN 978-1-4648-0206-5



SKU 210206