

Carbon Leakage: Definition, Evidence, Challenges



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“One day this will all be outsourced.”

- Potential chain of effects caused by climate policy
 - **Cause:**
Partial implementation of climate policy (unilateral policy)
 - **Effect:**
 - Cost increase of production in the region affected by climate policy, depending on stringency of target and scope of climate policy scheme
 - Risk of loss of competitiveness in international markets, depending on possibility of cost pass-through
 - Potentially: Shift of emission activities to third countries not subject to comparable carbon constraints – carbon leakage
 - i. Relocation of production shares, parts of value chain or production sites
 - ii. Increase in import from regions without carbon pricing
- But: How exactly do we define carbon leakage?

- **European Commission Proposal for Amending EU ETS Directive**
 - **Explanatory Memorandum:**
 - ... risk of "carbon leakage", i.e. relocation of greenhouse gas emitting activities from the EU to third countries and thereby **increasing global emissions.**
- **Commision vs. *Doyle Amendment* :**
 - Recital 19: ... In the event that other developed countries and other major emitters of greenhouse gases do not participate in this international agreement, this could lead to an increase in greenhouse gas emissions ***from less carbon efficient installations*** in third countries where industry would not be subject to comparable carbon constraints ("carbon leakage")...
 - Article 10b: ...regard to energy-intensive sectors or sub-sectors that have been determined to be exposed to significant risks of ***loss of significant market share to less carbon efficient installations outside the Community in countries which do not participate in the future international agreement*** ("carbon leakage").

- **Industry view (German Steel Federation):**
 - ‚Carbon leakage‘: the risk that the cost of **purchasing** CO₂ permits will contribute to a shift in energy-intensive production to outside the EU where CO₂ emissions are not capped, thereby potentially increasing emissions.
- **Leakage rate terminology under Kyoto Protocol:**
 - Decrease of domestic emissions relative to increase of emissions outside the countries taking domestic action
- **Peters and Hertwich (2008) define leakage as:**
 - Total emissions embodied in imports from non-Annex I countries to Annex I countries
- **Leakage may include:**
 - **Negative spillover:** Increase in emissions abroad
 - **Positive spillover:** Decrease in emissions abroad, e.g. through technology spillover
- **And more..... You name it!**

- Leakage channels refer to a number of effects caused by carbon pricing...
- ... which differ by long-term and short-term effects and net effects on international GHG balance
 - 1) Industry-specific leakage (as defined in previous slides)
 - Investment leakage: Industries may stop investing in affected region, but factors other than carbon related costs may play important role
 - Production leakage: Industries may replace domestic production or part of it by imports
 - 2) Energy channel leakage: Decrease of aggregate world fossil fuel demand because of ambitious climate policies within the EU
 - Changes in (relative) world prices of fossil fuels (inelastic supply)
 - Increased demand in the rest of the world (demand elasticity matters)
 - Offsetting and undermining efforts within EU

Need to assess

- Additional costs caused directly or indirectly by the EU ETS
 - And whether industries are able to pass on these additional costs without loss of international competitiveness (i.e. without losing a significant market share in either domestic or export markets)
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- a) Value at stake assesses policy induced cost increase as ratio of GVA
 - b) Trade intensity evaluates exposure to international competition
 - c) Combination of value at stake und trade intensity to assess impacts on international competitiveness
 - d) Correlation analysis aims to evaluate the impact of the EU ETS on product prices using empirical and statistical analyses
 - e) Use of existing estimates for elasticity of demand as proxy for ability to pass-through carbon costs (Armington elasticities, aggregate demand elasticities)
 - f) Market share (loss of market to non-EU producers in a non carbon constrained world)
 - g) Profitability as a potential indicator of long-run investment

- A number of studies show varying degrees of evidence for carbon leakage, mostly using macro-economic approaches e.g. Sijm (2004), Babiker (2005)
- But in how far can analyses that are based on, and calibrated to, a single base year be useful for projections?
- Following sessions will provide more examples

- Historical data not well suited as
 - too short a time horizon for statistical econometric analyses
 - CO₂ prices very low at times
 - Lead-time for investment
 - Bias because of substantial increase in energy prices (oil prices)
 - Assessment of future based on historic observations
- How to disentangle effects of EU ETS from other factors determining production and investment decisions?
- Other important factors that deserve consideration:
 - product differentiation and market segmentation within a sector (including specialty products),
 - close cooperation with domestic/European partners and intrafirm trade
 - differences across countries in the costs for labour and other input factors,
 - infrastructure quality, transportation costs, political and legal environment, or exchange rate risks, trade barriers
 - capital mobility

**Thank you for your attention
and
please enjoy the workshop!!**

