

Climate Change and Carbon Leakage

The problem and a proposal

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Overview



1. The problem
2. Trade and Carbon leakage in a standard trade model
3. the proposal

Climate Change: Introduction

impacts / UNFCCC



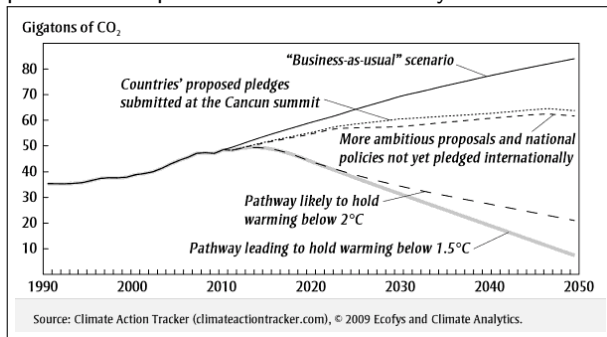
- Getting an idea (“estimate”) of the impacts of global warming:
 1. How much more CO₂ than in pre-industrial times (1750-1850) do we have in the atmosphere. Often: How much more than 280 parts per million (PPM), assuming that the CO₂-stock is in an equilibrium.
 2. Then estimate the impact on the global average temperature.
 3. And then try to get an idea about the consequences.
 4. of course all this is questionable! (a simplification of a very complex system)
- Global negotiations about Climate Change: Within the UN-Framework Convention on Climate Change (UNFCCC):
 - Aimed at stabilizing atmospheric concentration of Greenhouse Gases to avoid “dangerous anthropogenic interference” with the climate system (Art. 2)
 - principle of common but differentiated responsibilities (Art. 3) (circumstances, fairness principles etc. matter)
 - 195 Parties to the Convention (almost universal)
 - 1995: Kyoto Protocol (emission reduction targets for developed countries)
 - 2009: (COP15-Copenhagen): agreement to limit temperature increases to 2°.

Climate Change: Introduction

pledges



- so, we agreed to limit global warming to 2° and limit emissions of greenhouse gases accordingly
- private provision of a global public good by UNFCCC members → in a non-cooperative setting, this doesn't work
- promises compared to what is necessary:



taken from Mattoo and Subramanian, 2013b, p. 4, based on data from <http://climateactiontracker.com>

Introduction

developed vs. developing countries I



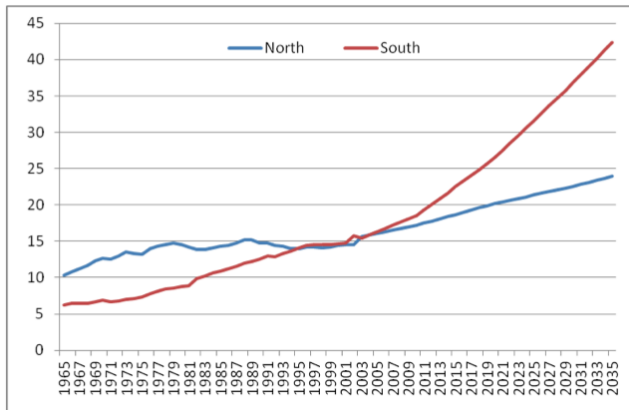
- So far, the principle of common but differentiated responsibility means that developing countries argue for their right to develop, developing countries argue for more emission reduction in return for money
- “Adding-Up Problem” (Mattoo and Subramanian, 2013a,b): CO₂ is a stock that accumulates. To avoid too much global warming, the world needs to respect a “carbon budget” of around 750 gigatons between now and 2050.
- The flow of emissions that is caused by developing countries is already exceeding the emissions by developed countries:

Introduction

emissions of developed vs. developing counties



Annual CO₂-emissions (gigatons), 1965-2035



taken from Mattoo and Subramanian, 2013a, p. 13, based on Wheeler and Ummel, 2007

... and this will soon also be true for accumulated emissions

Introduction

Carbon Leakage



- The principle of common but differentiated responsibility in Kyoto meant that, essentially, developed countries had to reduce emissions
- Is that a useful strategy?
- In a world where developed and developing countries trade, reducing the production of carbon-intensive goods doesn't mean they are not produced elsewhere (relocation of production).
- “Carbon Leakage”:
 - $$\frac{\text{increase in emissions in countries without emission reduction}}{\text{reduction of emissions in countries that reduce emissions}}$$
 - CGE-studies find leakage rates between 0 and 130%. In general, empirical evidence about the relocation-effects of environmental policy is very mixed (“pollution haven” literature)

Introduction

Carbon Leakage - definition



- Mechanisms behind carbon leakage:
 - lower energy prices in the world market due to less demand from countries that reduce emissions
 - relocation of production
 - changed comparative advantage (clean vs. dirty production)
 - different input mix, for example labor vs. energy
- A problem with that definition (from IPCC, 2007): Higher emissions in the developing world can occur for other reasons than climate policy in the developed world
- Recently, another definition became prominent: “weak” carbon leakage
- CO₂-emissions embodied in imports from countries that do not try to mitigate emissions (Kyoto: non-Annex B, developing world) to countries that try to mitigate emissions (Kyoto: Annex B countries) (Peters and Hertwich, 2008)

Introduction

Carbon Leakage - evidence / unilateralism



- Recent evidence on Kyoto and carbon leakage: Aichele and Felbermayr, 2012
- Emission reductions agreed in the Kyoto protocol led to higher imports of CO₂ from countries that did not agree to reduce emissions (8%)
- Kyoto had (probably) no significant effect on world-wide emissions
- A general problem in the current setup of climate change negotiations is that unilateralism doesn't work and all the efforts that have been made turn out to be insufficient
- in the policy debate: A shift to adaptation (providing local public goods) instead of mitigation (to the disadvantage of developing countries)
- One general theme of our RECAP15-project: How to ensure that unilateralism works.

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Trade and Carbon leakage in a standard trade model I



- What follows is based on a joint paper (in german, sorry): Becker et al., 2013
- Starting point: harmonized international climate policy with consistent CO₂-pricing is unrealistic
- Unilateral action ineffective and harming the competitiveness of those countries with ambitious climate change policies
- current solution: Exclude energy-intensive industries (...)
- The solution we (not only we) are proposing: Border Adjustments (BA)
- A BA means that importers have to pay a tariff that matches an emission tax that applies to home firms (leveling the playing field)
- Our analysis:

Trade and Carbon leakage in a standard trade model II



1. Economics: Understanding the impact of an CO_2 -tax, combined with border adjustment, on trade, competitiveness, carbon leakage and global CO_2 -emissions
2. Law: Discussing the compatibility of border adjustments with WTO-regulations and WTO-case law (skipped)
3. Policy: Suggestion of border adjustment that are consistent with WTO-rules. Discuss the impact on developing countries

model: setup I



- partial equilibrium¹ trade policy analysis, based on a traditional 2x2x2 model
- 2 countries: Home & Foreign
- 2 goods: CO₂-intensive and CO₂-extensive
- 2 factors: labor & energy
- technology implies that the use of energy causes CO₂-emissions
- climate policy at home is a CO₂-tax (could also be an Emissions trading scheme)
- no climate policy at all in Foreign
- Home internalizes production-externalities
- Foreign has an comparative advantage in the production of the energy-intensive good

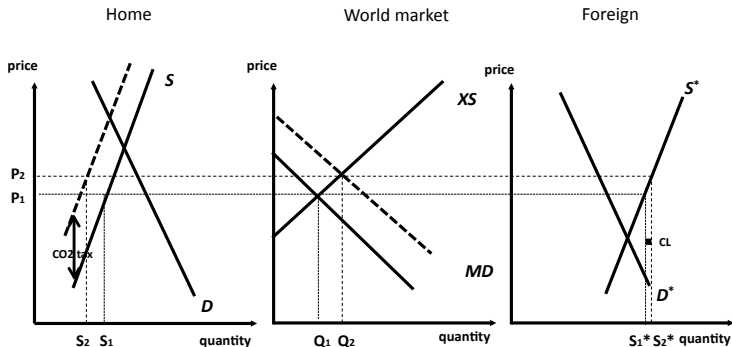
- Home is producing that good, too, but also imports it from Foreign
- partial equilibrium analysis of trade in the energy-intensive good. We distinguish two cases:
 1. equal technologies in both countries
 2. different technologies: imports of the energy-intensive good “contain” more CO₂ than local production
 3. the tax base both for the CO₂-tax and for the border-adjustment is CO₂-emission per good (“Carbon Footprint”)
 4. A combination of a CO₂-tax and a border adjustment based on carbon footprints (of production) makes sure that all emissions are taxed similarly
 - equal technologies: border adjustment is equal to the CO₂-tax
 - different technologies: border adjustment is higher than the CO₂-tax

¹Jakob and Marschinski, 2013 argue that general equilibrium effects might be important when thinking about policy interventions into the trade with embodied carbon. We tend to disagree, but that is research that needs to be done

model: unilateral policy without BA I



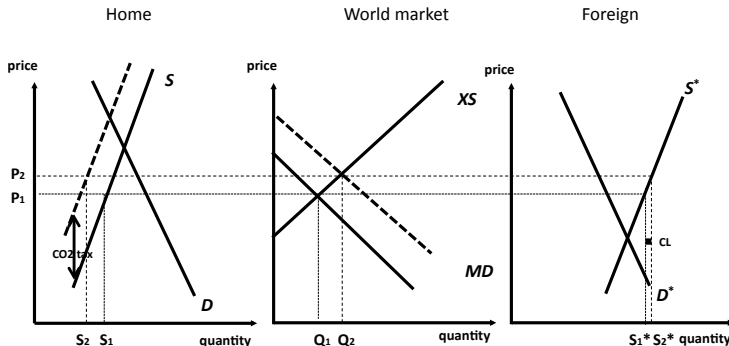
- local supply and demand, resulting export supply (Foreign) and import demand (home)
- free trade, no tax: price P_1 , trade volume Q_1
- CO₂-tax: home producers less competitive, increased demand for imports



model: unilateral policy without BA II

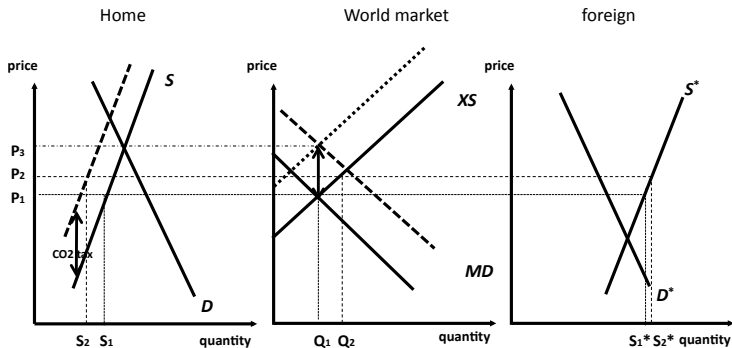


- reduced production at home (S_2), increased production in Foreign (S_2^*). Emissions change accordingly
- Carbon Leakage: $S_2^* - S_1^*$ (stronger comparative advantage for foreign)



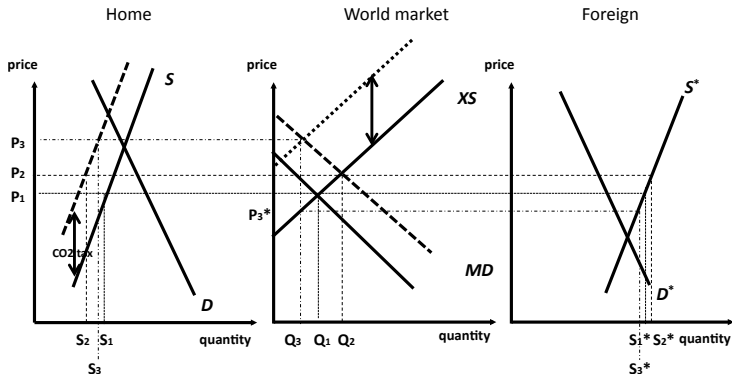
model: BA, equal technologies

- introducing a BA = imposing the CO₂-tax on imports, too: shift of the export supply curve
- compared with free trade: Foreign produces S_1^*
- no leakage, trade volume as before



model: BA, different technologies

- different technologies: $BA > CO_2\text{-tax}$
- trade volume shrinks to Q_3
- less production in foreign S_3^*
- leakage is more than compensated



- what happens to the competitiveness of home and foreign depends on what you choose as a reference
- For WTO-compatibility, this matters (...)

Instrument	status quo	ToT home	ToT Foreign	Environment
CO2-tax	free trade	(-)	(+)	equal technology: (+) different technology: (+ or -)
BA, equal technology	CO2-tax	(+)	(-)	(+)
	free trade	neutral	neutral	(+)
BA, different technology	CO2-tax	(+)	(-)	(+)
	free trade	(+)	(-)	(+)

- It matters (for lawyers) whether the CO₂-tax and the corresponding BA are introduced separately or as a package
- two strategies to justify “climate-tariffs” within the WTO-system:
 1. Design a BA that is consistent with non-discrimination
 2. claim an exception based on Art. XX GATT
- the introduction of a policy that is not changing the ToT is not against the spirit of the GATT. And we also argue in a legal analysis that a package can be seen as WTO-consistent, even without reliance on Art. XX GATT
- Even if the introduction of an BA is consistent with the WTO, it might be seen as unfair when designed as in our model. (taxing dirty technologies ≈ taxing poverty)

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strategy 1: BA based on the carbon footprint



- We suggest two different strategies to design a BA: Carbon footprint vs. Carbon Added Tax
- strategy 1: BA based on the carbon footprint
 - carbon leakage is eliminated
 - what is taxed is the consumption of “embedded” CO₂
 - the use of dirty technologies is punished
 - it is no longer the decision of each nation individually how the local industry is regulated
 - a lot of potential for conflict! (And since a BA is hopefully only an intermediate step ...)
 - WTO-compatibility only based on Art. XX (WTO and WTO-panels need to decide the conflict between free trade and the environment in favor of the latter)

strategy 2: a neutral BA ala VAT



- strategy 2: a neutral BA ala VAT
 - assign prices to CO₂ at home (tax, emission trading,...)
 - implement a BTA similar to the price on CO₂ at home
 - For the sake of simplicity: A BA that is targeting the average firm in an industry (based on tariff classifications, for example)
 - rebates for home exporters
 - neutral in terms of competitiveness
 - consumption of similar goods at home according to home-standards and -decisions about climate policy
 - no double taxation (incentive to merge different emission trading systems)
 - The use of a dirty technology in Foreign is NOT punished. National Sovereignty is untouched
 - problems with WTO-rules? Unlikely

thanks

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