

# Lecture # 27 – Trade and the Environment

## I. Globalization and the Environment

- Three key questions:
  - First, how does international trade affect environmental quality within a country?
    - For example, does it make it more difficult to strengthen environmental regulations?
  - Second, should environmental issues be included in international trade agreements?
  - Third, can sanctions using trade policy be useful to address global environmental problems, such as climate change?
- Classification of environmental objectives
  - Environmental damage internal to the household or firm
    - Indoor air pollution from smoke is an example
    - Higher incomes generally improve the situation
  - National externalities
    - Most pollution falls here
    - External to the individual causing the pollution
    - Damage felt within the country
    - Government intervention necessary to address
  - International externalities
    - Pollution that crosses borders
      - Acid rain
      - Greenhouse gases
      - Habitat destruction that reduces biodiversity

- Effects of openness to trade
  - We discussed ways in which trade and globalization affect the environment. I include examples from our discussion and from my notes below.
  - Examples of trade improving environmental quality.
    - Consumer power
      - It is through importing Mexican tuna that Americans can influence Mexican fishermen to use dolphin friendly nets
    - Increased competition improves efficiency
    - Trade policy could be used to encourage reduced emissions (e.g. tariffs on dirty imports)
    - New knowledge
      - Countries can learn from other nation's experiences
      - Trade encourages innovation
        - Innovation could benefit the environment
      - Multinational corporations (MNCs) bring state of the art production techniques to host countries
        - Prefer to use the same processes in all locations
        - Want to avoid negative publicity
        - Concerned about liability for meeting standards
  - Examples of trade harming the environment
    - More consumption: trade leads to more economic activity and more exploitation of resources
    - Race to the bottom
      - Fear that trade pressures countries to weaken environmental standards
        - Concerns of workers that stronger domestic regulations will make firms less competitive globally
      - Note that does not require a weakening of regulations. It may just slow the pace at which regulations become more stringent
    - Increased transport costs
  - Uncertain effects
    - Greenwashing: are claims of reduced emissions legitimate (e.g. are emissions truly net zero?)
- These examples illustrate that international trade can have multiple effects on environmental quality. These can be summarized by the following three effects of economic growth or trade on the environment:
  - Scale effects
    - Higher incomes => increased pollution due to greater consumption.
  - Composition effects
    - Higher incomes=> preferences for cleaner goods.
      - E.g. an economy that, over time, switches from agriculture to manufacturing to service as the dominant sector.
  - Technique
    - Higher incomes => cleaner production processes.

## II. Evidence

- Because trade can affect the environment in multiple ways, we turn to empirical evidence to see which effect dominates
- Evidence on pollution haven hypothesis
  - Early studies looked at variation in pollution abatement costs and trade flows in a cross-section
    - These studies found no relationship
    - Suggested race to the bottom not a concern
  - Critique: Doesn't account for unobserved heterogeneity across industries
    - Later studies address this using more disaggregated data
    - Example: Levinson *et al.* ("[Footloose and Pollution Free](#)", *Review of Economics and Statistics*, 2005)
      - They argue that aggregate data miss effects in specific industries.
      - Their work proposes three reasons why others find little effect
        - Most trade is between similar countries (North/North)
          - If look specifically at North/South trade, find an effect.
          - They divide countries into low and high environmental costs
            - When US environmental costs rise, net imports to low cost countries increase. Elasticity is 0.2 (10% increase in US costs => 2% increase in imports)
        - Not all industries are mobile
          - Industries are mobile if:
            - Low benefits to agglomeration
            - Low transport costs
          - Industries that are mobile are more sensitive to environmental costs
        - Not all industries are pollution intensive
          - Surprisingly, they do not find a bigger effect of environmental costs on pollution intensive industries, unless they control for mobility.
          - *It appears that pollution intensive industries are also less mobile!*
            - However, this also means that the argument that there is no pollution haven effect because most PACE costs are insignificant is not sufficient.

- Aichele and Felbermayr ([2012](#), [2015](#))
  - Study effects of Kyoto Protocol on trade and emissions from 1995-2007
    - Use input-output tables to attribute the emissions from production in each country to where the goods are consumed
    - Compare countries that ratify the Kyoto Protocol and must reduce emissions to those that don't
  - 2012: Countries that ratify the Kyoto Protocol shift emissions to developing countries
    - Emissions in country fall by 7%, but import of carbon increases by 14%
    - Suggests carbon footprint increases by about 7%
  - 2015: Study the carbon content of trade from 1995-2007
    - Use a gravity model
    - In bilateral pairs of countries with importer committed to Kyoto and exporter not committed, Kyoto Protocol led to a 5% increase in imports
- Tanaka et al. ([2021](#)) examine the relocation of lead-acid battery recycling to Mexico in response to the imposition of more stringent U.S. air quality standards.
  - Upward trend in US exports of used lead-acid batteries increased after a 2009 policy change
  - Found a 39% increase in low birthweight incidence (a consequence of lead exposure) near battery-recycling plants in Mexico after the change

- These recent studies provide evidence of a Pollution Haven effect
  - Environmental policy affects trade flows
  - But does trade affect environmental outcomes?
    - Here there is less evidence
  - Levinson ([2009](#), [2015](#)) studies by measuring technique, scale, and composition effects
    - Scale and composition effect measured using observed data
    - Technique effect calculated as residual of total observed effect minus scale and composition effects
      - Compares actual pollution levels to what they would have been if:
        - Pollution intensities remained the same (e.g. no technique effect)
      - But manufacturing output (scale effect) and mix of goods produced (composition effect) allowed to change
    - Figure 1 in the 2009 paper is an example
      - Scale effect: US manufacturing increased by 24% from 1987 to 2001
      - Total SO<sub>2</sub> emission from US manufacturing fell by 27%
      - If emissions per unit of output held constant (e.g. no technique effect), pollution would have increased by 12%
      - Pollution would have increased 12%
        - The difference between this increase and the increase in manufacturing is due to the change in composition of production.
        - The composition effect reduced pollution by 12%.
      - The remaining difference is the technique effect
        - Leads to a 39% drop in emissions
        - Explains 77% of the total gap between emissions and output
      - Trade plays a smaller role
        - Increased imports between 1987 and 2001 accounts for less than 1/3 of the shift in US manufacturing

- These results are consistent with other recent studies. Small composition effects suggest trade has little effect on emissions
  - Copeland *et al.* ([2021](#)) calculate scale, composition, and technique effect for several countries.
    - Magnitude of composition effect generally smaller than scale effect, and direction varies by country
      - E.g. in China, composition increased CO<sub>2</sub> emissions, but decreased NO<sub>x</sub>
    - In almost every country, the technique effect is larger than the composition effect
      - Often larger than the scale effect as well.
  - How to reconcile small net effects with the empirical studies mentioned earlier showing how environmental regulations affect trade flows
    - May be that effect of trade is statistically significant, but small magnitude
    - Competition encourages improvements in technique
      - Barrows and Ollivier ([JEEM 2018](#)) find the composition effect similar in magnitude to the technique effect in India.
      - Gutierrez and Teshima ([J Dev. Econ. 2018](#)) found that after Mexico lowered tariffs, firms selling to the local market faced more competition
        - Lead to increased energy efficiency
        - Both results suggest evolution of emissions may differ in developing and developed countries

### III. Should Trade and the Environment Be Linked?

- Should environmental policy be addressed in trade agreements? Should trade and environmental policy be linked?
  - Or should each be kept separate: use environmental policy to deal with environmental problems and trade policy to deal with trade issues?
    - Keeping these issues separate assumes we have policy instruments that can deal with all relevant distortions
  - Does trade policy influence environmental outcomes?
    - Shapiro (2021): trade policy is biased towards increased carbon emissions
      - Equivalent to an implicit subsidy to carbon emissions of \$85-\$120/ton
      - Barriers to trade are lower on upstream goods than on final products
        - But upstream goods are more carbon intensive
      - Suggests trade policy could be reformed to improve environment
  - How are trade policy and environment becoming linked?
    - World Trade Organization (WTO) rules limit environmental considerations.
      - Environmental measures should minimize effect on trade
      - Must be applied in a non-discriminatory way. Can't favor local firms.
      - Usually does not approve of discrimination based on how products are made
    - As a result, countries are using bilateral trade agreements to address environmental concerns.
      - The EU refuses to sign new trade deals with countries that have not ratified the Paris Agreement
      - The European Free Trade Association offers Indonesian palm-oil exporters lower tariffs if they meet certain environmental standards.
      - In 2018, China banned the import of plastic waste. Forced rich countries to take more responsibility for the waste they generate

- **QUESTION:** Is this appropriate? Consider first local pollutants. Should local environmental conditions be part of negotiations? Should trade agreements require all participants to have minimum environmental standards?
  - By setting policy unilaterally, a country can impose costs on foreign firms
    - For example, lowering an environmental standard for an industry that competes with imports
    - Will lower prices in the domestic market
      - Affects the importer as well as the domestic firm
    - Standards may not be efficient globally if these costs to others are not considered
      - Little empirical evidence of a race to the bottom, however
  - Note that when trade agreements limit tariffs, countries can use environmental policy as a means to help domestic firms
  - Market access and national sovereignty – if pollution in one country does not affect another, should trade partners dictate environmental policy in other countries?
  - Note relevant political economy issues
    - In most cases, both sides (e.g. industry and environmentalists) are represented in policy debates
    - But if a good is produced in foreign countries, foreign producers receive less weight in the debate
      - As a result, environmental regulation can discriminate against foreign firms
      - Example: Europe and GMO crops
        - Note that GMO seeds were developed by US companies
        - They would have less voice in the European political process

- Should trade policy be used as an enforcement mechanism for climate change?
  - One challenge with climate policy is leakage
    - If a country reduces emissions at home, but then imports goods generating carbon emissions abroad, global emissions have not fallen
  - Moreover, countries have an incentive to free-ride by not partaking in climate agreements
  - Policy options include:
    - Subsidies
      - Can be used to protect industries that face unregulated competition abroad (e.g. in early years of EU-ETS)
      - Subsidies with domestic content requirements protect local industry and may help develop local supply chains
      - But also raise costs to consumers
    - Climate clubs
      - Countries with ambitious policy prevent free-riders by penalizing countries with weak policies
        - Unlike a border adjustment mechanism, not meant to level the playing field, but to encourage ambition.
      - Challenges
        - Reaching agreement on what policies are equivalent
          - Policy does not need to be a carbon price, but comparing carbon prices is most transparent
            - E.g. do subsidies count?
          - Would it violate WTO rules for equal treatment of foreign and domestic producers?
      - Carbon border adjustments (discussed below)

- A border tax on carbon would penalize free-riders
  - Implementation options
    - Base the tariff on the carbon content of domestic production
      - Easier to calculate
      - Taxes goods from each country uniformly
      - Because domestic carbon content lower, tariffs would be smaller
    - Base the tariff on the carbon content of imports
      - Creates a level playing field for domestic firms whose costs increase due to climate regulation
      - But, difficult to implement
        - How do we know the carbon content of each good?
          - Does it matter where the parts that make up a car come from?
    - Which emissions to include in a border tax adjustment (scope)?
      - Scope 1: only direct emissions from production of goods and services
      - Scope 2: emissions created from purchased energy
      - Scope 3: emissions created from purchased products and possibly from downstream combustion of fossil fuels
    - Calculating emissions
      - Emissions first assigned to a facility
      - Then assigned to the various products the facility produces
        - Typically only applies to products above a minimum threshold emission intensity
    - What price to charge?
      - Typically related to a local carbon price or the price implied by other local policies
        - Translating non-carbon-price policies into an equivalent carbon price will be challenging

- Tax imports or subsidize exports?
  - Import fee applied by nations where a product is sold
  - Export rebate given to producers by the home country government when exporting, so that local firms are not at a disadvantage
    - For example, the EU subsidizes producers of aluminum, cement, fertilizers and steel to compensate them for the cost of the EU-ETS
      - Will be phased out between 2025-2035, to be replaced with import fees
        - Note that this protects firms selling the EU from competition that faces weaker carbon policy, but exporters losing the subsidies will now have to compete in markets with lower carbon policy.
    - Potential for leakage if it makes goods cheaper where sold (e.g. because local producers lower price in response to competition)
    - Thus, export rebates less commonly proposed
- Benefits of a BCAM
  - Levels the playing field
  - Reduces leakage
  - Raises revenue
  - Could help encourage other countries to enact climate policy
- Costs of a BCAM
  - Difficult to implement. Administrative costs could be high
  - Requires quality data from foreign trade partners
  - Will it lead to retaliatory trade policy?
  - Poor countries at a disadvantage
    - Less likely to avoid tariffs by reducing emissions
  - Question: Are there ways to avoid the tax?
    - Could sell greenest imports to Europe and other goods elsewhere (“resource shuffling”)
      - Happened in California: power companies send greenest electricity to California
    - Could change supply chains – buy inputs from overseas that are not covered by tariffs on final goods.

- Is it legal under WTO rules?
  - If exporting to a country, that country must give your companies the same access to the market that local firms have.
  - Possible arguments
    - A BCA must have an objective methodology, cannot charge more than what domestic producers face on similar product, and the export rebate cannot exceed the domestic tax.
    - Importing nations cannot credit foreign countries that have more stringent regulations.
    - Could argue for an exemption from WTO rules by saying the lack of climate policy is an actionable subsidy
      - Must be seen as addressing leakage and not as a trade barrier
      - Thus, some importing countries will be exempt because they have satisfactory climate policy