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Getting carbon footprint models ready for prime-time: response

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Consumption-based approaches

Consumption-based *input-output* approaches

- What can they be used for?
- What are the problems?



Consumption-based *input-output* approaches

➤ Measurement

Who emits for whom?

US emissions in metals industry

German emissions in machinery industry

embodied in:

Japanese “consumption” of

UK transport equipment



Consumption-based *input-output* approaches

➤ Measurement

Who emits for whom?

- Footprints (and other stylized facts)
- Raising consumer awareness (e.g. labelling)
- Making projections
(what happens if, assuming anything else remains as is)
 - ageing becomes a huge problem
(also in China despite 1 → 1½ → 2 child policy)
 - what would 2010 have looked like, if we had ...
- Scenario analyses
lifestyle changes



➤ Pricing, taxing & financial transfers

Border carbon adjustment

price paid at the border for imports, rebating the exports
complex and costly to implement
role for global MRIO analysis?

Carbon price per ton of CO₂ emitted in production

pass costs over to buyers

yields price per ton of carbon added

nasty to implement at product level

easy to determine financial transfers



Price per ton of carbon added in production

US emissions in metals industry

German emissions in machinery industry

embodied in:

Japanese “consumption” of

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Price per ton of carbon added in production

US emissions in metals industry × 16 \$/ton

German emissions in machinery industry × 12 \$/ton

embodied in:

Japanese “consumption” of

UK transport equipment

Sum over all “consumption” in Japan yields

how much Japan owes US and Germany for CO₂

Alternatively: as % of value (basically extra value added tax)



Price per ton of carbon added in production

Sum over all “consumption” in Japan yields

how much Japan pays US, Germany, China, etc

But what will US, Germany, China do with the money?

China: improve coal-based power plants

Germany: more sun panels

Same value (in terms of mitigation) for the money?



Price per ton of carbon added in production
Same value (in terms of mitigation) for the money?

Simpler option:

globally the same price (e.g. 10\$/ton)
not only for emissions abroad embodied in say US
consumption, but all emissions in US consumption
pay to supranational institution (UN?)
and they are responsible for spending the money

What is the potential?

increase all prices in the world by 0.5% (i.e. GDP decreases)

final demand (consumption, govnm expenditures,
 investments) increases by 241 b\$ (2006)



What is the potential?

increase all prices in the world by 0.5% (i.e. GDP decreases)

final demand (consumption, govnm expenditures, investments) increases by 241 b\$ (2006)

mitigation costs 50 \$ per ton: 4.8 bT

which was 14% of global GHG emissions in production in 2006 (34.2 bT)



US: GDP = 13,396 b\$

extra money for abatement = 67 b\$

abatement costs 50 \$ per ton

US reduction = 1.34 bT

(on US territory, or help China to reduce)

China: GDP = 2,713 b\$, which implies 0.27 bT reduction

How: raise existing VAT by 0.5%-point

Note: this cannot be done unilaterally

(price increases, loss of competitiveness, etcetera)



Applying consumption-based approaches with global MRIO requires supranational co-ordination (UN?)

It shifts the negotiations

- agree on a carbon price, for example
- agree on the underlying method and data (i.e. MRIO)

Items involved:

- No direct measurement, model calculations
- Number of industries, industries or products
- Country coverage, what about countries not included
- Processing trade misrepresented in IO tables, hence bias
- New SNA (classification issues, handling processing trade)

Scientific research: lots of sensitivity analyses and comparisons across databases

This will take much time
and will we agree on the outcomes
will this converge to consensus?

Is it necessary to wait for consensus?

Is there an alternative?



Is there an alternative?

Yes, there is!

Trade in value added \approx trade in emissions

trade theorists re-invented the wheel much later
but acted much faster

WTO/OECD: TiVA database

OECD: "we make our own world IO tables"

which is used for policy issues

But again, requires a supranational institution
to take the lead



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Thank you for your attention