Green Fiscal Reforms: A Framework for Measuring Effectiveness

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Green Fiscal Reforms

- Revenue initiatives that raise fiscal revenues while furthering environmental goals (OECD, 2005)
  - Might include green investment expenditures as part of the package
- Green fiscal reforms increasing in number and impact

Goal of the Paper

- Develop a framework for assessing the impact of green fiscal reforms
- Apply it to a number of case studies

Some General Questions

- Do market prices reflect the full costs of production or consumption taking into account externality generating activities?
- What are the efficiency and distributional implications of any proposed environmental fiscal reforms?
- Should fiscal reforms be revenue neutral?
- What are the relevant administrative, compliance, and enforcement issues that should be addressed with the reform?

Conceptual Template for Analysis

Indicators	Metric	Data Needs
Environmental Impact	• reduction in externality generating activity	• emissions data • economic performance data
Environmental Cost Effectiveness	• cost per unit of externality reduction	• emissions data • program cost data
Fiscal Potential	• revenue potential • expenditure requirement	• social marginal damages of pollution (e.g. GHG emissions, congestion, accident externalities, local pollution) • cost of green spending programs • budget data
Efficiency Gains	• deadweight loss reduction from removing subsidies to fossil fuels • deadweight loss reduction from taxing externalities at optimal rate	see above
Equity Gains	• quantitative (or qualitative) measures of changes in income distribution (e.g. distributional tables, Suits Index)	• household spending and tax data, where available • input-output tables, where available, to track price changes through economy
Economic Impacts	• impact on economic growth (GDP), labor supply, employment, etc.	• economic data on national income, employment • sub-national data allows for more disaggregated analysis
Barriers to Reform	• qualitative, perhaps • capacity measures?	• indicators (e.g. World Bank "Doing Business Indicators", MIF/BNEF Climatescope)? • interviews or case studies?

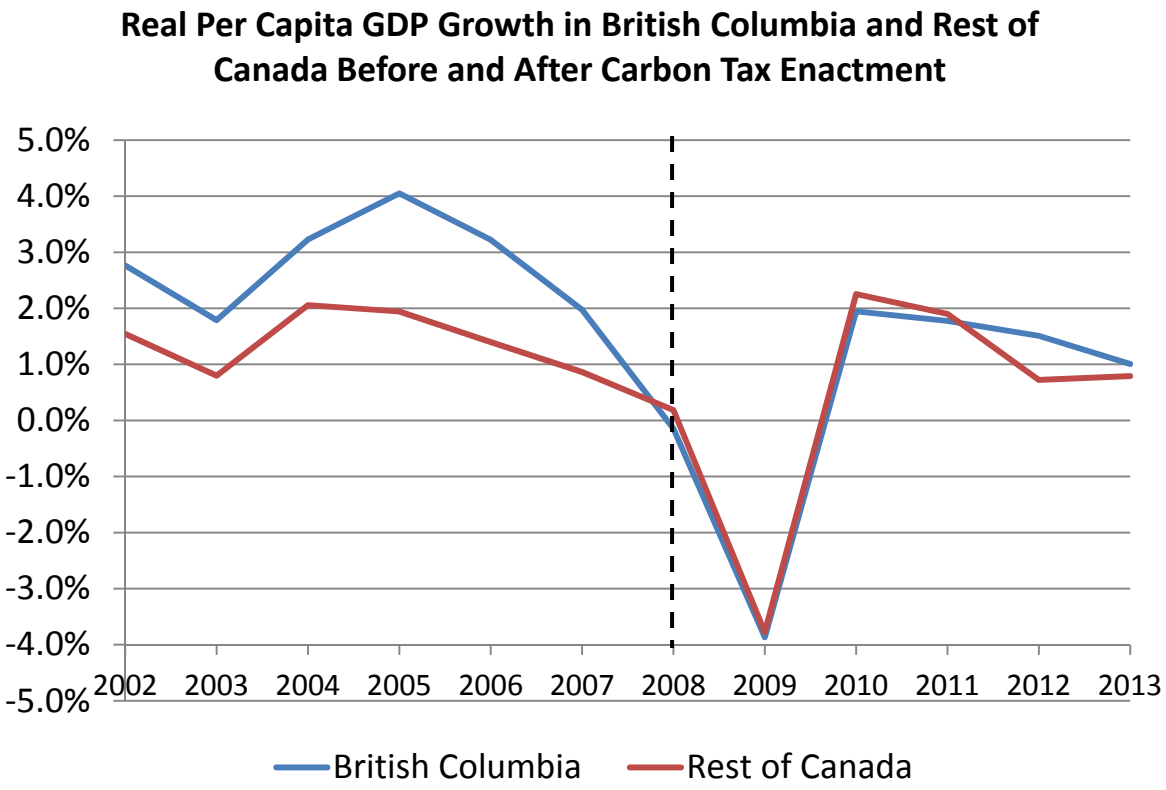
Case Study Examples

- British Columbia Carbon Tax
- London Congestion Charge
- Mexico Carbon Tax and Retail Energy Market Reforms
- United States Fossil Fuel Production Tax Expenditures

British Columbia

- Province wide carbon tax went into effect in 2008 with gradual increases in rates to current rate of C$30 per ton (US$25.50)
- Tax base is fossil fuels combusted in province
- Measuring economic impact requires appropriate counterfactual:

A Naive Perspective



Quasi-Experimental Analysis

Economic Impact of British Columbia Carbon Tax			
	(1)	(2)	(3)
BC*(Year > 2007)	-0.081 (0.081)	0.004 (0.021)	0.002 (0.035)
Year > 2007	0.102** (0.020)	-0.053 (0.031)	-0.067 (0.042)
Crude Oil Price			0.002** (0.001)
Lumber Price Index			-0.003* (0.001)
Lumber Price Index*BC			0.002*** (0.001)
Constant	10.708*** (0.081)	-28.766*** (5.742)	-18.173*** (4.275)
Province Fixed Effect Included	No	Yes	Yes
Trend Included	No	Yes	No
Province Specific Trend Included	No	No	Yes
Observations	195	195	195
R^2	0.030	0.963	0.975

Dependent variable is the ln of per capita real GDP.

Robust standard errors in parentheses. Standard errors are clustered at the province level.

*** p<0.01, ** p<0.05, * p<0.1

Framework: British Columbia

Indicators	Grade	Comments
Environmental Impact	✓	Appears to be a reduction in fossil fuel consumption
Environmental Cost Effectiveness	✓	Carbon pricing a cost effective way to reduce emissions
Fiscal Potential	✓	Projected to raise over $1 billion in FY2015 (5 percent of projected tax revenue)
Efficiency Gains	✓	Fossil fuels priced at full social cost; some revenues used to lower marginal tax rates
Equity Gains	✓?	Some revenues allocated to low-income and rural tax relief. Fuller distributional analysis needed
Economic Impacts	✓	No adverse impact on province economic growth. Offsetting tax cuts likely played a role
Barriers to Reform	✓	Do not appear to be any major impediments to enactment of tax; public opinion favorable

London Congestion Charge

- Center city charge went into effect in 2003
- Current rate of £10.50 with penalty rates of £130 (£65) for non-compliance
- Flat fee charged between 7:00 am and 6:00 pm during weekdays
  - Traffic statistics suggest on-peak and off-peak congestion similar during those hours
- Revenues spent on public transit
- Lower charges for “green” vehicles

Framework: London

Indicators	Grade	Comments
Environmental Impact	(✓)	Initial reduction in congestion on the order of 30 percent (Leape, 2006); Congestion benefits undermined by green vehicle preferences
Environmental Cost Effectiveness	✓	Flat congestion rate appears to be supported by data on daytime congestion patterns
Fiscal Potential	0	Modest revenue potential: FY 16 revenues projected at £172 million (3% of TfL revenue)
Efficiency Gains	✓?	Most studies find a positive net benefit from system; full analysis would include impact on congestion outside of zone
Equity Gains	✓?	Support for transit riders progressive
Economic Impacts	✓	No apparent adverse impact on center city economic activity
Barriers to Reform	✓	Strong support from political leadership

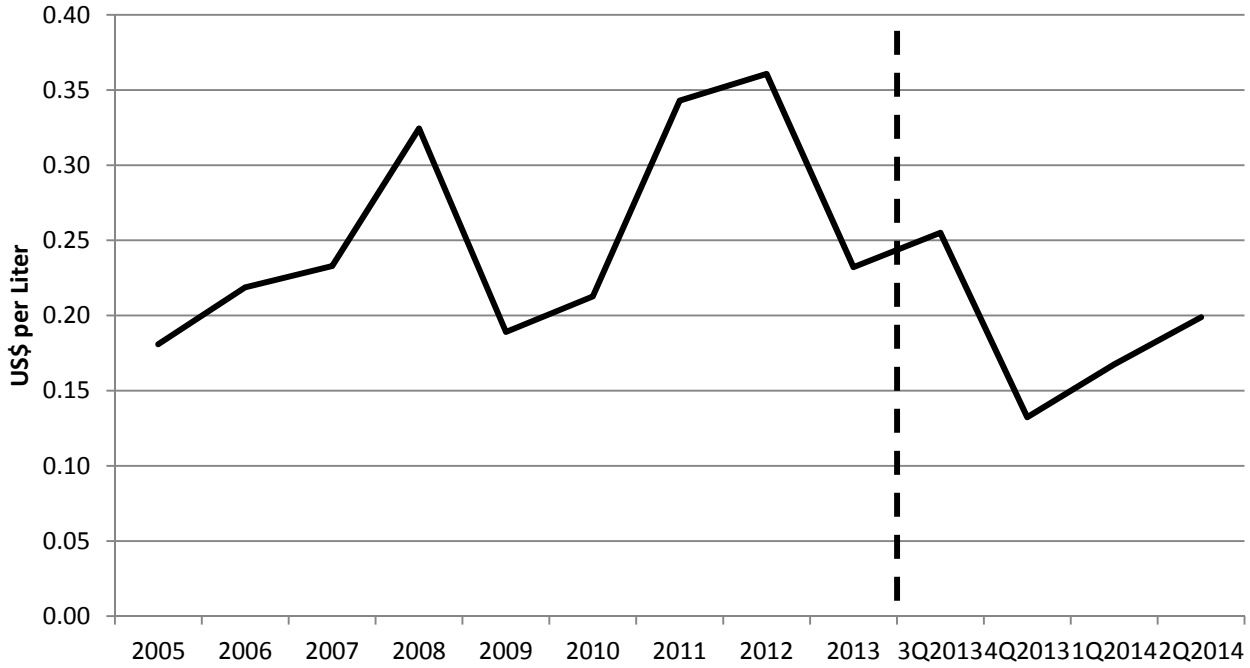
Mexico Energy Reforms

- Fiscal elements of Mexico Energy Reforms
  - Carbon tax
  - Liberalizing retail energy markets
- Building on previous initiatives
  - Cash for Coolers Program
    - Rebound undermines program effectiveness

Carbon Tax

- Levied on fossil fuels on carbon content in excess of carbon content of natural gas
  - Natural gas accounts for 1/3 of Mexico's CO_2 emissions
- Tax collections modest: US$ 720 million (FY2015) - < 1 percent of federal tax collections
- 0.33 percent reduction in emissions predicted in 2014

Liberalized Retail Energy Markets



Source: International Energy Agency (2014b) and author's calculations

Framework: Mexico

Indicators	Grade	Comments
Environmental Impact	✓	Most of the impact likely to come from higher gasoline prices as subsidies phased out. Impact undercut by collapse in world oil prices
Environmental Cost Effectiveness	(✓)	Carbon tax is cost effective (albeit with a low rate and excluding NG). Phasing out retail energy prices cost effective
Fiscal Potential	✓	Carbon tax too small for substantive impact; more revenue potential from retail reform; could be as much as 10 percent of tax revenue when fully phased in
Efficiency Gains	(✓)	Efficiency gains undercut by differential carbon tax rates; retail pricing reform contributes to efficiency
Equity Gains	?	Depends on what spending is increased (or other taxes reduced)
Economic Impacts	0	Modest impacts on the economy
Barriers to Reform	✓	Government overcame substantial challenges from industry to effect reforms

United States Oil & Gas Tax Expenditures

- Administration proposal to eliminate tax preferences for fossil fuel production
  - Replace percentage with cost depletion
  - Eliminate expensing of intangible drilling costs
  - Reduce accelerated depreciation for certain exploration and development costs
- 10 year revenue impact: $34 billion

Framework: United States

Indicators	Grade	Comments
Environmental Impact	0	Negligible impact on oil and gas production
Environmental Cost Effectiveness	0	Modest impact on greenhouse gas emissions though impact might be larger on marginal producers at low world oil prices
Fiscal Potential	0	Modest revenue potential
Efficiency Gains	✓	Provides efficiency gains in investment by leveling the playing field across capital investment opportunities
Equity Gains	✓	Benefits of subsidies accrue primarily to resource owners
Economic Impacts	0	No impact on economic growth or labor markets
Barriers to Reform	X	Major resistance from oil and gas producers and energy producing states

Assessment Tools

- Ex post empirical studies important
  - Characterizing the counterfactual key
- New techniques can supplement existing tools
  - Quasi-experimental methods (diff in diff)
  - Randomized Control Trials
- Collecting and making available data to researchers has high value

Summing Up

- Optimistic about potential for green fiscal reforms (GFRs)
- Fiscal needs will increase support for GFR's
- Mixed evidence to date on effectiveness of various reforms
- Template may provide an organizing framework for assessing reforms

Thank You

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