Globalization and the Environment

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Handbook of International Economics Conference

Big Picture Goals: The Why

- Introduce the Reader to a broad set of trade and environment issues
- Highlight Areas of research neglected in earlier reviews
- Stimulate New Research

Method: The How

- Introduce 9 "new" stylized facts; Confront the literature with them; where possible expose gaps/inconsistencies/remaining mysteries
- Discuss links between trade and climate change; trade and the sustainability of renewable resources; trade and transport emissions.
- Very little formal modelling; graphs/models introduced to clarify when necessary; no one modelling framework encompasses all issues.

Content: The What

- Stylized facts
- How does Globalization affect the Environment?
- Globalization and the Environment: Policy
- Trade and Climate Change

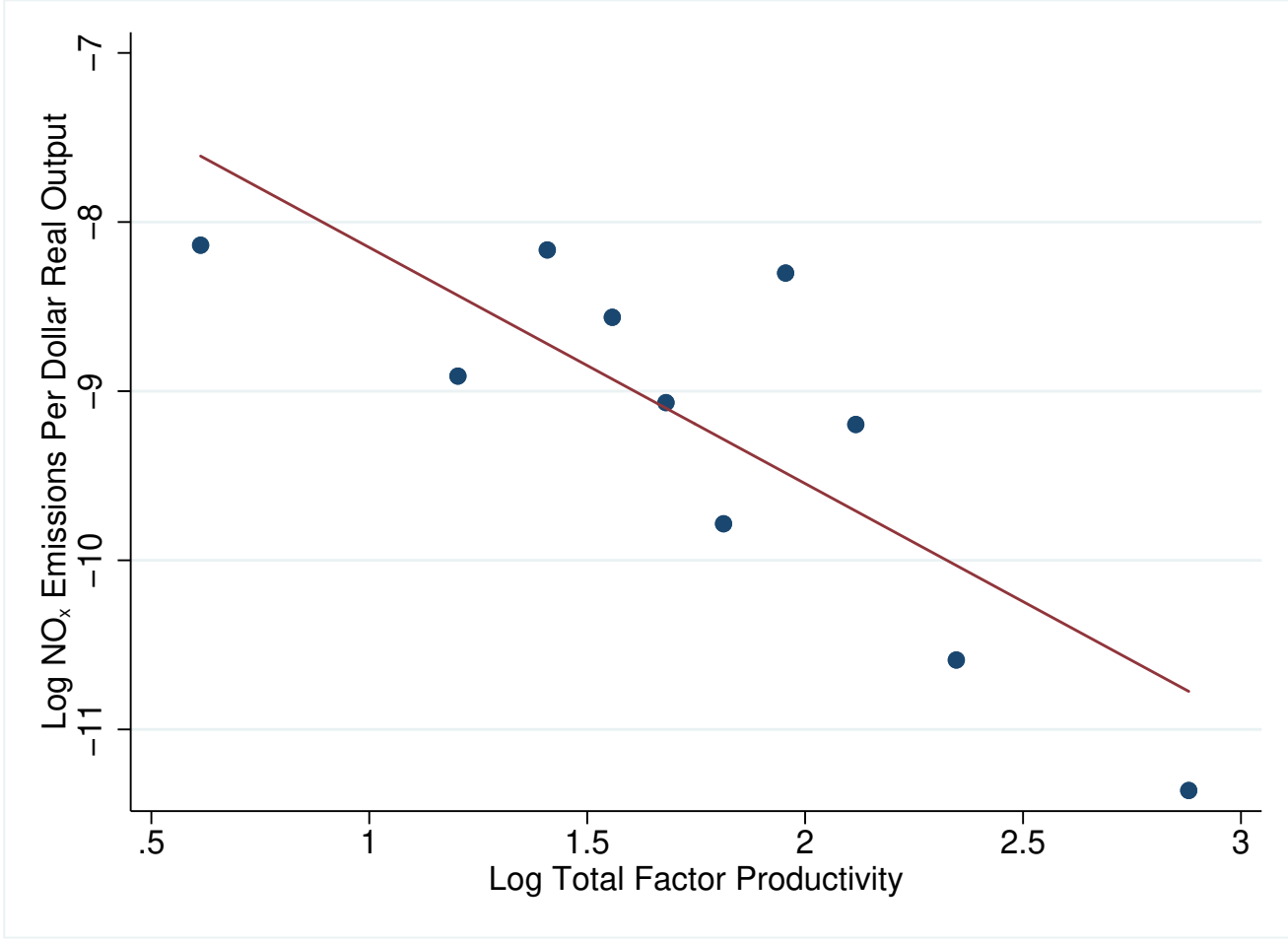
Stylized Facts

#1: Dirty industries are more exposed to trade
#2: Different types of pollution are correlated
#3: Dirty industries are more upstream

	Direct Emission Rate		Total Emission Rate		Total Output ($trillion)	Output Traded (%)	Upstream-ness
	CO_2	NO_x	CO_2	NO_x			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Cleanest industries							
Real estate activities	8	0.0	84	0.3	$7.9	0.6%	1.5
Financial intermediation	11	0.0	101	0.3	$7.2	7.0%	2.3
Equipment & machine rentals	28	0.1	166	0.6	$10.0	8.6%	2.7
Wholesale trade	25	0.1	201	0.8	$5.9	7.9%	2.2
Retail fuel; vehicle repair, sales	34	0.1	186	0.6	$1.2	1.2%	1.9
Mean of cleanest 5 industries	*21*	*0.1*	*148*	*0.5*	*$6.4*	*5.1%*	*2.1*
Panel B. Dirtiest industries							
Coke, oil refining, nuclear fuel	359	0.5	984	2.4	$2.5	22.9%	2.7
Air transport	1,227	4.8	1,613	6.0	$0.6	31.0%	2.1
Water transport	1,147	12.7	1,681	16.0	$0.6	40.6%	2.9
Other non-metallic mineral	1,332	4.0	2,291	6.4	$1.3	11.2%	2.6
Electricity, gas, water supply	3,295	5.6	4,324	7.8	$3.4	2.1%	2.8
Mean of dirtiest 5 industries	*1,472*	*5.5*	*2,179*	*7.7*	*$1.7*	*21.5%*	*2.6*

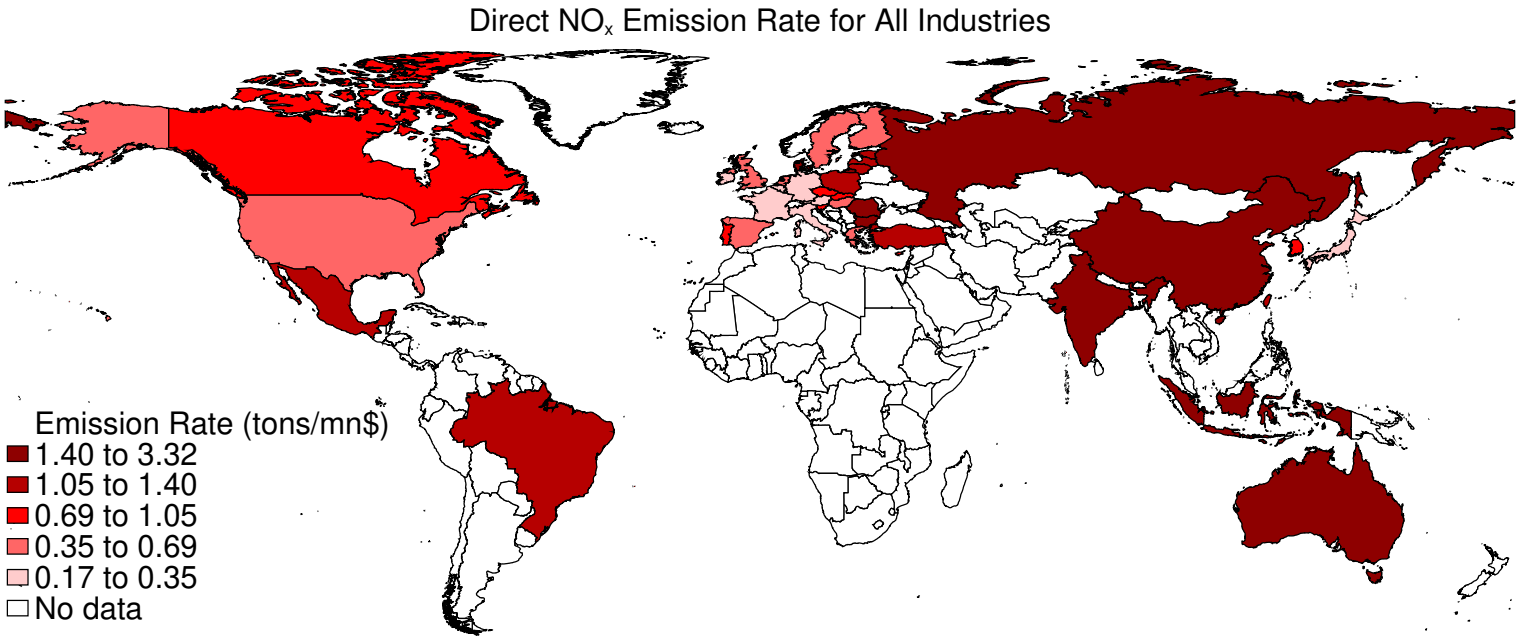
Stylized Facts

#4: More Productive Plants are Cleaner



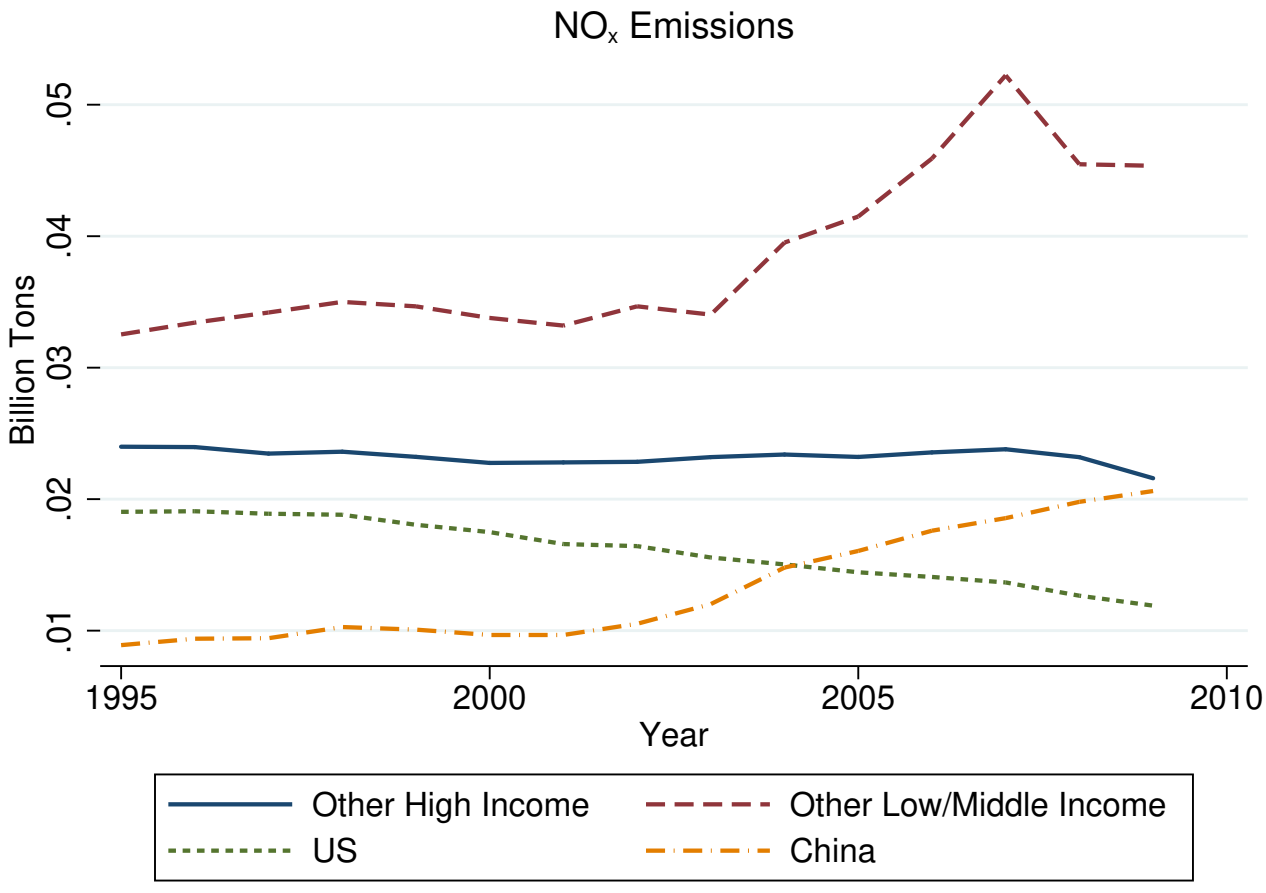
Stylized Facts

#5: Pollution emission rates differ substantially across countries.



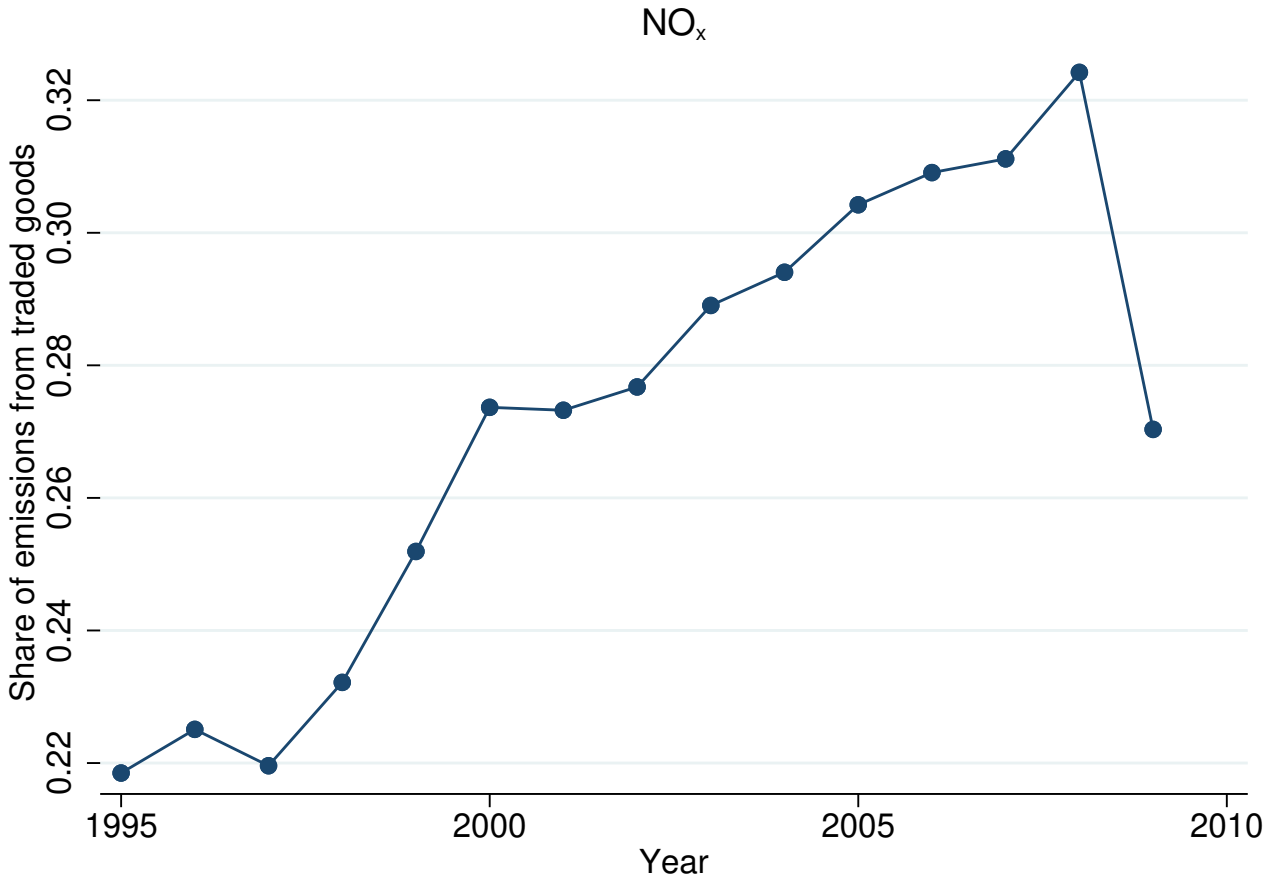
Stylized Facts

#6: Most global emissions growth comes from developing countries.



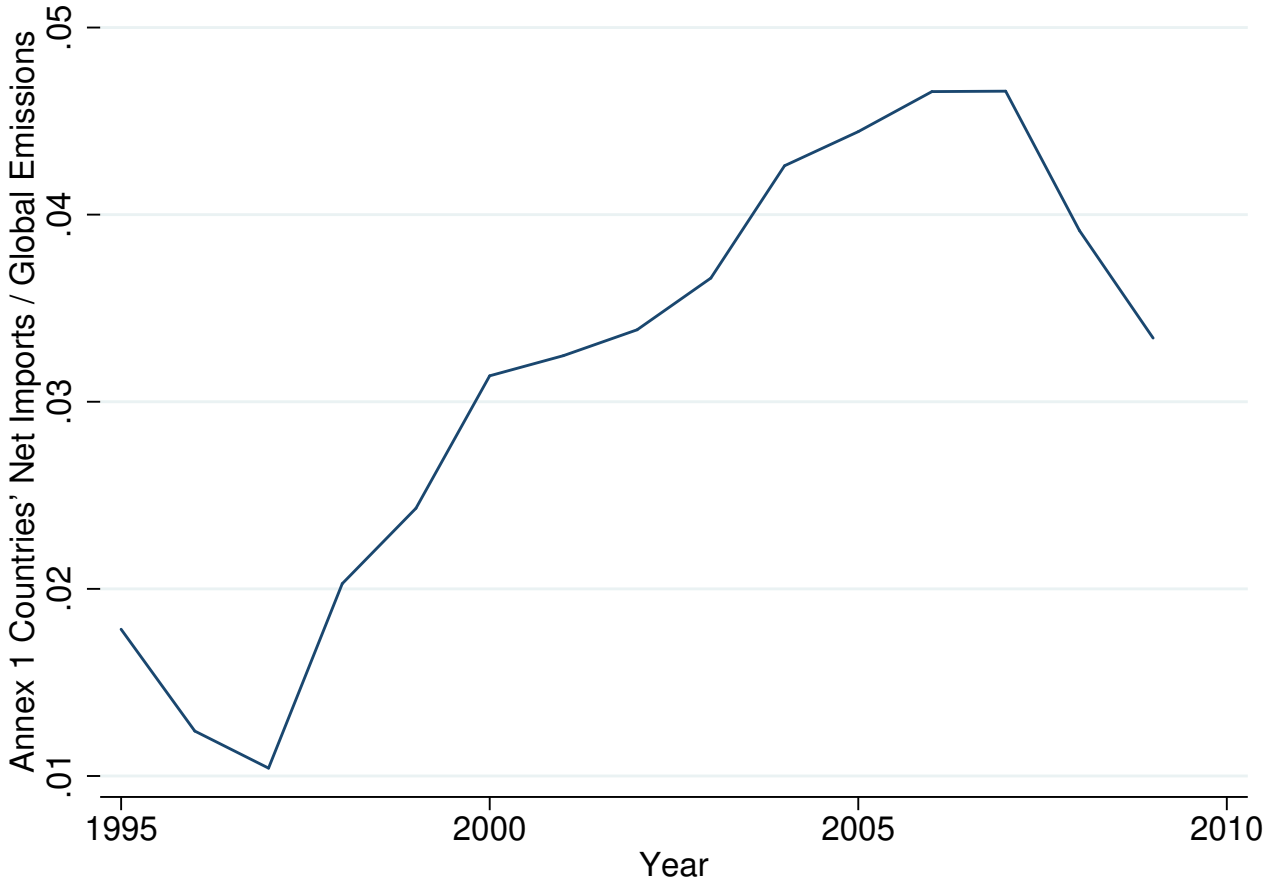
Stylized Facts

#7: International trade accounts for a fourth to a third of global emissions.



Stylized Facts

#8: Rich countries are increasingly outsourcing pollution.



Stylized Facts

#9: Technique accounts for more of changes in emissions than composition.

$$\text{Scale} = 100 * \left(\sum_i Y_{it}\right) / \left(\sum_i Y_{i1995}\right)$$

$$\text{Scale, composition, \& technique} = 100 * \left(\sum_i Y_{it} e_{it}\right) \left(\sum_i Y_{i1995} e_{i1995}\right)$$

$$\text{Scale \& composition} = 100 * \left(\sum_i Y_{it} e_{i1995}\right) \left(\sum_i Y_{i1995} e_{i1995}\right)$$

Stylized Facts

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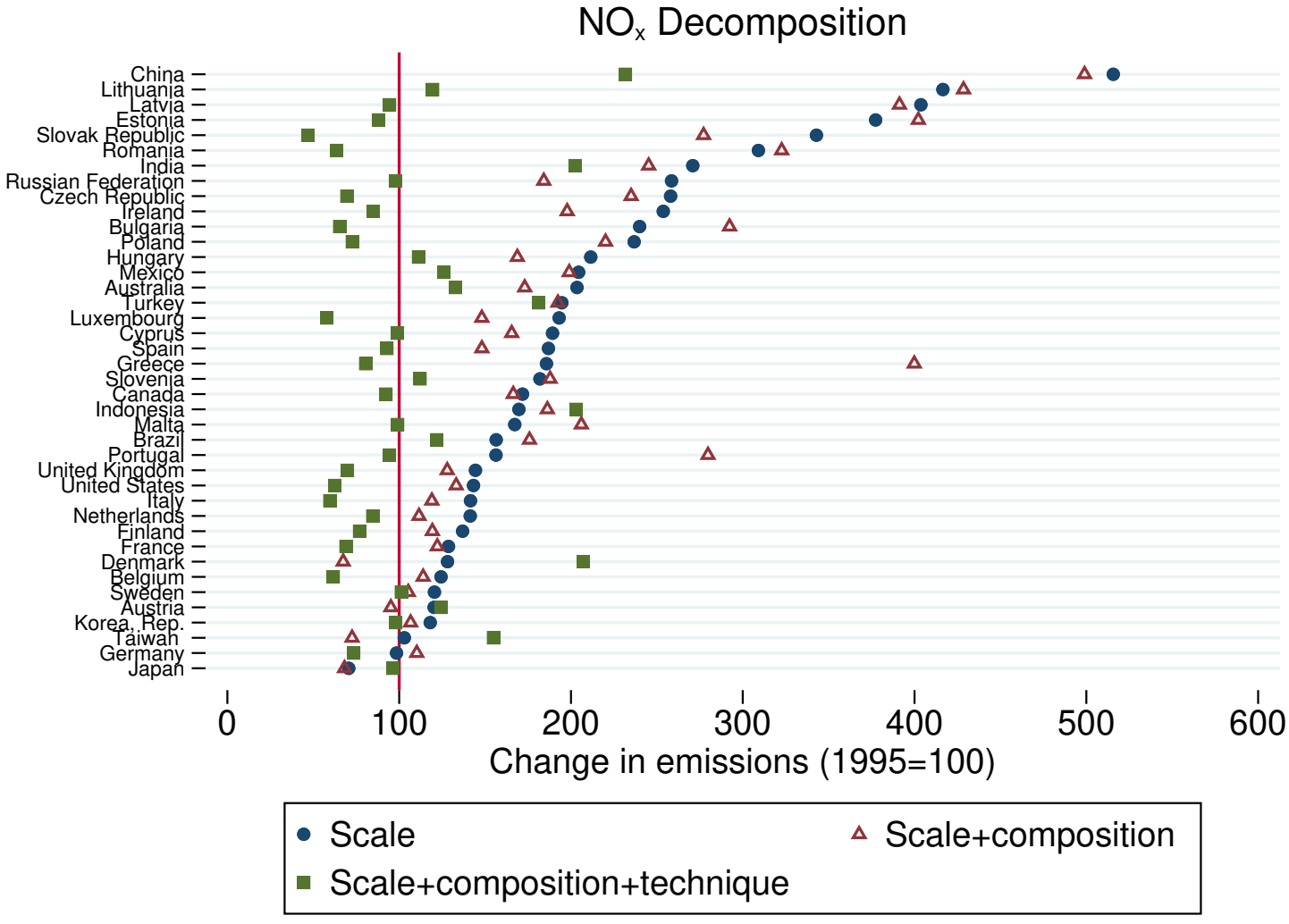

How Does Globalization Affect the Environment?

- Trade may raise or lower pollution because of potentially offsetting effects: Scale, Technique, Composition, now joined by Rationalization and Offshoring effects.
- Pollution Haven Hypothesis: Do poor countries get dirtier with trade?
  - Is Environmental policy an important determinant of firm costs?
  - Are these costs pivotal in determining the pattern of trade?
- Pollution Reduction by Rationalization Hypothesis: When trade causes rationalization and exit is this process environmentally friendly or not?
  - Tentative answer is yes
- Pollution Offshoring Hypothesis: Do firms break-up value chains to chase low regulation environments?

Emissions in Transport

- Greatly complicates the data exercise
- Only two studies that have done so on a large scale.
- Transport emissions are a surprisingly large part of trade related emissions.
- Counterfactual of Autarky, lowers emissions by only 5
- Trade, in many cases, lowers emissions despite transport costs.
- Environmental Policies to reduce transport emissions create large distributional effects
- Further trade liberalization unlikely to cause large changes unless tied to growth

Renewable Resources use and Trade

- Similar overall themes: how does resource management affect comparative advantage?; does trade cause overuse and when?; what other consequences might trade bring?
- Different because: Time series becomes far more important as consequences are often long run productivity effects; data is harder to come by as resource abundance is concentrated in countries with weak reporting and monitoring capabilities;
- Trade can be tremendously destructive and rapid in its effects.
- Difficult to identify good and poor candidates for trade liberalization ex ante.
- Productivity effects of overuse can mean tighter regulation implies lower rather than higher costs, implying world markets can act as a backstop technology.
- Remote sensing, and GIS techniques are/will be a tremendous boost to research.

Has environmental degradation been an unintended side effect of trade policy reform?

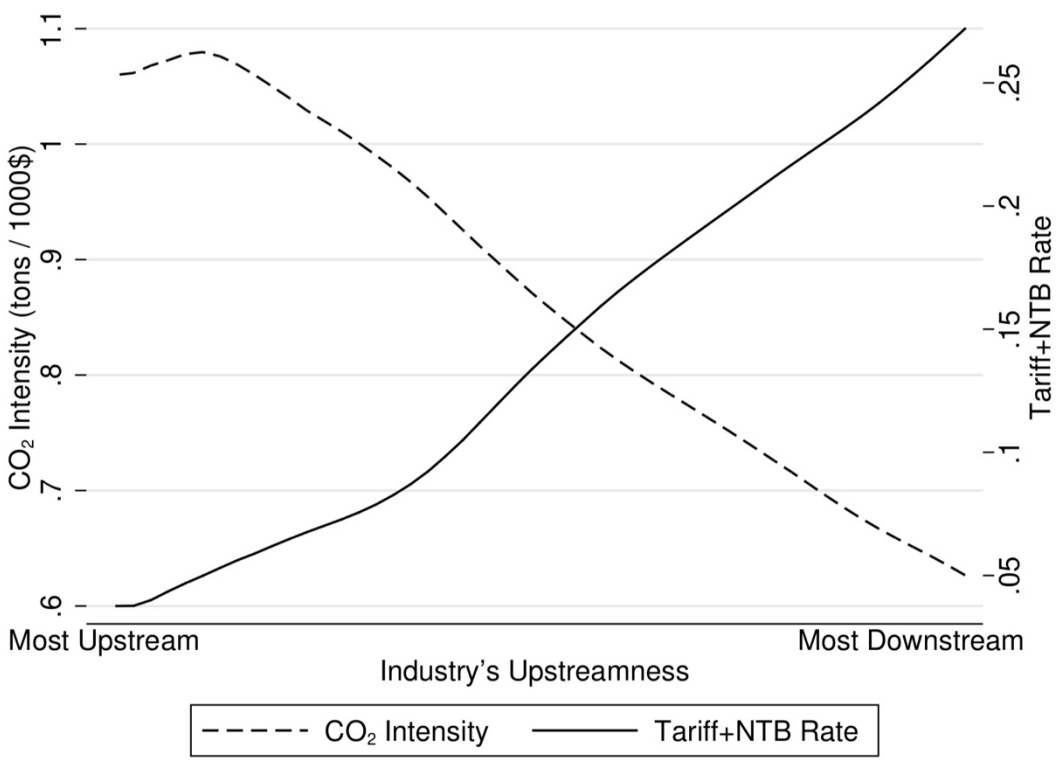

Figure 9: Pollution intensity, upstreamness, and protection.

Existing structure of trade protection stimulates trade in pollution-intensive goods

Shapiro (2021): tariff and non-tariff barriers are lower in carbon-intensive industries than in clean industries.

- Upstream industries are more carbon intensive
- Upstream industries face lower trade barriers

Literature: Environmental effects of trade policy reform; design of trade policy reforms that improve welfare where there is pollution

How does globalization affect domestic environmental policy?

Do concerns about international competitiveness increase pressures on governments to weaken (or not tighten up) environmental policy?

- There is evidence that environmental policy affects competitiveness
- However, there has been relatively little empirical work that establishes a link between globalization and the stringency of environmental policy

Has weak environmental policy been used as a substitute for trade protection when trade agreements constrain the use of trade policies and subsidies?

- Theory suggests that it depends on whether pollution comes from production or consumption
- Evidence that non-tariff barriers increase after committing to tariff reductions, but few studies look at effects on environmental policy

Implications for trade agreements

- Tradeoffs between restricting domestic policy vs. allowing governments flexibility to respond to local policy needs. [Horn, Maggi, and Staiger (2010)]

Trade and climate change: Leakage

Theme of most of the literature on trade and climate change is the implications of the failure to achieve effective global agreements to reduce emissions

A large literature focusses on carbon leakage

- Unilateral restrictions on carbon emissions shift production elsewhere
- Policy-induced reduced demand for fossil fuels lowers world price and increases consumption by non-coalition countries

Measurement of leakage

- Estimates mostly come from quantitative models
- Most estimates of leakage rates are positive and 30% or less

Policies to mitigate leakage

- Border carbon adjustments (tariff on embodied carbon emissions)
- Output-based allocation of emission permits (subsidies to polluting industries)
- Supply side policies - restrict production of fossil fuels
- Quantitative models have been used to assess efficacy and domestic and global distributional effects

Trade and climate change: other issues

Trade and adaptation to climate change

- Climate change will have heterogenous effects within and across countries on productivity, especially in agriculture. Can international trade reduce the costs of adaptation?
- Growing area of research using quantitative gravity and economic geography models [Costinot et al. 2016, Dingel et al. 2019; Cruz Alvarez and Rossi-Hansberg 2021)]

Linkage between trade and climate agreements

- Efficiency gains from linking negotiation due to increased enforcement power, but tradeoffs – trade may be less free (Limao, 2005)
- Climate clubs (Nordhaus, 2015). Numerical simulation models to show how a coalition could use threat of tariffs to encourage participation in emission reduction agreements