Effects of Institutions on ”Transformation”

David G. Victor

University of California, San Diego

ILAR
UC San Diego
laboratory on
INTERNATIONAL LAW AND REGULATION
at the School of International Relations and Pacific Studies

What are Institutions?

- Institutions are social creations that help stabilize expectations, provide information and lower the costs of regular interactions

- Their impacts on carbon mitigation arise both in **decision-analytic** and **strategic** modes of policy choice, human decision-making and organizational behavior

Some Inconvenient Insights about Institutions and IAMs

- Most of what's interesting in institutional research is subtle, complex and thus hard to parameterize for coarse models (recall 2011 and 2012 meetings)
- Most institutional impacts on mitigation (and adaptation) are sub-national in origin and impact and thus hard to integrate into models with nations and regions as unit of analysis
- Most institutional insights lead to pessimism about speed and cost of policy implementation

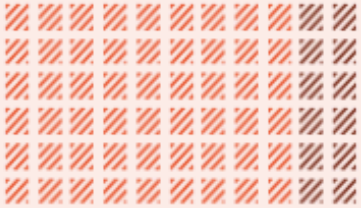
➢ But, before we slit our wrists, there is a lot we can do to add institutions

Adding Institutions: Decision-Analytic Mode

- ✓ Institutions affect credibility of long-term projections and commitments
- ✓ Institutions affect the cost of capital
- ✓ Institutions affect existing technology costs
- ➢ Institutions affect the ability to invest in innovation
- ➢ Institutions affects norms about environmental quality and preferences
- ➢ Institutions affects policy instrument choice

The current scale of global investment is insufficient

$0.25 trillion



INVESTED, 2011-2014

$1.095 trillion

Renewable energy and energy efficiency investment captured in the global landscape reports over the last four years.

NEEDED TO SUPPORT NDC PLEDGES

$13.5 trillion[3]

Investment required over the next 15 years in energy efficiency and low-carbon technologies to implement the national climate pledges (so-called "Nationally Determined Contributions") countries made before international climate negotiations held in Paris in December 2015.

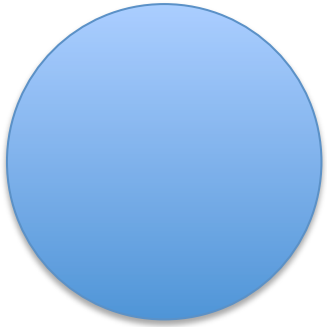
NEEDED TO LIMIT TO 2°C

$16.5 trillion[5]

Investment required over the next 15 years in energy efficiency and low-carbon technologies to meet the NDCs plus the additional investment required over the same time to limit global temperature increase to 2°C.

Source: Climate Policy Initiative using IEA estimates

Costs of Second-Best Policies (aka life): The Problem of Short Time Horizons



Blind Response (0-5 yr time horizon)

Muddy foresight (~8 year anticipation)

Perfect foresight (15+ year anticipation)

Note: The effect of anticipation on regulatory costs for developing countries (% deadweight loss of economic output from developing countries in our "second best" scenario). Calculated from WITCH and reported in Bosetti and Victor (2011)

Improved representation of investment decisions in assessments of CO_2 mitigation

Gokul C. Iyer[1,2*], Leon E. Clarke[2], James A. Edmonds[2], Brian P. Flannery[3], Nathan E. Hultman[1†], Haewon C. McJeon[2] and David G. Victor[4]

Assessments of emissions mitigation patterns have largely ignored the huge variation in real-world factors—in particular, institutions—that affect where, how and at what costs firms deploy capital[1–5]. We investigate one such factor—how national institutions affect investment risks and thus the cost of financing[6–8]. We use an integrated assessment model (IAM; ref. 9) to represent the variation in investment risks across technologies and regions in the electricity generation sector—a pivotally important sector in most assessments of climate change mitigation[10]—and compute the impact on the magnitude and distribution of mitigation costs. This modified representation of investment risks has two major effects. First, achieving an emissions mitigation goal is more expensive than it would be in a world with uniform investment risks. Second, industrialized countries mitigate more, and developing countries mitigate less. Here, we introduce a new front in the research on how real-world factors influence climate mitigation. We also suggest that institutional reforms aimed at lowering investment risks could be an important element of cost-effective climate mitigation strategies.

A number of factors such as national policy environments, quality of public and private institutions, sector and technology specific risks, and firm-level characteristics can affect investors'

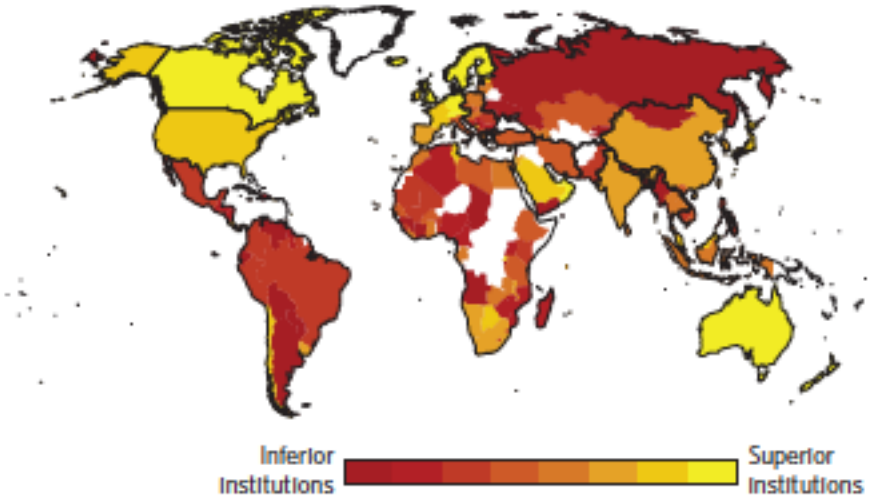
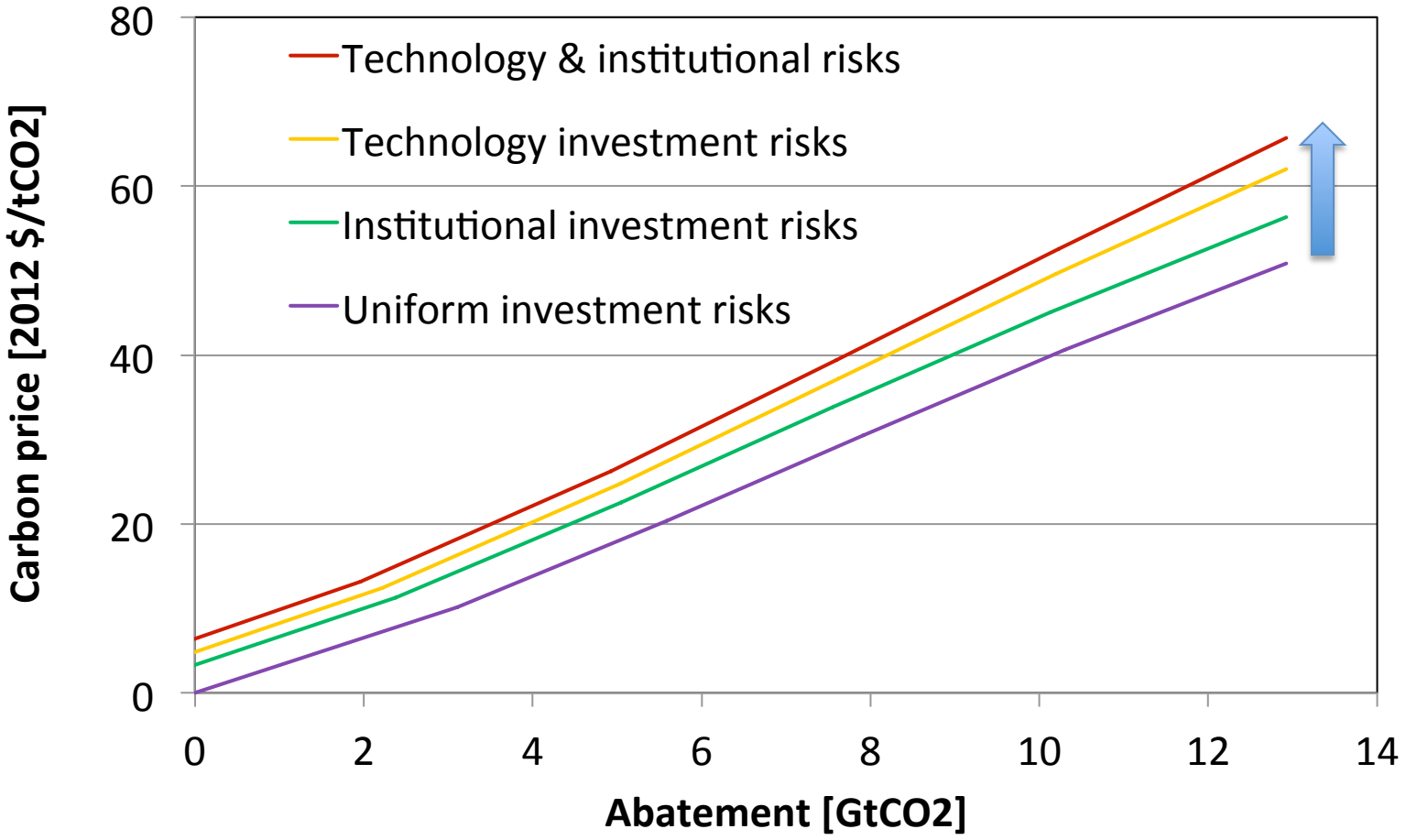


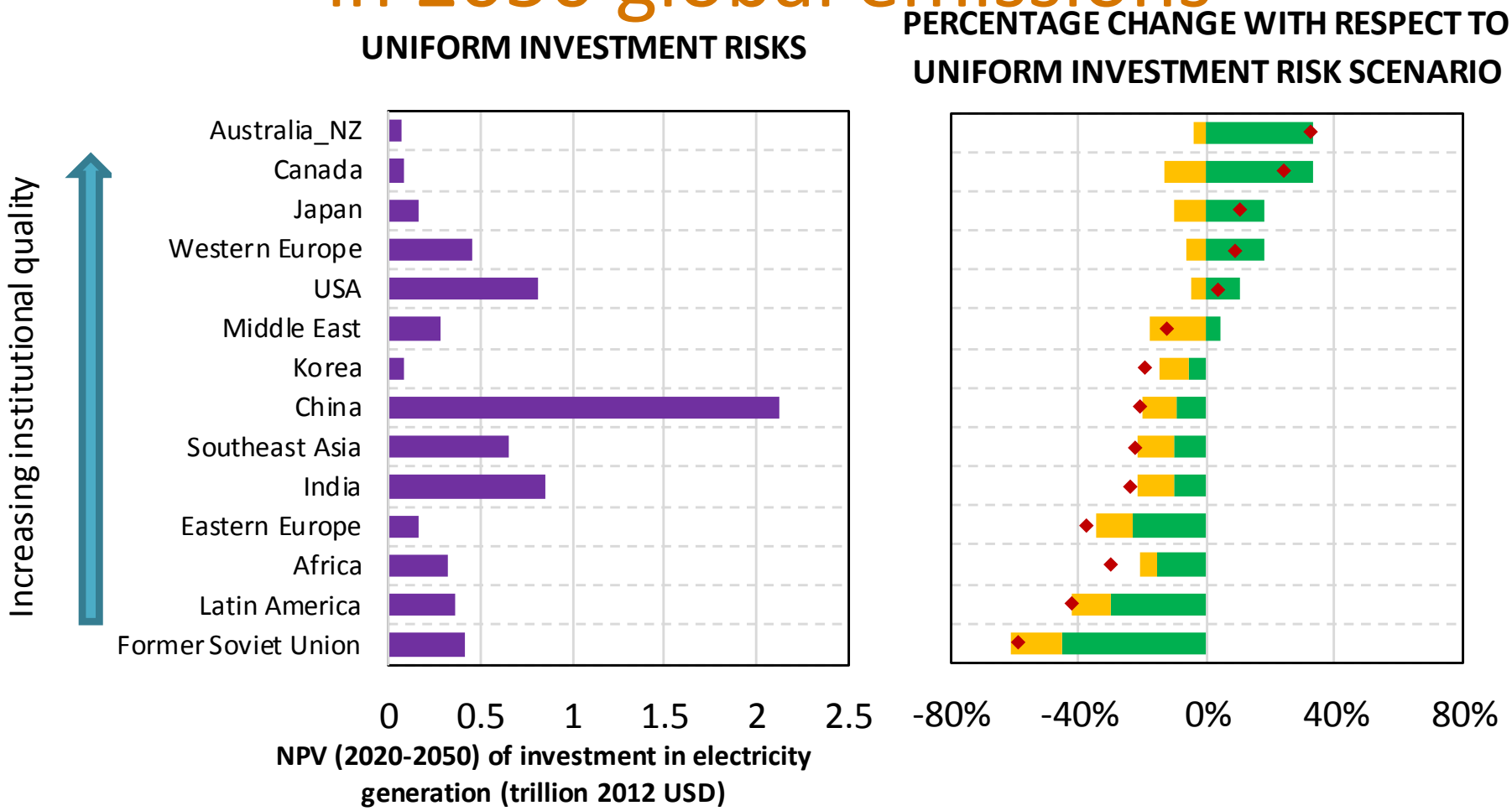
Figure 1 | Quality of national institutions based on the World Economic Forum's Global Competitiveness Index data set[11]. Assuming that non-uniformities in investment risks arise due to differences in institutional qualities, we use these data to represent costs of capital for investing in the electricity generation sector as a function of the quality of a country's institutions. This reflects behaviour of investors in the real world, where investors demand risk-adjusted rates of return that are higher in regions with inferior institutions.

Global marginal abatement costs



Source: Iyer et al 2015

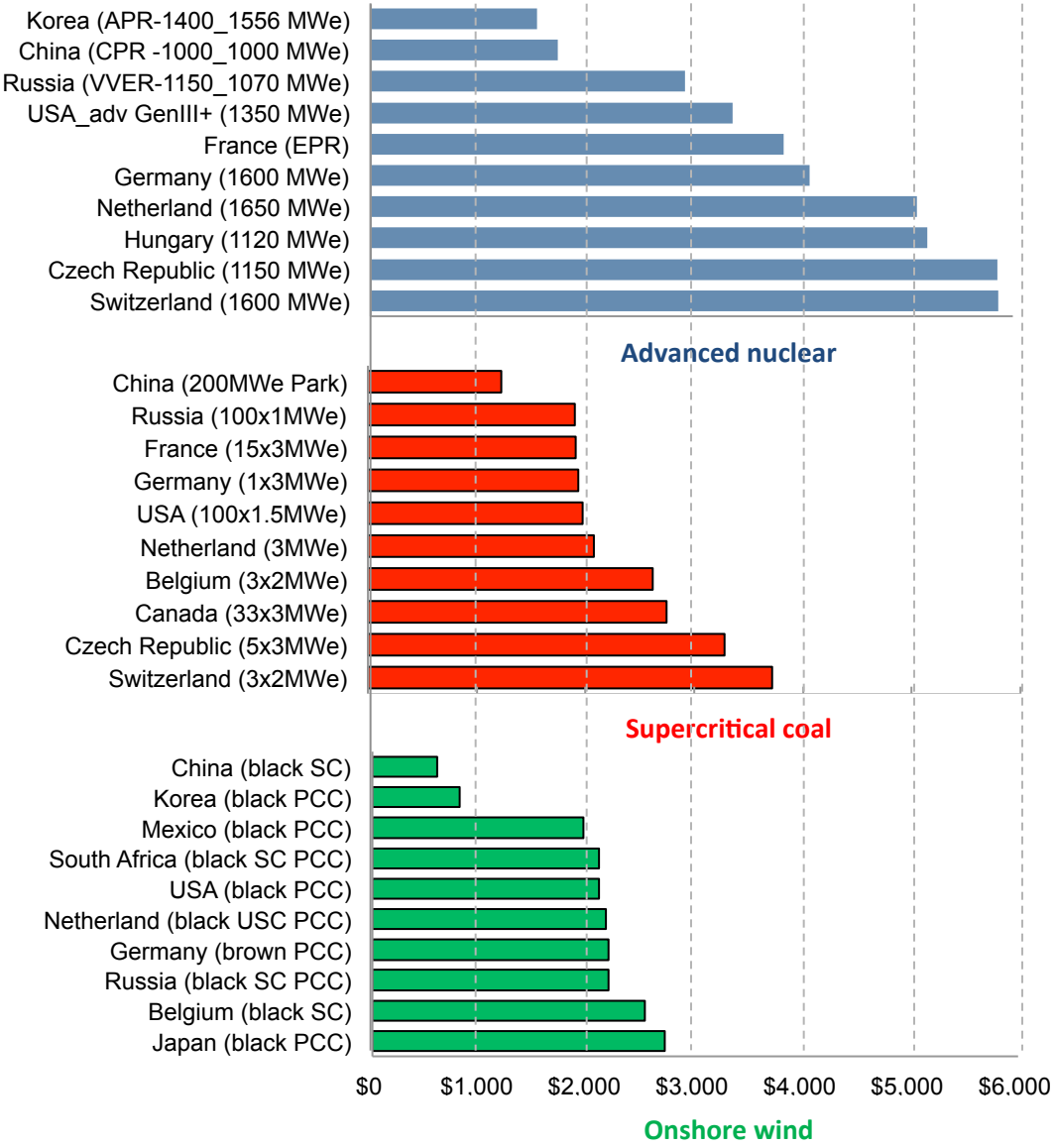
Regional investments: 50% reduction in 2050 global emissions



Source: Iyer et al 2015

Huge capital cost variations across countries

2010 Overnight Capex for Selected Power Generating Technologies in Major Countries (2010 USD/kWe)



Data source: IEA and OECD NEA (2010)

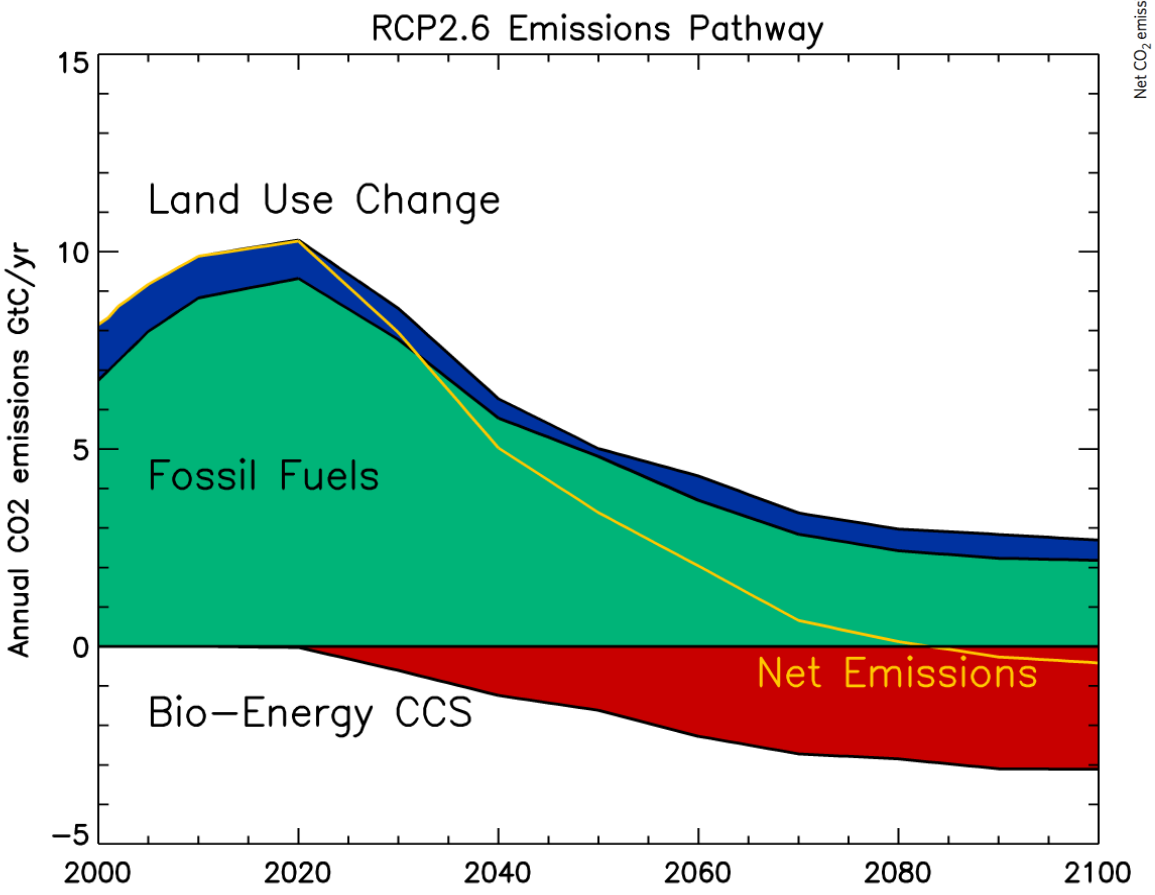
Adding Institutions: Decision-Analytic Mode

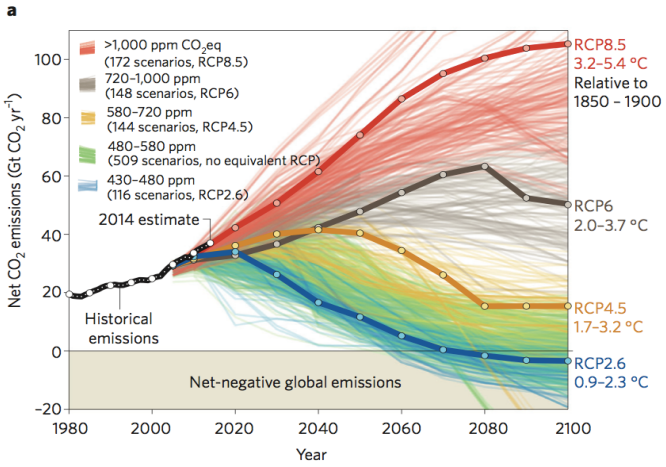
- ✓ Institutions affect credibility of long-term projections and commitments
- ✓ Institutions affect the cost of capital
- ✓ Institutions affect existing technology costs
- ➢ Institutions affect the ability to invest in innovation
- ➢ Institutions affects norms about environmental quality and preferences
- ➢ Institutions affects policy instrument choice

Institutions and Innovation: ”Intuition Map”

- High capex, complex system technologies don’t just “learn” but require demo projects
- Degree of need for demos depends…
  - ...gap between current and competitive performance
  - …the importance of system integration for overall performance
  - …risk aversion of deploying institutions.
- We can create an algorithm that differentiates technologies that ”learn through scale” from those that “learn through demos”
  - Former: existing renewables and efficiency; PWRs
  - Latter: BECCS, radical novel renewables; SMRs
- Countries vary in the credibility of their demo programs

“gross” vs “net” negative emissions





Sources: Fuss et al (2014) *upper right*; Van Vuuren et al (2011) *lower left*; Graphics courtesy of Chris Jones, UK Met Office

Adding Institutions: Decision-Analytic Mode

- ✓ Institutions affect credibility of long-term projections and commitments
- ✓ Institutions affect the cost of capital
- ✓ Institutions affect existing technology costs
- ➢ Institutions affect the ability to invest in innovation
- ➢ Institutions affects norms about environmental quality and preferences
- ➢ Institutions affects policy instrument choice

Adding Institutions: Decision-Analytic Mode

- ✓ Institutions affect credibility of long-term projections and commitments
- ✓ Institutions affect the cost of capital
- ✓ Institutions affect existing technology costs
- ➢ Institutions affect the ability to invest in innovation
- ➢ Institutions affects norms about environmental quality and preferences
- ➢ Institutions affects policy instrument choice

Institutions and Policy Instruments

- How can we move beyond stylized "first best" efficient instruments?
- Some places to begin:
  - **Incumbency effects**: assume that policies that deliver large rents to existing firms will be stickier than policies that don't
  - **Regulation & Markets**: assume that politicians almost always favor regulation over markets, and model how regulatory and market instruments interact
  - Model inefficiencies in existing policies and assume **policy reform only affects the margins**

Institutions and Policy Instruments

- How can we move beyond stylized "first best" efficient instruments?
- Some places to begin:
  - **Incumbency effects**: assume that policies that deliver large rents to existing firms will be stickier than policies that don't
  - **Regulation & Markets**: assume that politicians almost always favor regulation over markets, and model how regulatory and market instruments interact
  - Model inefficiencies in existing policies and assume **policy reform only affects the margins**

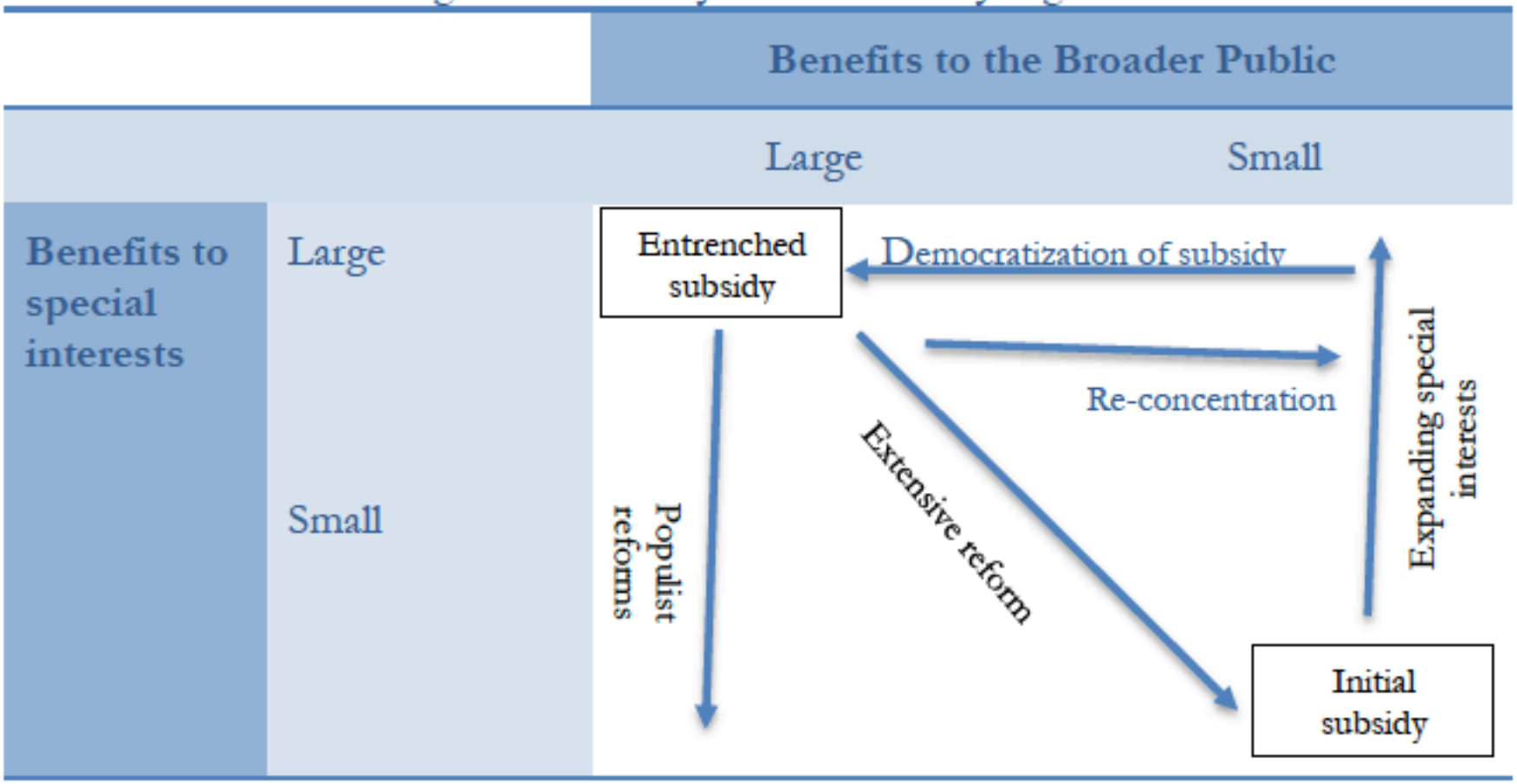
The Political Economy of Incumbency

Figure. 1.1 Characterizing Policy Benefits

		Benefits to the Broader Public	
		Large	Small
Benefits to special interests	Large		
	Small		

Source: Inchauste and Victor, eds., "The Political Economy of Energy Subsidy Reform," World Bank (in production)

Figure 1.4 Life cycle of a subsidy regime

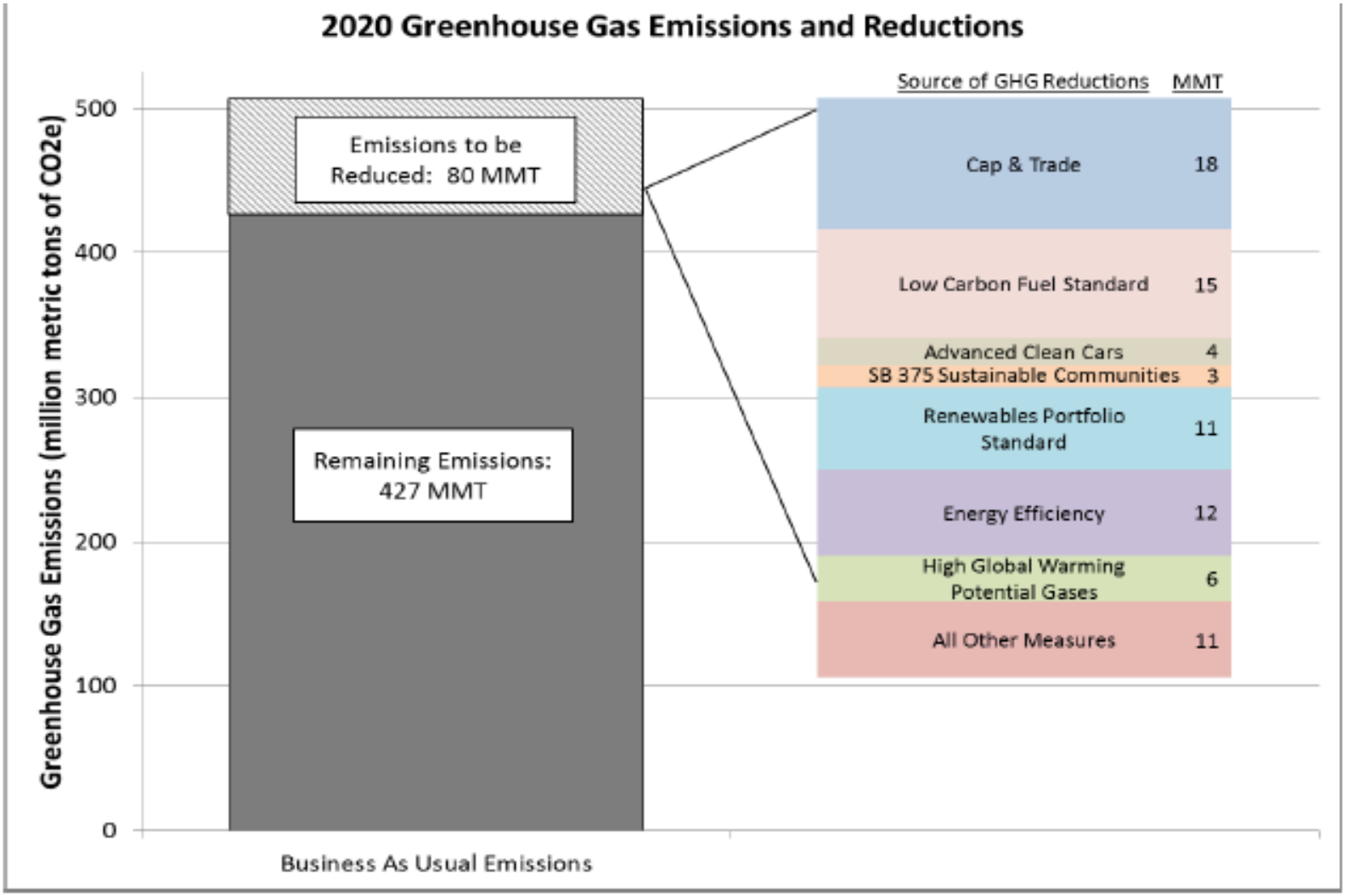


Source: Inchauste and Victor, eds., "The Political Economy of Energy Subsidy Reform," World Bank (in production)

Institutions and Policy Instruments

- How can we move beyond stylized "first best" efficient instruments?
- Some places to begin:
  - **Incumbency effects**: assume that policies that deliver large rents to existing firms will be stickier than policies that don't
  - **Regulation & Markets**: assume that politicians almost always favor regulation over markets, and model how regulatory and market instruments interact
  - Model inefficiencies in existing policies and assume **policy reform only affects the margins**

Climate Markets are "Potemkin" Markets



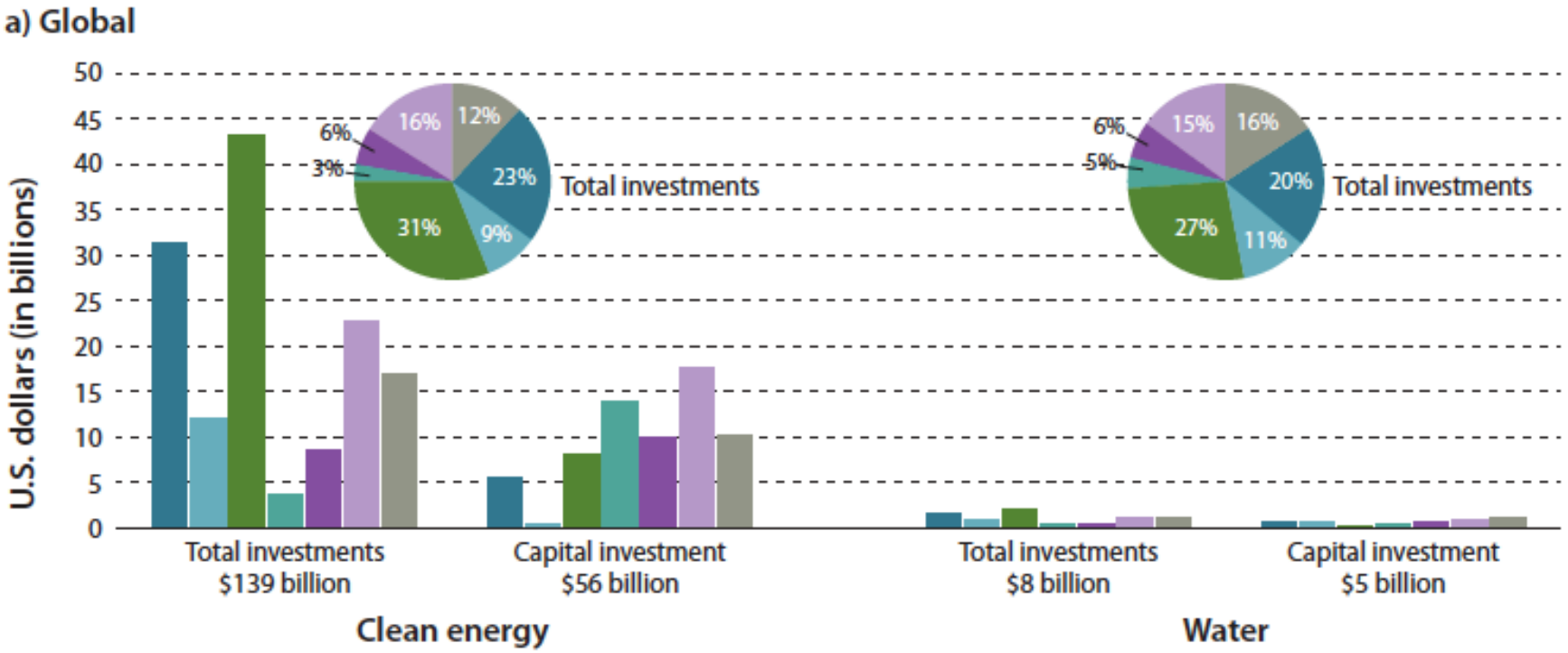
CARB Concept paper, 15 Feb 2013

Institutions and Policy Instruments

- How can we move beyond stylized "first best" efficient instruments?
- Some places to begin:
  - **Incumbency effects**: assume that policies that deliver large rents to existing firms will be stickier than policies that don't
  - **Regulation & Markets**: assume that politicians almost always favor regulation over markets, and model how regulatory and market instruments interact
  - Model inefficiencies in existing policies and assume **policy reform only affects the margins**

FIGURE 4.

Sources of Investment Dollars for Global and U.S. Innovation in the Clean Energy and Water Sectors, 2000–13



Source: Ajami, Thompson and Victor, 2014, “The Path to Water Innovation,” Hamilton/ Stanford

Adding Institutions: Game-Theoretic Mode

- Institutions affect credibility of cross-border linkages
- Institutions affect the size of clubs, their cohesion and the depth of cooperation
- Institutions allow “experimentalist” approaches to governance

Adding Institutions: Game-Theoretic Mode

- Institutions affect credibility of cross-border linkages
- Institutions affect the size of clubs, their cohesion and the depth of cooperation
- Institutions allow "experimentalist" approaches to governance

Moving from Autarchy to True International Cooperation

nature climate change

PERSPECTIVE

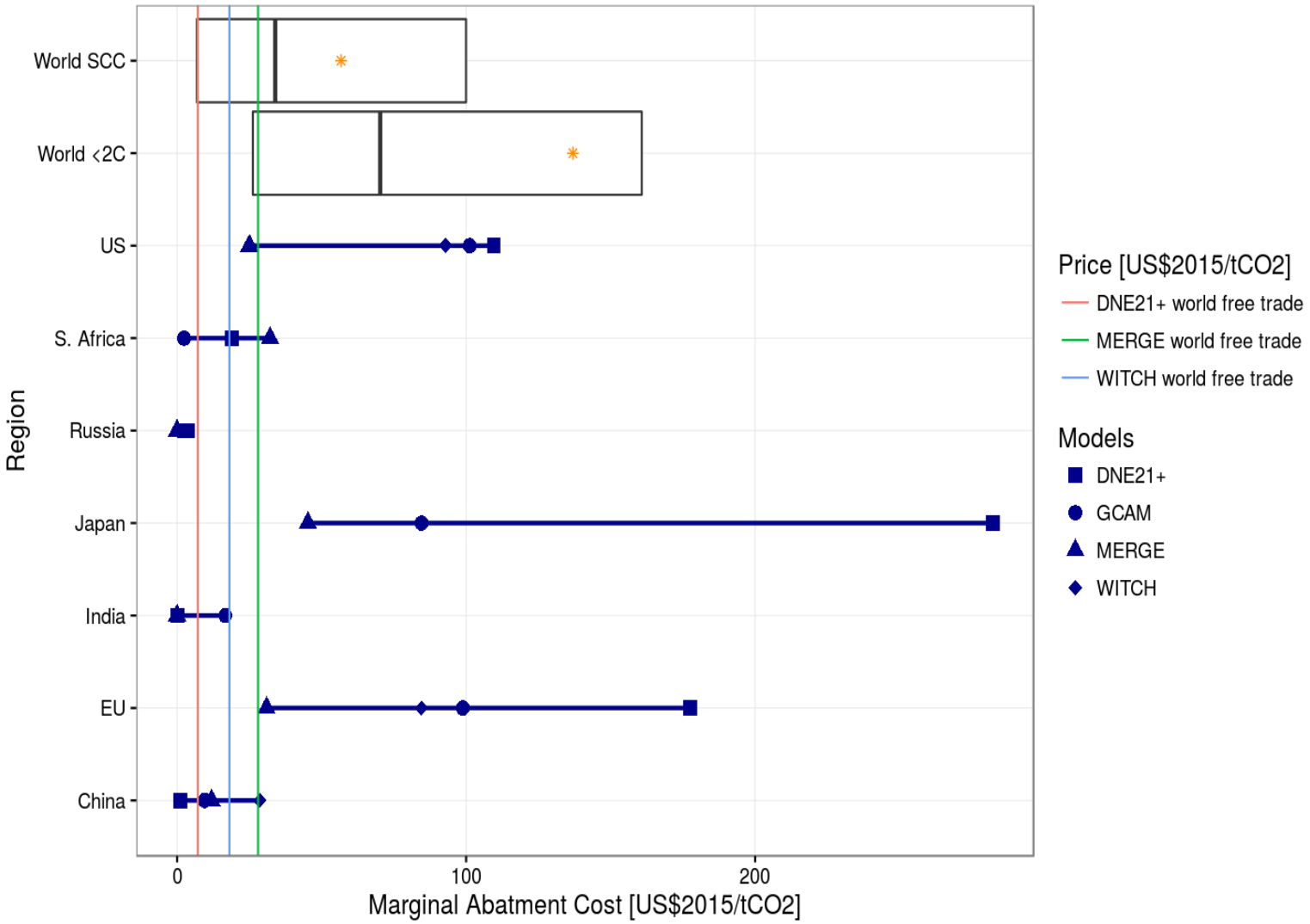
PUBLISHED ONLINE: 9 MAY 2016 | DOI: 10.1038/NCLIMATE2937

Cooperation and discord in global climate policy

Robert O. Keohane[1] and David G. Victor[2,3,4]*

Effective mitigation of climate change will require deep international cooperation, which is much more difficult to organize than the shallow coordination observed so far. Assessing the prospects for effective joint action on climate change requires an understanding of both the structure of the climate change problem and national preferences for policy action. Preferences have become clearer in light of the United Nations Framework Convention on Climate Change Conference of the Parties in December 2015. Although deep cooperation remains elusive, many partial efforts could build confidence and lead to larger cuts in emissions. This strategy of decentralized policy coordination will not solve the climate problem, but it could lead incrementally to deeper cooperation.

Potential Gains from Cross-Border Linkages



Source: Aldy et al (and many of you), in press.

Rethinking How IAMs model Trading: Intuition Map

- Huge potential gains from integrated global markets
- Gains are most risky (and least credible) when they involve countries with poor institutions
- Trading is most likely between countries of similar, high institutional quality
  - Gresham meets carbon
  - Let's call this the "Carbon Trading Paradox"

➢ Create algorithm to index trading transaction costs and valid cross-border flows by…
  - Institutional quality
  - Existing cross-border flows (FDI, trade)

Adding Institutions: Game-Theoretic Mode

- Institutions affect credibility of cross-border linkages
- Institutions affect the size of clubs, their cohesion and the depth of cooperation
- Institutions allow "experimentalist" approaches to governance

Adding Club-driven cooperation to IAMs: Intuition Map

- Large-N cooperation is prohibitively difficult
  - Prone to shallowness and gridlock
  - Sticking with large N institutions will guarantee failures of collective action
- Deeper cooperation possible in smaller groups under the "right conditions"
  - ABM modeling has helped identify those (border measures, conditional commitments, true club benefits in the Buchanan sense, etc)
- Implies large differences in marginal costs along with adequate measure to address leakage

➢ Use IAMs to create dynamic estimates of leadership costs, efficiency losses and maps of differential cooperation

palgrave communications
HUMANITIES | SOCIAL SCIENCES | BUSINESS

REVIEW ARTICLE

Revised 10 Apr 2016 | Published 10 May 2016

DOI: 10.1057/palcomms.2016.20

OPEN

Climate change mitigation: a role for climate clubs?

Jon Hovi[1], Detlef F Sprinz[2,3], Håkon Sælen[1,4] and Arild Underdal[1,4]

Adding Institutions: Game-Theoretic Mode

- Institutions affect credibility of cross-border linkages
- Institutions affect the size of clubs, their cohesion and the depth of cooperation
- Institutions allow "experimentalist" approaches to governance

Experimentalist Governance in IAMs: Intuition Map

- Global cooperation is not a "PD" problem as much as an informational one
- Actors often want to act but don't know what to do—don't know what works, scales and integrates cooperation.
- They solve these problems by running policy experiments that reduce transaction costs through learning and scaling

➢ Create algorithm that rewards early efforts with lower abatement costs and deeper cooperation

An Offer

Any IAM team that wants to “add institutions” my team will help get you the right theory and measurement approach.

Thank You

Some Implications
(from Snowmass 2012)

All this suggests that climate policy will unfold at higher cost and slower speed than might be ideal…

…and those two trends are self-reinforcing and rewarding to local incumbents…

At least two areas where "adding institutions" could result in faster action

- Diffusion of social norms affecting attitudes and behavior
  - Often a tipping phenomenon, especially vis behavior
    - Slavery; "logic of appropriateness"
    - Alters preferences and restructures the cooperation problem
- Drivers of Technology Deployment Costs
  - Rapid organizational learning
    - Offshore drilling
    - Sweeney's airlines example from yesterday

Thank You

Polity Scores

ranging from -10 (consolidated autocracy) through middle scores ("anocracy," meaning no integrated authority) to +10 (consolidated democracy)