Climate Change:

Problems of climate change mitigation policies

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Outline

1. Costs of climate change mitigation
2. Carbon leakage: The case for carbon tariffs?
3. Shall the EU act unilaterally?

1. Costs of climate change mitigation

The problem: Transition to low-carbon economy is costly.

- Green technologies are more expensive.
- Firms and societies already locked in carbon-intensive transport/industry.

  => Path dependency of technological progress.
- Sunk costs do matter.

  => If climate change shall we mitigate, we need much more than business as usual scenario.

1. Costs of climate change mitigation

Short-term and long-term costs might be different!

(follows Gillingham, Kenneth, Carbon Calculus, IMF Finance & Development, December 2019)

Short-term costs

- acquiring of green technologies, phasing out coal power plants, transition to electric cars and costs of the new infrastructure, thermal insulation and energy-saving houses ...
- writting-off past investments
- green finance and divestment from carbon-intensive industries

1. Costs of climate change mitigation

Long-term costs

Lower or higher than the short-term costs?

- Numerous theories suggest that the costs might be actually lower in the long-run.
    - Higher effort in innovations and mass production => lower costs
    - Knowledge spillovers (positive externality)
    - Network effects (single standards)

1. Costs of climate change mitigation

Long-term costs

Acemoglu, Ufuk, Hanley and Kerr (Transition to Clean Technology, JPolEcon, 2016):

- Endogenous growth model with microfoundations and two technologies: clean and dirty.
- Both compete in production and innovation

  => their relative productivity stimulates relative innovation effort.
- No assurance that the payoffs of innovations in both technologies must be the same: technological gap might emerge.

Implications:

- Transition from dirty technology to clean technology uneasy, but feasible
- Carbon taxes and research subsidies suitable policies to foster the transition.

1. Costs of climate change mitigation

Transition costs

- Each structural shift in the economy creates winners - and those who lose.
- Parallel to a shift to the clean technologies: globalization and offshoring of production.
- On globalization: Autor, Dorn, Hanson: The China shock: Learning from labor-market adjustment to large changes in trade (Annual Review of Economics, 2016)

"China's emergence as a great economic power has induced an epochal shift in patterns of world trade. Simultaneously, it has challenged much of the received empirical wisdom about how labor markets adjust to trade shocks.

Alongside the heralded consumer benefits of expanded trade are substantial adjustment costs and distributional consequences.

These impacts are most visible in the local labor markets in which the industries exposed to foreign competition are concentrated.

***Adjustment in local labor markets is remarkably slow**, with wages and labor-force participation rates remaining depressed and unemployment rates remaining elevated for at least a full decade after the China trade shock commences.*

*Exposed workers experience greater job churning and reduced lifetime income. At the national level, **employment has fallen in the US industries more exposed to import competition, as expected, but offsetting employment gains in other industries have yet to materialize.***

Better understanding when and where trade is costly, and how and why it may be beneficial, is a key item on the research agenda for trade and labor economists."

Autor, Dorn, Hanson (2016): The China Shock

Counterargument(s)

Labor market effects of trade factors appear to be linked to innovations too (and perhaps more than to e.g. “China Shock”), we cannot avoid them

- See e.g. Timmer et al. (2014): Slicing Up the Value Chains

The adjustment might also generate positive changes in the demand for labor in selected countries/sectors

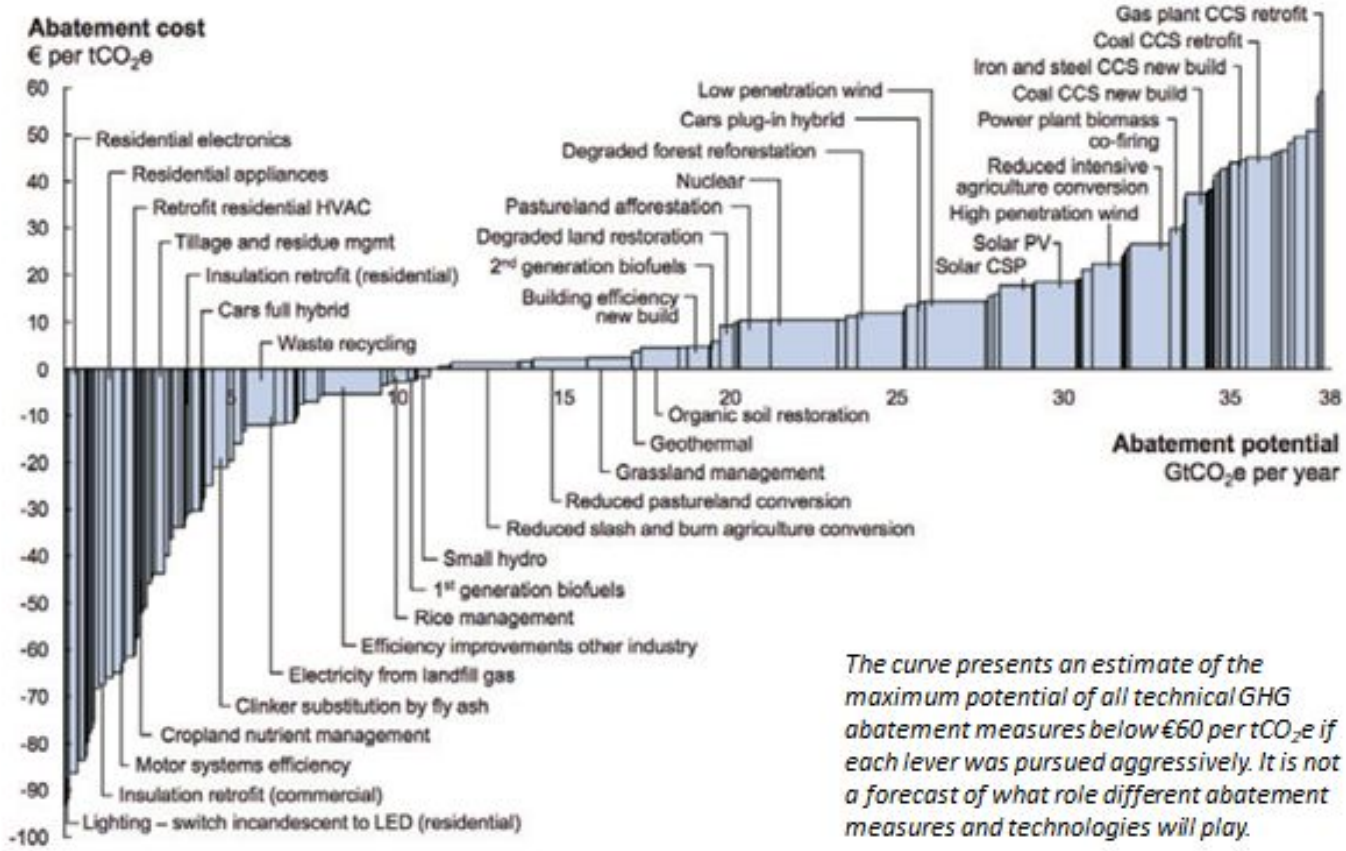
Changes in Factor Shares over 1995–2008 in Global Value Chains of Manufactures, by Country

(in percentage points)

	Capital	*Low-skilled labor*	*Medium-skilled labor*	*High-skilled labor*
United States	3.9	−1.9	−5.9	4.0
Japan	4.5	−5.4	−2.1	3.1
Germany	6.8	−2.8	−7.4	3.4
France	0.2	−8.7	0.1	8.4
United Kingdom	−3.4	−8.0	1.2	10.2
Italy	−1.1	−14.8	10.4	5.5
Spain	0.1	−12.9	4.7	8.1
Canada	1.8	−2.0	−4.6	4.8
Australia	6.0	−8.4	−0.9	3.3
South Korea	9.3	−11.6	−5.6	8.0
Netherlands	5.5	−7.3	−7.1	8.9
Total all high-income	**2.9**	**−4.9**	**−3.0**	**5.0**
China	9.3	−9.3	−2.1	2.0
Russian Federation	1.1	−1.6	−2.4	2.8
Brazil	−6.7	−4.8	7.5	4.0
India	4.5	−5.9	−1.7	3.1
Mexico	6.4	−4.2	−0.5	−1.7
Turkey	−12.7	4.5	5.2	3.1
Indonesia	5.3	−8.1	1.3	1.6
World minus all high-income	**3.2**	**−6.3**	**1.4**	**1.7**
World	**6.5**	**−3.8**	**−4.2**	**1.5**

Source: Timmer at al. (2014)

The McKinsey (2009) Marginal Abatement Cost Curve: "Global GHG Abatement Cost Curve Beyond Business-As-Usual-2030"



The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO_2e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.

2. Carbon leakage: The case for carbon tariffs?

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The problem: If, for reasons of higher costs related to climate policies, businesses were to transfer production to other countries with laxer emission constraints, their total emissions might increase and the country that introduces carbon tax can be worse-off.

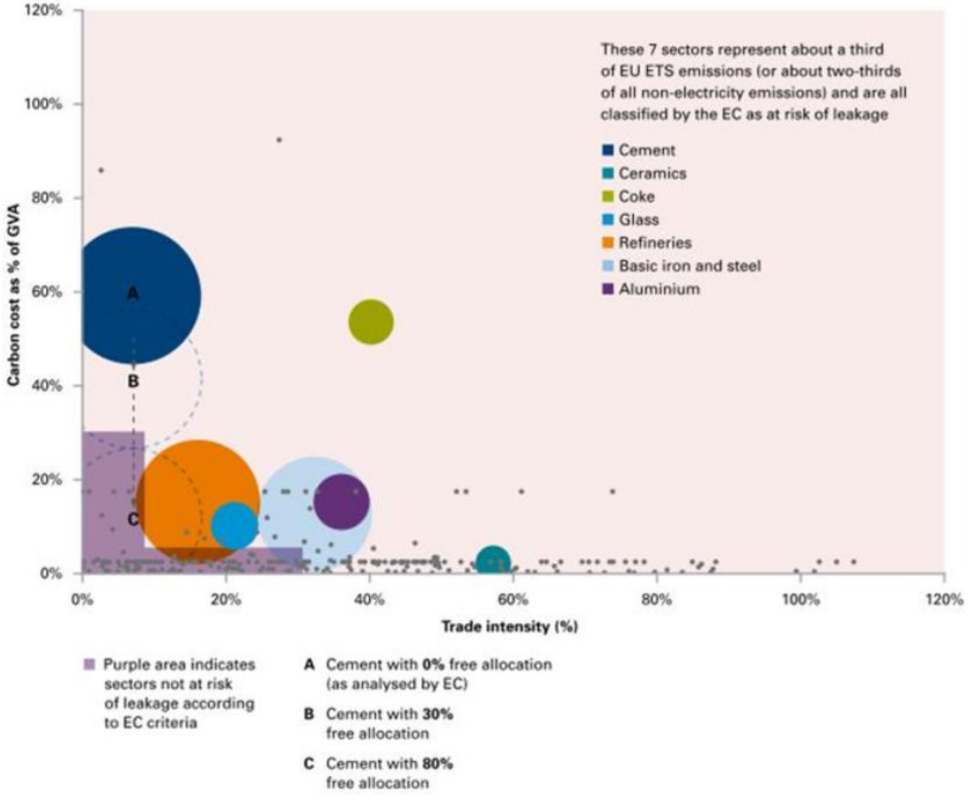
- EU measures: Industries more exposed to the risk of carbon leakage receive higher share of free allowances in the emission trading system.

  See https://ec.europa.eu/clima/policies/ets/allowances/leakage_en .

- Also, the EU aims reaching an international cooperation in ETS, in particular with China, Australia, Switzerland and other countries as well.

  https://ec.europa.eu/clima/policies/ets/markets_en .

2. Carbon leakage: The case for carbon tariffs?



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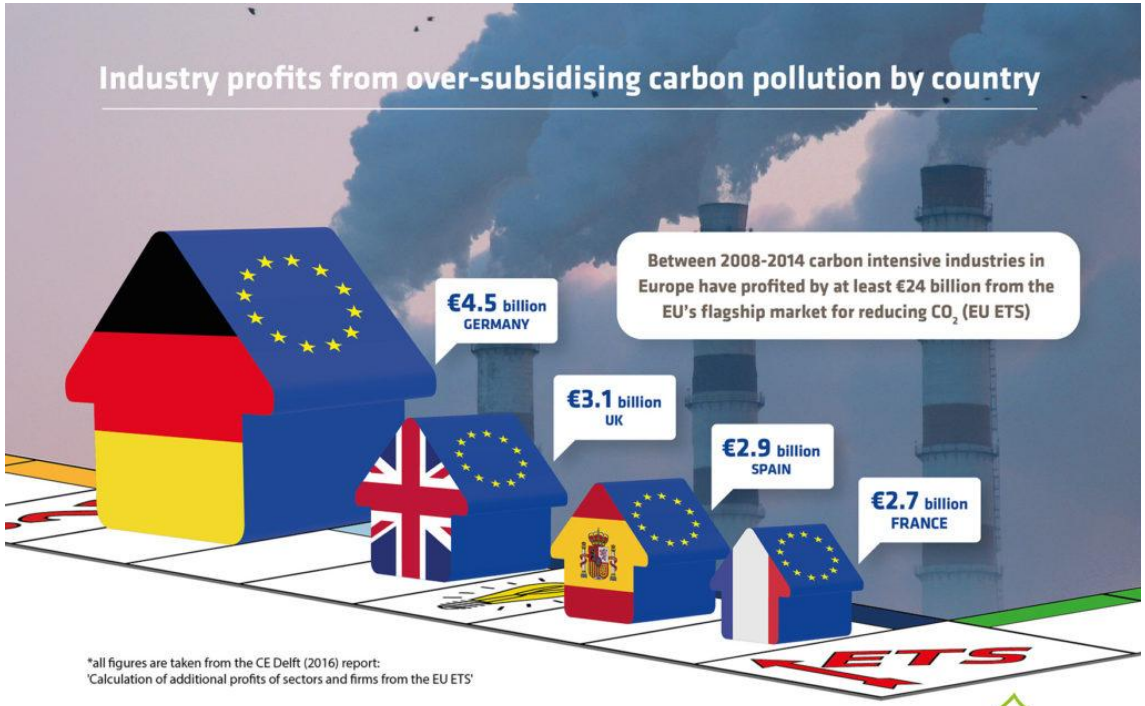
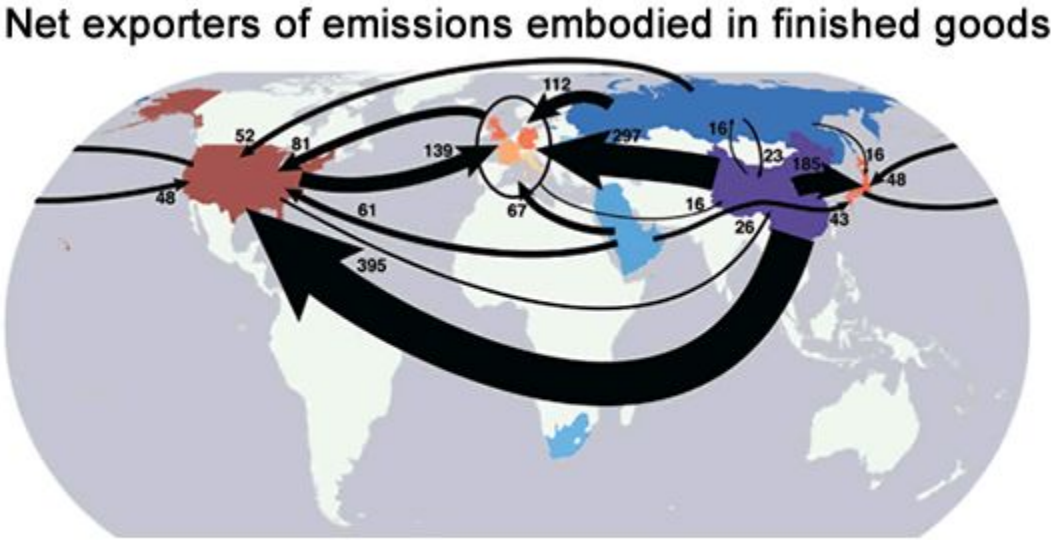


2. Carbon leakage: The case for carbon tariffs?

Other option to ETS allowances - Carbon tariffs



Interregional movements of embodied carbon in trade from dominant net exporting countries (purple and blue) to dominant net importing countries (red) in 2004. Source: Davis and Calderia.13 (The units are megatons CO2 per year, which is millions of metric tons of CO2 per year.)

2. Carbon leakage: The case for carbon tariffs?

Other option to ETS allowances - Carbon tariffs

- Paris agreement => no effective enforcement.
- Thus, carbon tariffs considered, although they are not without problems as well:

"Any moves to tie tariffs to climate action would likely be met with fierce opposition: A backlash from the US would be swift. Retaliatory tariffs and appeals to the WTO would be inevitable. However, leading trade experts are increasingly of the view that tariffs to account for traded carbon are compatible with WTO rules as long as they are applied fairly and in a non-discriminatory manner. And there are precedents for tariffs of this nature: GATT Article XX, section g provides an exception for trade measures relating to the conservation of exhaustible natural resources, including air, and the WTO has approved measures that restrict trade citing Article XX."

(http://www.ictsd.org/opinion/could-the-threat-of-carbon-tariffs-save-the-paris-agreement)

- The new EU ETS Directive has given the bloc the legal means to target trade arrangements if climate safeguards are not met. See (24) here: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.076.01.0003.01.ENG .

2. Carbon leakage: The case for carbon tariffs?

Impact of carbon tariffs.

Christoph Böhringer, Thomas Rutherford and Jared Carbone: Embodied Carbon Tariffs, 2011

"Embodied carbon tariffs tax the direct and indirect carbon emissions embodied in imported goods. The appeal seems obvious: as OECD countries are, on average, large net importers of embodied emissions from non-OECD countries, carbon tariffs could substantially extend the reach of OECD climate policies.

We investigate this claim by simulating the effects of embodied carbon tariffs with a computable general equilibrium model of global trade and energy use.

We find that embodied carbon tariffs do effectively reduce carbon leakage.

However, the scope for improvements in the global cost-effectiveness of unilateral climate policy is limited.

The main welfare effect of the tariffs is to shift the burden of OECD climate policy to the developing world."

3. Shall the EU act unilaterally?

YES: The situation is urgent.

NO: It could harm its own economy, and the carbon-intensive production will move overseas, thus the overall emissions won't decrease anyway.

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- But, can the EU and the EU firms be better off if the EU fosters the climate mitigation policies unilaterally?
- Thus, the YES answer further supported by the following arguments:

  (a) significant share of emissions generated in activities that are inherently local, thus not subject to international competition (transportation, buildings, power generation)

  (b) risk of losing competitiveness in other sectors can be addressed by additional measures (carbon tariffs)

  (c) innovations lead to comparative advantage (in the spirit of Acemoglu et al., 2016)

3. Shall the EU act unilaterally?

More detailed assessment provided by Schwerhoff, Kornek, Lessmann and Pahle: Leadership in Climate Change Mitigation: Consequences and Incentives (JOES, 2017)

Assume that the EU decides to lead and to impose carbon taxes and subsidies.

1. Carbon leakage arises, due to
- free-riding of other countries
- energy market effect (lower demand in the EU => lower prices of energy => no incentive to save)
- trade effect (rellocation of emission intensive production to countries with less stringent regulation)

2. Positive effects of leadership include
- development of new technologies and spillovers to other countries lead to broader emission reduction
- provision of good practices to other countries => lower uncertainty when switching towards low carbon economy

\+ competitive advantage in green technologies..

Summary

1. Costs of climate change mitigation

    => long term costs could be much lower due to innovations, knowledge spillovers and other positive externalities; even without considering the negative effects of climate change itself

    => the positive and negative effects of the transition will not be distributed evenly

2. Carbon leakage: The case for carbon tariffs?

    => likely part of the solution

    => supplementing the existing emission trading system

3. Shall the EU act unilaterally?

    Opinions differ.


attn:
but great leaders that charge
forward towards the future.