BERLIN GRADUATE SCHOOL FOR TRANSNATIONAL STUDIES

MCC

Political Economy Conditions for Carbon Pricing

Explaining cross-national variation in carbon pricing

Presenter: Sebastian Levi, MPhil.
Paper Authors: Sebastian Levi, Prof. Christian Flachsland, Dr. Michael Jakob

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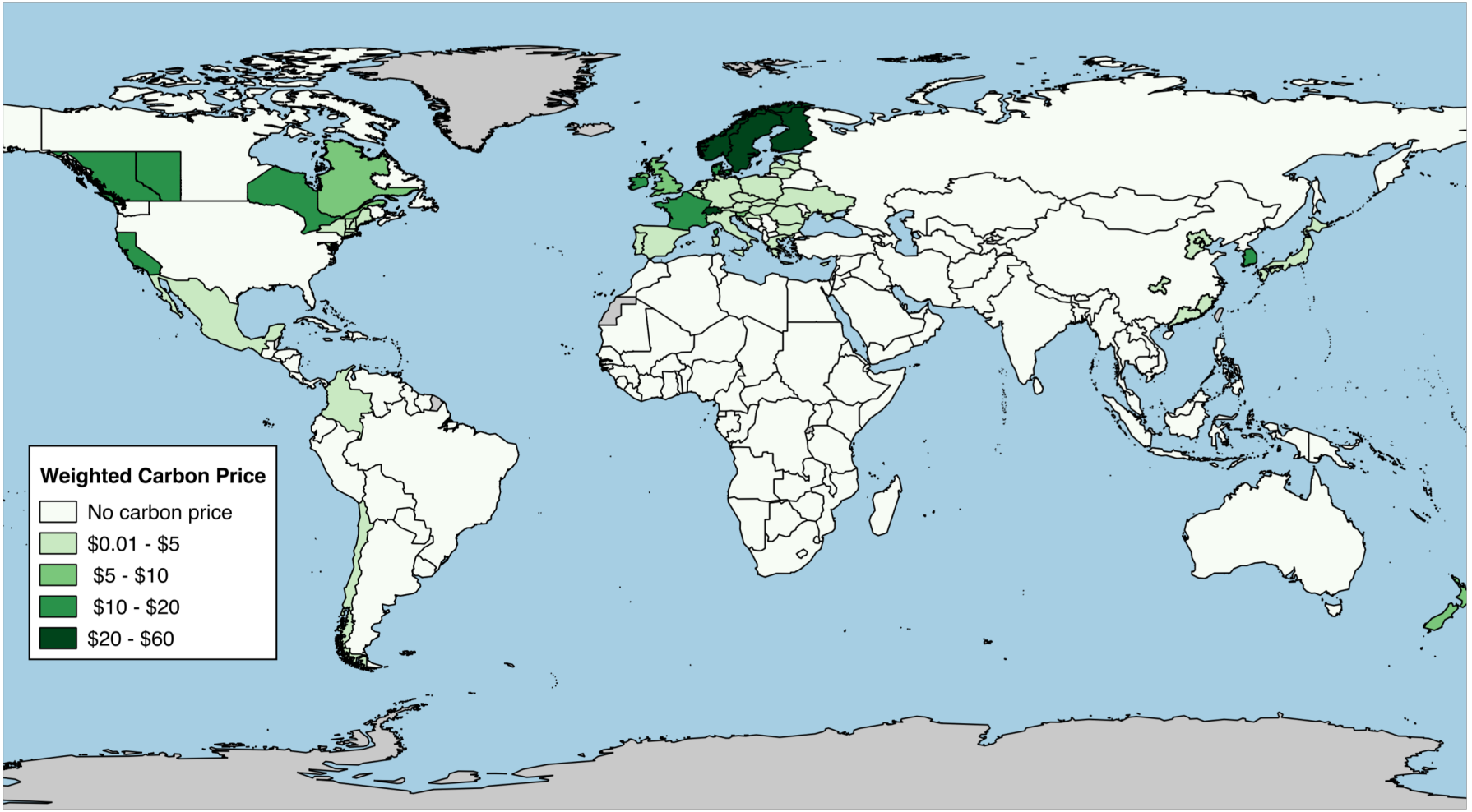
Overview

1 – Carbon Prices Worldwide

2 – Methods

3 – Regression Analysis
Empirical Result and Theoretical Links

CO_2 prices are deployed in all regions of the world, except Africa. Prices are highest in the Global North



Data / Literature: World Bank Carbon Pricing Dashboard. Data as of 1st April 2017.

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To estimate the effect of political economy conditions on CO_2 prices we calculate a cross-national Tobit model on 192 observations

169 countries[1] + 23 subnational units

missing values are imputed[2]

cross-sectional

Tobit model

1) Includes only UN recognized nation states with a population over 500'000 (minus Rwanda and Western Sahara which have been excluded due to missing data issues) and all Chinese, Canadian, and US-American states/provinces that have a carbon price. 2) We also estimate a model using case-wise deletion as a robustness test

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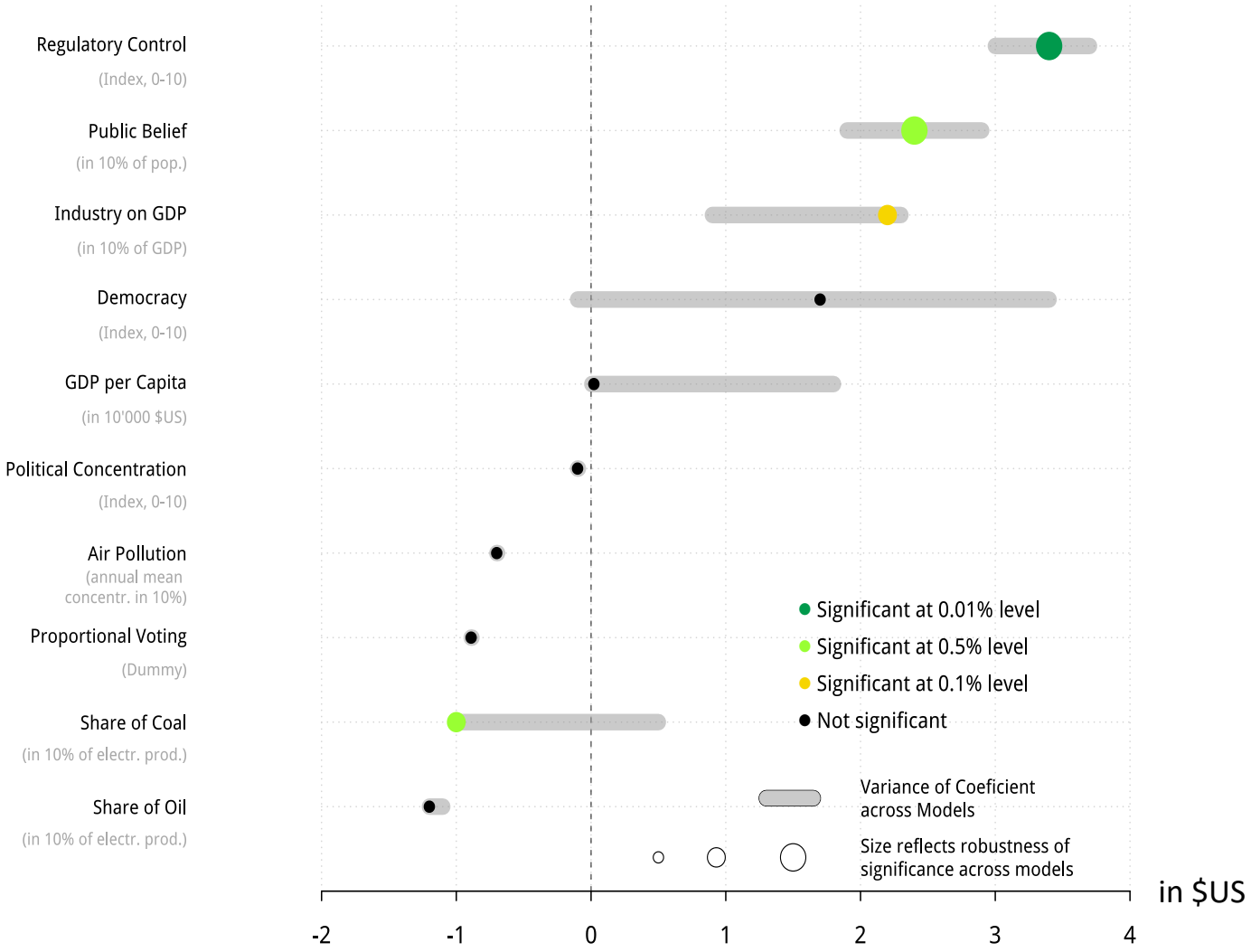
Carbon Prices depend positively on good governance and public attitude and negatively on the burning of fossil fuels



The strongest predictor is Good Governance – a ten percent increase corresponds with a rise of $3.30 per tCO_2

Regulatory Capacity | Absence of Corruption | Public Trust

Literature: Karapin (2016); Joas & Flachsland (2016); Rafaty (2018); Carattini, Baranzini & Roca (2015)

The second-important factor is public belief in human-made climate change. Prices increase by $2.40 per 10% of pop. believing

Absence of Information | Lack of Attention | Active Denial

Literature: Bord, Connor & Fischer (2000); Carlsson et al. (2012); Tjernström & Tietenberg (2008)

Fossil Fuel Usage is negatively associated with carbon prices. Prices decrease by $1 for each 10% of electricity produced by coal or oil

Economic Costs | Political Costs | Regulatory Capture

Literature: Lapachelle & Peterson (2013); Dolphin, Pollitt & Newberry (2016); Biber,Kelsey & Meckling (2017)

Take-Home Messages

1. Carbon prices are diverse but often very **low**.

2. **Good Governance** and **Public Attitude** are the most important determinants of CO2 prices.

3. **Fossil fuel firing** does negatively affect carbon prices – however, influence is lower compared to political factors.

Annex

Annex

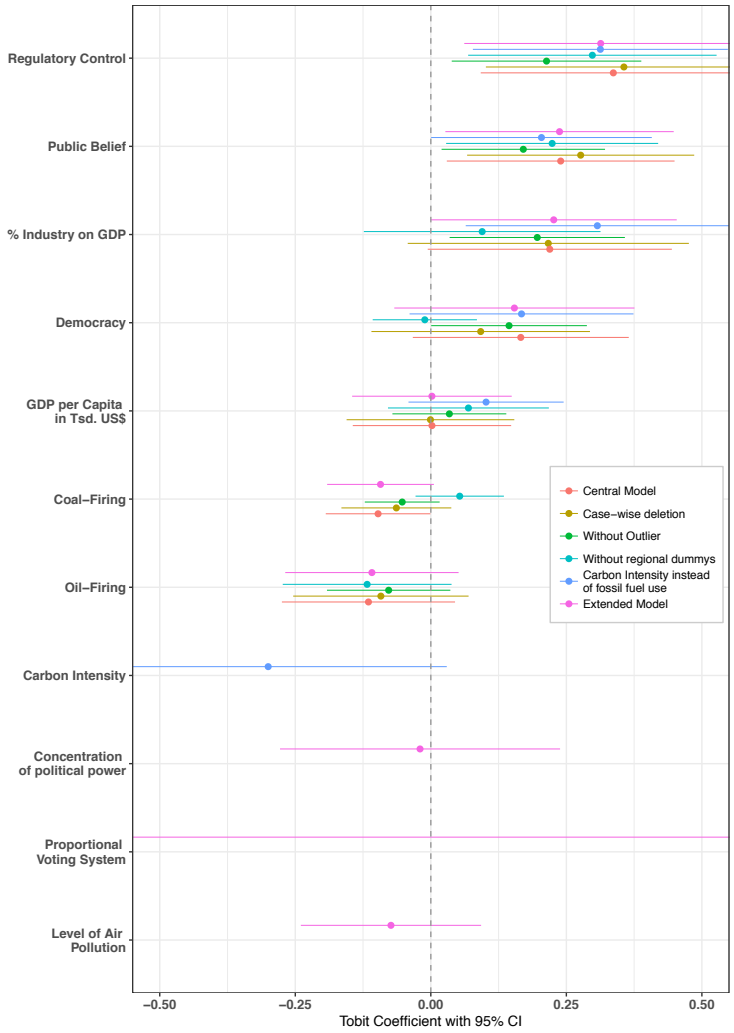
Data Sources

Variable	Data Source
Weighted Carbon Price	World Bank
GDP per Capita	World Bank; U.S. Bureau of Economic Analysis ; Statcan; National Bureau of Statistics of China
Democracy	Polity IV Index, Center for Systemic Peace
Regulatory Control	World Governance Indicators, World Bank
Government Effectiveness	World Governance Indicators, World Bank
Corruption Control	World Governance Indicators, World Bank
Public Belief in Human-Made Climate Change	Gallup Research Yale University
Industry on GDP	World Bank; US Bureau of Economic Administration; CANSim, National Bureau of Statistics of China
Oil Usage	World Bank
Coal Usage	U.S. Energy Information Administration ,Canadian state energy agencies Guangdong civic exchange report; U.S. EPA
Carbon Intensity	World Bank; U.S. EIA; Environment and Climate Change Canada; Deng (2015)
Air Pollution PM2.5	World Health Organization
Political Concentration	Witold J. Henisz
Proportional Voting System	Parline Database

Main results stay robust across different model specifications

	Tobit Regression Model on weighted carbon price in $US						
Variable	1	2	3	4	5	6	7
GDP per capita (in Thsd. $US)	0 (0.07)	0.07 (0.08)	0 (0.07)	0 (0.07)		0.19 *** (0.05)	0.05 (0.07)
Public Belief (in % of population)	0.24 ** (0.11)	0.22 ** (0.1)	0.24 ** (0.11)	0.24 ** (0.11)	0.3 *** (0.1)		0.19 * (0.1)
Air Pollution (in %)				-0.07 (0.08)			
Coal Use (in % of elec. Prod)	-0.1 ** (0.05)	0.05 (0.04)	-0.1 * (0.05)	-0.09 * (0.05)	-0.09 * (0.05)	-0.06 (0.05)	
Oil Use (in % of elec. Prod)	-0.12 (0.08)	-0.12 (0.08)	-0.11 (0.08)	-0.11 (0.08)	-0.12 (0.08)	-0.11 (0.07)	
Industry on GDP (in % of GDP)	0.22 * (0.11)	0.09 (0.11)	0.22 * (0.12)	0.23 * (0.12)	0.13 (0.11)	0.22 * (0.12)	
Carbon Intensity (in ton per capita)							-0.18 (0.16)
Democracy (Scale 1-100)	0.17 (0.1)	-0.01 (0.05)	0.17 (0.11)	0.15 (0.11)		0.33 *** (0.12)	0.11 (0.11)
Proportional Voting System (Dummy)			-0.89 (2.52)				
Concentration of political power (Scale 1-100)			-0.02 (0.13)				
Regulatory Control (Scale 1-100)	0.34 *** (0.12)	0.3 ** (0.12)	0.33 ** (0.13)	0.32 ** (0.13)	0.37 *** (0.08)		0.34 *** (0.12)
Part of EU ETS	9.32 *** (2.15)		9.88 *** (2.63)	9.38 *** (2.15)	10.64 *** (2.09)	9.49 *** (2.15)	8.89 *** (2.21)
Part of Chinese Pilot ETS	34.79 *** (8.76)		34.27 *** (8.77)	38.66 *** (10.02)	24.73 *** (5.19)	36.59 *** (10.34)	28.04 *** (9.04)
No. of observations	192	192	192	192	192	192	192
Log Liklihood	-470.64	-495.16	-470.46	-470.2	-472.5	-478.66	-474.81
	*** - p<0.01, ** - p<0.05, * - p<0.1						

Main results are also robust to outliers and to different strategies in dealing with missing observations



Main results stay robust even when a generalized Tobit model instead of a standard Tobit model is calculated[1]

Coefficients (location model):

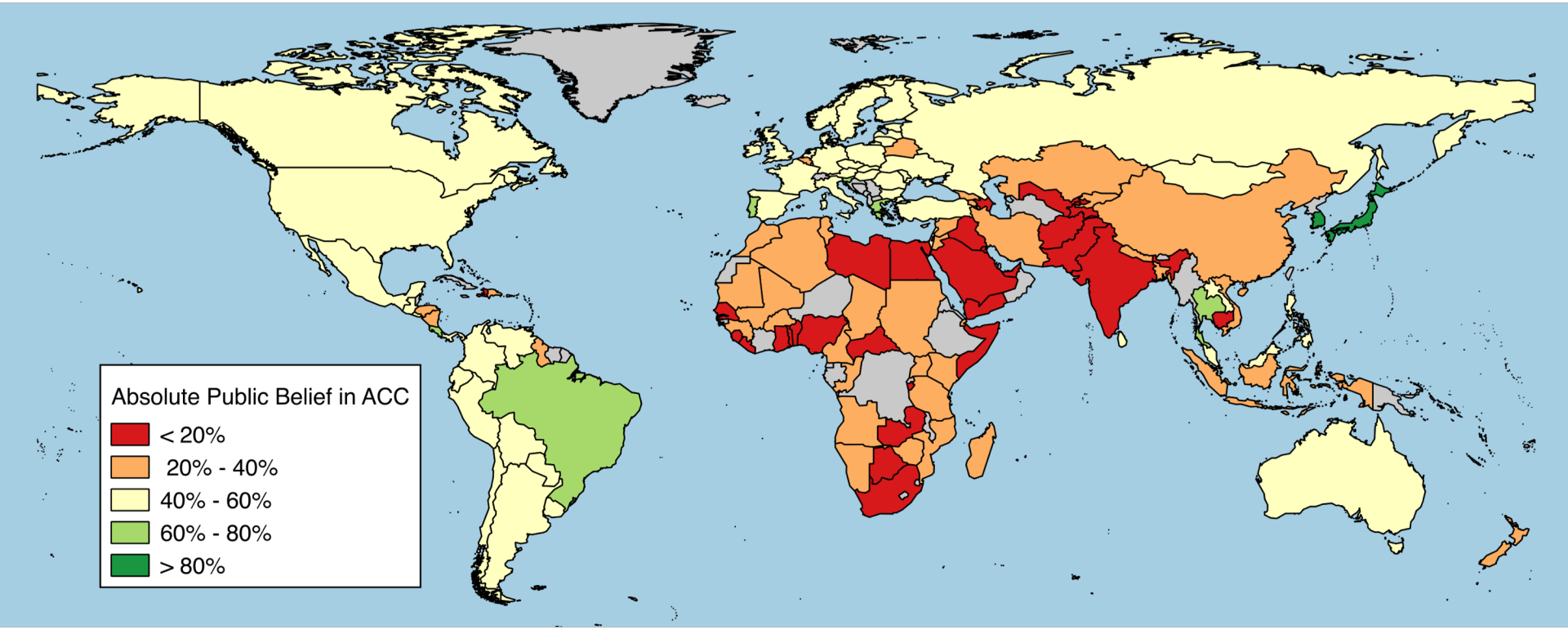
	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-276.1922	183.5913	-1.504	0.132482
GDP.per.capita.USD.2015	-1.2227	0.5347	-2.287	0.022209 *
Democracy	1.2726	1.5297	0.832	0.405459
Regulatory.Control	3.8147	0.7831	4.871	1.11e-06 ***
HUMANTOTALC	1.4742	0.8162	1.806	0.070898 .
Industry.on.GDP.2015	-6.8204	1.1228	-6.075	1.24e-09 ***
Share.Electricity.Oil	-1.8565	0.2312	-8.030	9.73e-16 ***
Share.Electricity.Coal	-0.2281	0.1871	-1.220	0.222615
EU1	214.0314	15.1639	14.114	< 2e-16 ***
China1	483.8246	143.8641	3.363	0.000771 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Distribution: student
Df: 0.4898
Log-likelihood: -400.2 on 12 Df
Number of iterations in BFGS optimization: 2036

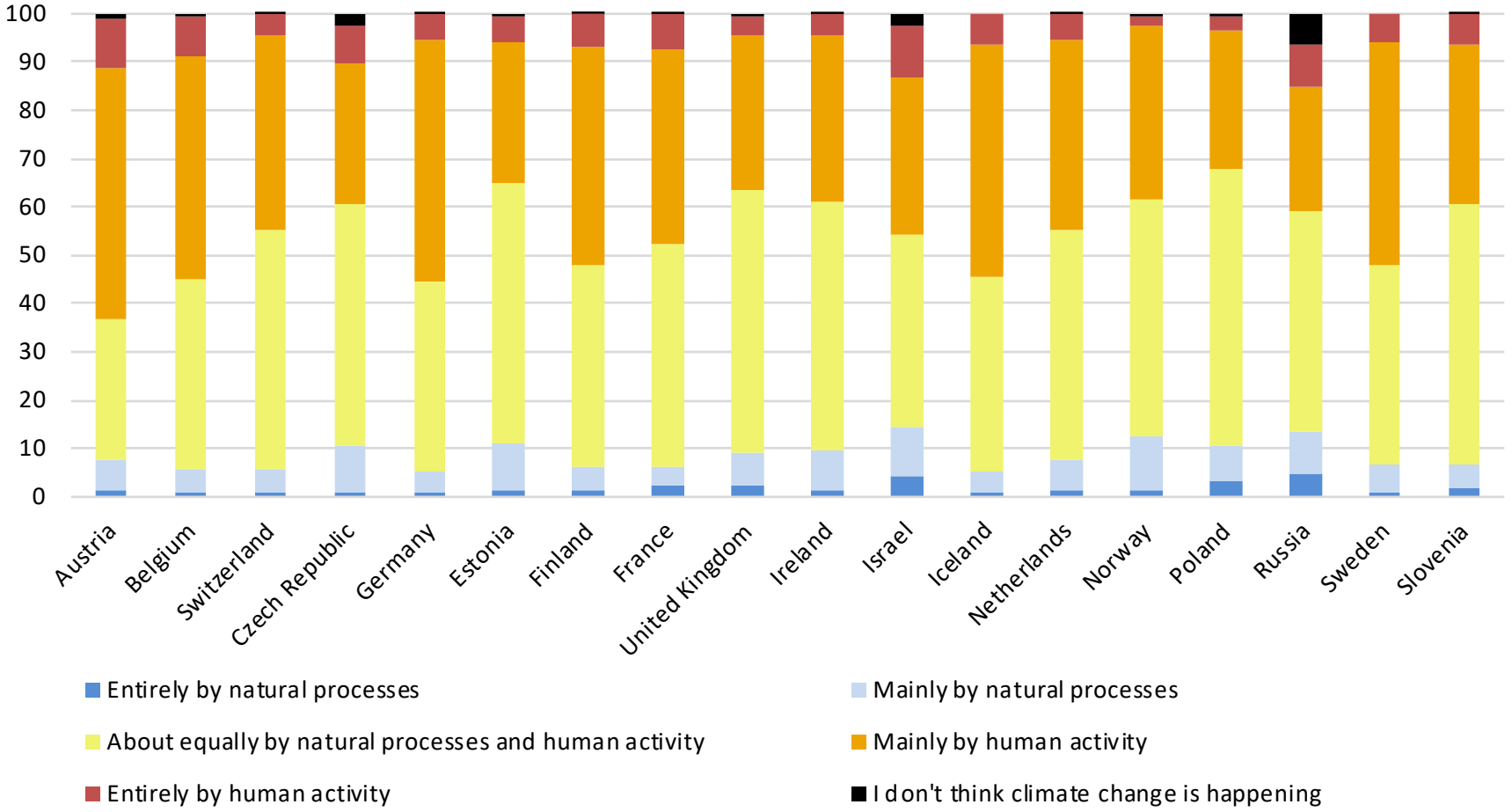
1) Preliminary Model Estimate – Please do not cite or circulate.

Public Belief in Human-Climate Change varies from 7% in Liberia to 86% in Japan



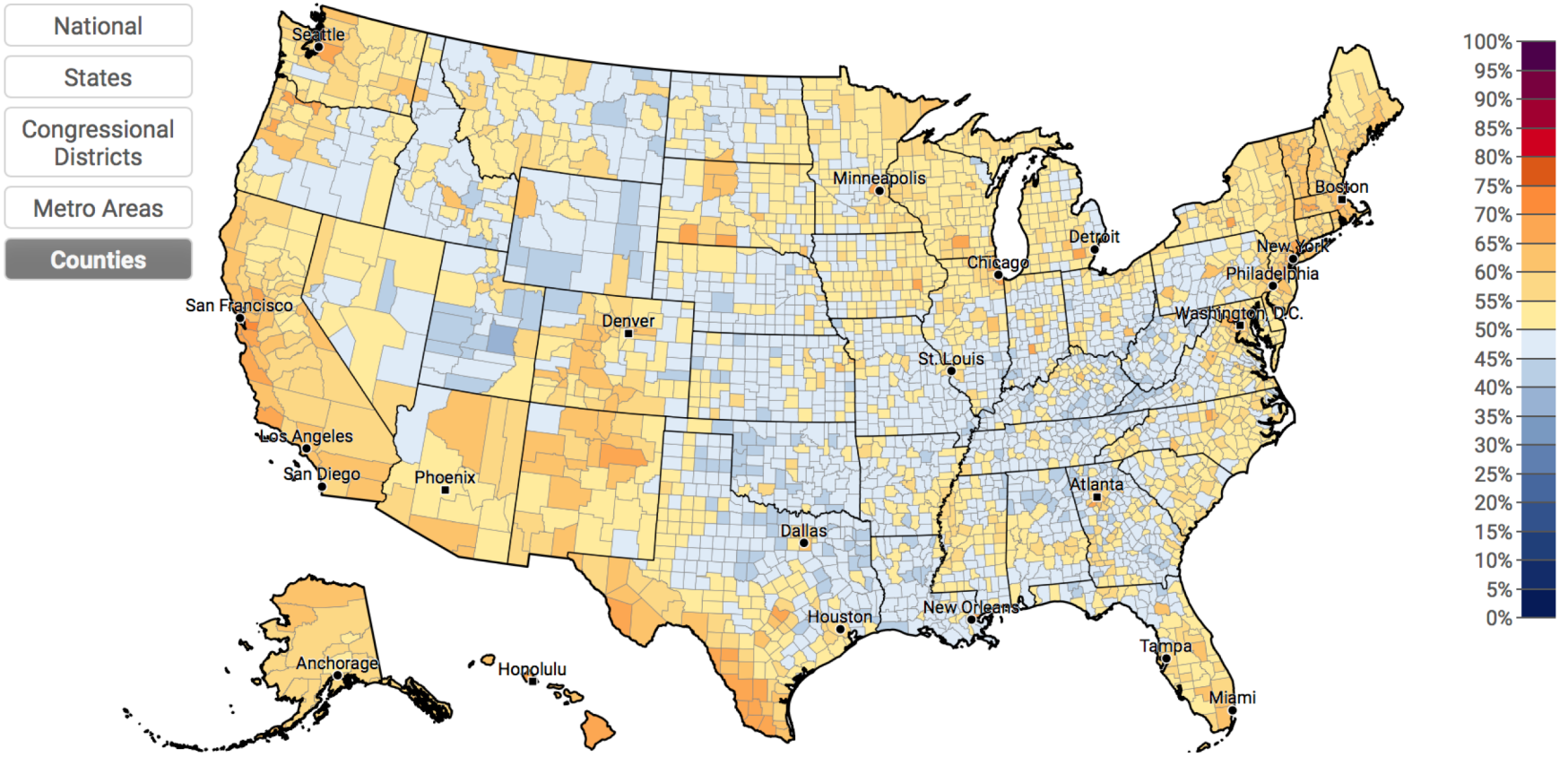
Data / Literature: Gallup Research 2008/09 and 2010/11

Also in Europe, less than 50% of the population believe that climate change is mainly caused by human activity…



Data / Literature: European Social Survey 8 (2016) - Row Percentages: Climate change caused by natural processes, human activity, or both

…just like in the USA



Data / Literature: Yale Climate Communication – 2018 Data: Estimated % of adults who think global warming is mostly caused by human activities

Literature and Data Sources

Biber, E., Kelsey, N. & Meckling, J. The Political Economy of Decarbonization: A Research Agenda. *Brooklin Law Rev.* (2017).

Bord, R. J., O'Connor, R. E. & Fisher, A. In what sense does the public need to understand global climate change? *Public Underst. Sci.* (2000). doi:10.1088/0963-6625/9/3/301

Carattini, S., Baranzini, A. & Roca, J. Unconventional Determinants of Greenhouse Gas Emissions: The role of trust. *Environ. Policy Gov.* **25,** 243–257 (2015).

Carlsson, F. *et al.* Paying for Mitigation: A Multiple Country Study. *Land Econ.* (2012). doi:10.3368/le.88.2.326

Dolphin, G. G., Pollitt, M. G. & Newbery, D. G. *The Political Economy of Carbon Pricing: A Panel Analysis*. (2016).

European Social Survey. ESS8 - 2016. (2017).

Joas, F. & Flachsland, C. The (ir) relevance of transaction costs in climate policy instrument choice : an analysis of the EU and the US. *Clim. Policy* **16,** 26–49 (2015).

Karapin, R. *Political Opportunities for Climate Policy*. (Cambridge University Press, 2016).

Lachapelle, E. & Paterson, M. Drivers of national climate policy. *Clim. Policy* **13,** 547–571 (2013).

Marlon, J., Howe, P. & Mildenberger, M. Yale Climate Opinion Maps – U.S. 2016. *Yale Program on Climate Change Communication* (2016). Available at: http://climatecommunication.yale.edu/visualizations-data/ycom-us-2016/?est=happening&type=value&geo=county. (Accessed: 9th April 2018)

Pelham, B. W. Awareness, Opinions About Global Warming Vary Worldwide. *Gallup World Poll* (2009). Available at: https://news.gallup.com/poll/117772/awareness-opinions-global-warming-vary-worldwide.aspx.

Rafaty, R. Perceptions of Corruption, Political Distrust, and the Weakening of Climate Policy. *Glob. Environ. Polit.* **18,** 106–129 (2018).

Ray, J. & Pugliese, A. Worldwide, Blame for Climate Change Falls on Humans. *Gallup World Poll* (2011).

Tjernström, E. & Tietenberg, T. Do differences in attitudes explain differences in national climate change policies? *Ecol. Econ.* **65,** 315–324 (2008).

World Bank. Carbon Pricing Dashboard. (2017). Available at: http://carbonpricingdashboard.worldbank.org.