# Climate Change and International Cooperation

Wonhyuk Lim

# Background and Motivation

- Climate change is a phenomenon characterized by pervasiv e externalities over time and space.
  - How to address climate externalities presents a special challenge b ecause the scope of externalities transcends generations and natio nal borders: solidarity vs. responsibility paradigm
- The global power shift over the past two decades is affectin g climate change negotiations, with advanced and developi ng countries blaming each other for the impasse.
- A post-Kyoto framework is needed to promote climate chan ge response, with the Green Climate Fund (GCF) playing a central role in climate finance.
  - Start with a one-world perspective based on fairness, eff ectiveness, and efficiency criteria.
  - Replace the current two-world framework.

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# Literature Review

- International Politics and Economics of Climate Change
- Climate Finance
  - World Bank Group (Oct. 2011). "Mobilizing Climate Finance," A Paper Prepared at the Request of G20 Finance Ministers. Retrieved from http://www.imf.org/external/np/g20/pdf/110411c.pdf
- Carbon Tax, Cap-and-Trade, and Hybrid Approach
  - CGE Simulation: China, India, Korea, South Africa, U.S., etc.
- Fossil Fuel Subsidies
  - IMF report on fossil fuel subsidies: http://bit.ly/14T17Xt
- Border Tax Adjustment (BAT)

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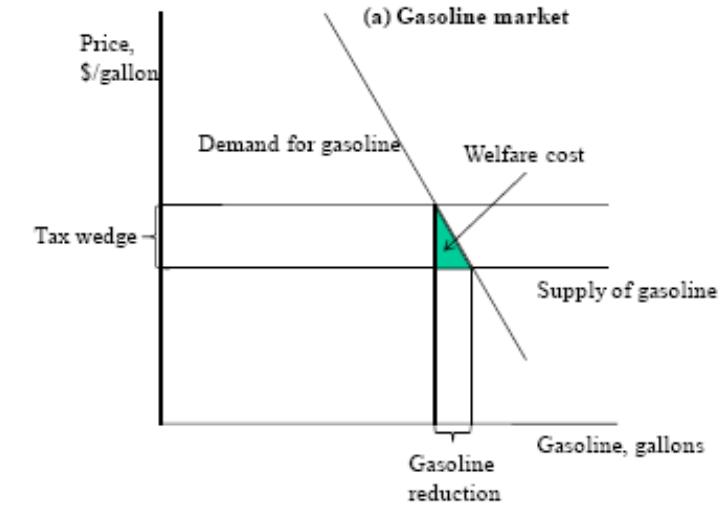
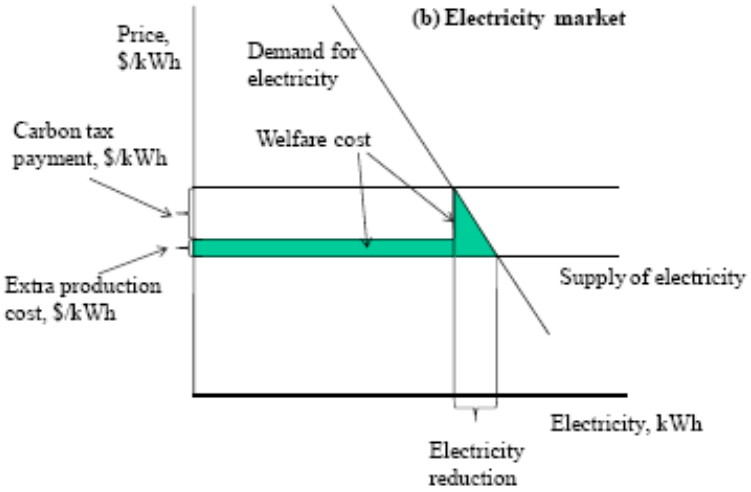
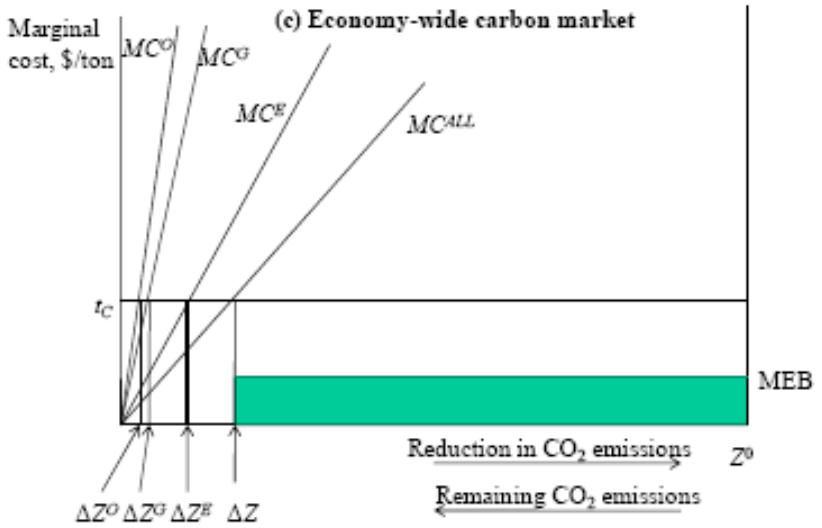
# Welfare Impact of Carbon Tax: Cost Side




Marginal Excess Burden: Efficiency Loss / Taxation = 0.25

Revenue-Recycling (RR) and Tax Interaction (TI) Effects

No RR and No TI : 0.5 x (5.88 – 5.38) bil. x $33 = $8.2 bil.

RR and TI: 8.2 - [(5.38 x 33) – 29] x 0.25 + 24.7 = - $4.5 bil

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Lump-Sum Transfer and TI = 8.2 + 7.2 + 29.7 = $45.1 bil.

Source: Ian W. H. Parry and Roberton C. Williams III, “Moving U.S. Climate Policy Forward: Are Carbon Taxes the Only G ood Alternative? (Washington, DC: Resources for the Future, 2011).

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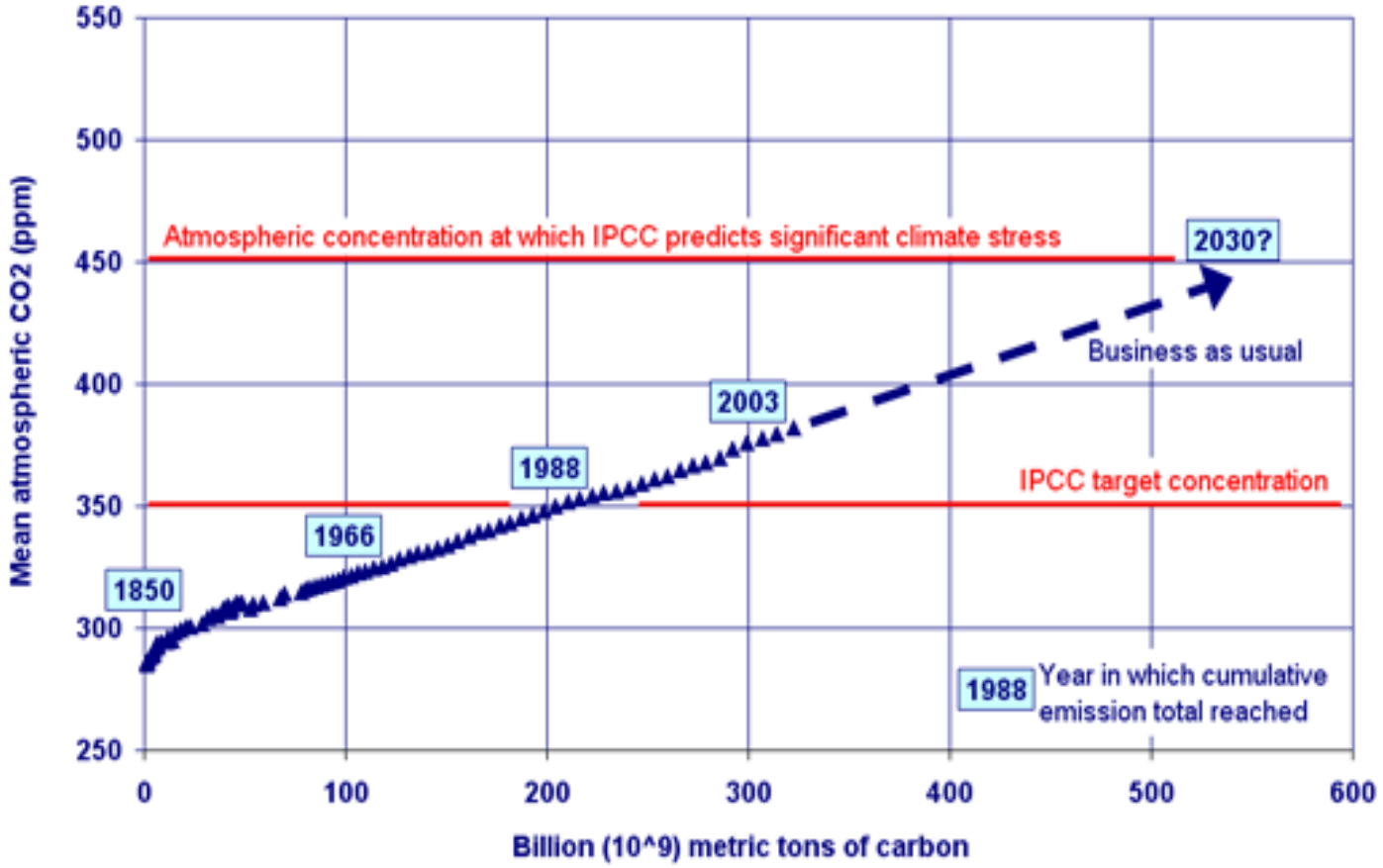
# Welfare Impact of Carbon Tax

**Welfare Cost Estimates for Reducing $CO_2$ for the U.S. in 2020 (Year $2007)**

| Policy instrument | Market-based | | | | Emissions standard |
|---|---|---|---|---|---|
| Sectoral coverage | Economy-wide | | Power sector | | Power sector |
| Revenue/rents allocated to | cutting distortionary taxes | lump-sum transfers | cutting distortionary taxes | lump-sum transfers | |
| **8.5 percent reduction in CO2** | | | | | |
| **Standard Approach** | | | | | |
| Total welfare cost, $billion | 8.2 | 8.2 | 9.2 | 9.2 | 12.1 |
| **Average cost, $ per ton** | **16.5** | **16.5** | **18.6** | **18.6** | **24.4** |
| **Accounting for Fiscal Interactions** | | | | | |
| Revenue-recycling effect, $billion | -37.4 | 7.2 | -15.1 | 3.2 | 0.5 |
| Tax-interaction effect, $billion | 24.7 | 29.7 | 10.9 | 13.2 | 1.9 |
| Total welfare cost, $billion | -4.5 | 45.1 | 5.1 | 25.6 | 14.5 |
| **Average cost, $ per ton** | **-9.1** | **90.7** | **10.3** | **51.5** | **29.2** |
| **17.0 percent reduction in CO2** | | | | | |
| **Standard Approach** | | | | | |
| Total welfare cost, $billion | 32.8 | 32.8 | 37.0 | 37.0 | 48.4 |
| **Average cost, $ per ton** | **33.0** | **33.0** | **37.2** | **37.2** | **48.7** |
| **Accounting for Fiscal Interactions** | | | | | |
| Revenue-recycling effect, $billion | -66.8 | 13.9 | -21.6 | 5.7 | 1.9 |
| Tax-interaction effect, $billion | 47.2 | 56.8 | 19.4 | 23.4 | 7.7 |
| Total welfare cost, $billion | 13.2 | 103.4 | 34.8 | 66.0 | 58.1 |
| **Average cost, $ per ton** | **13.3** | **104.1** | **35.0** | **66.4** | **58.4** |

# One-World Perspective: Basic Picture

**Cumulative Anthropogenic Emissions of Carbon Dioxide to the Atmosphere**

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**Source: Carbon Dioxide Information Analysis Center (CDIAC.ornl.gov) and values of atmospheric CO2 concentrations from Mauna Loa, as well as other locations**

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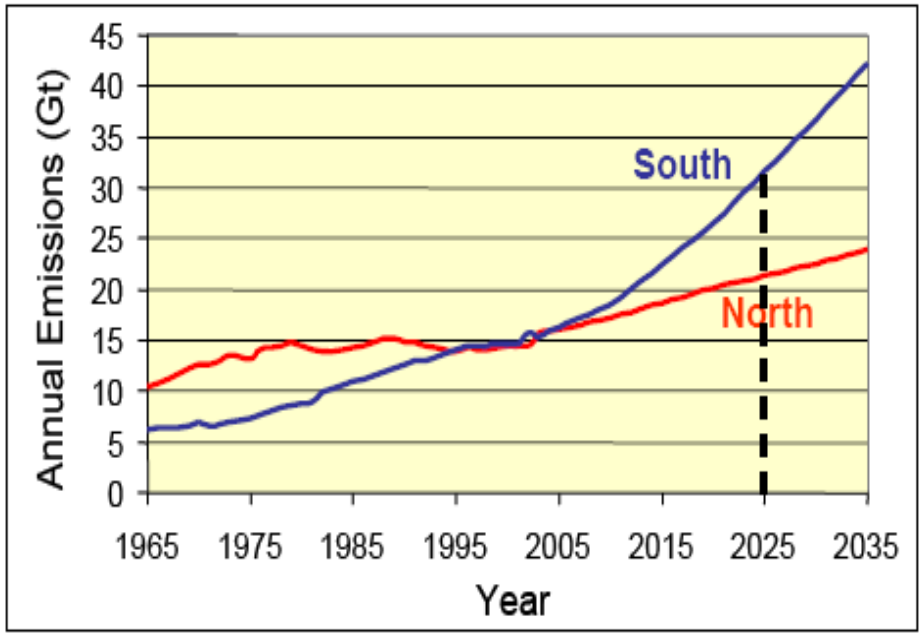
# One-World Perspective: Policy Response

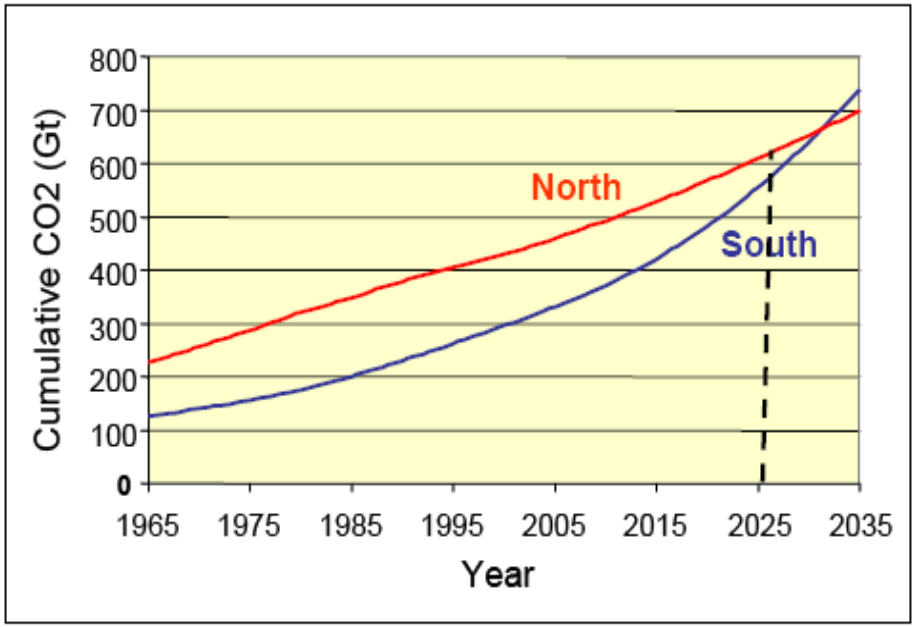
- Internalize externalities in a fair, effective, and efficient way.
  - Polluter Pays Principle (PPP)
    - Ownership Transfer and Retroactive Enforcement (cf. Asbestos)
  - Dual Meaning of Responsibility
    - Responsibility for Causing the Problem
    - Responsibility for Fixing the Problem
  - Marginal Abatement Cost (MAC)
- Phase out inefficient fossil fuel subsidies.
- Adopt a price for carbon reflecting its social cost, either thro ugh a tax or cap-and-trade with full allowance auctions.
  - Incentive Effect: Price Signal
  - Revenue Effect: Public Seed Money+
- Recycle (some of) the revenue to address existing distortion s in resource allocation.

# Two-World Perspective: Basic Picture

**Annual $CO_2$ Emissions, 1965–2035**

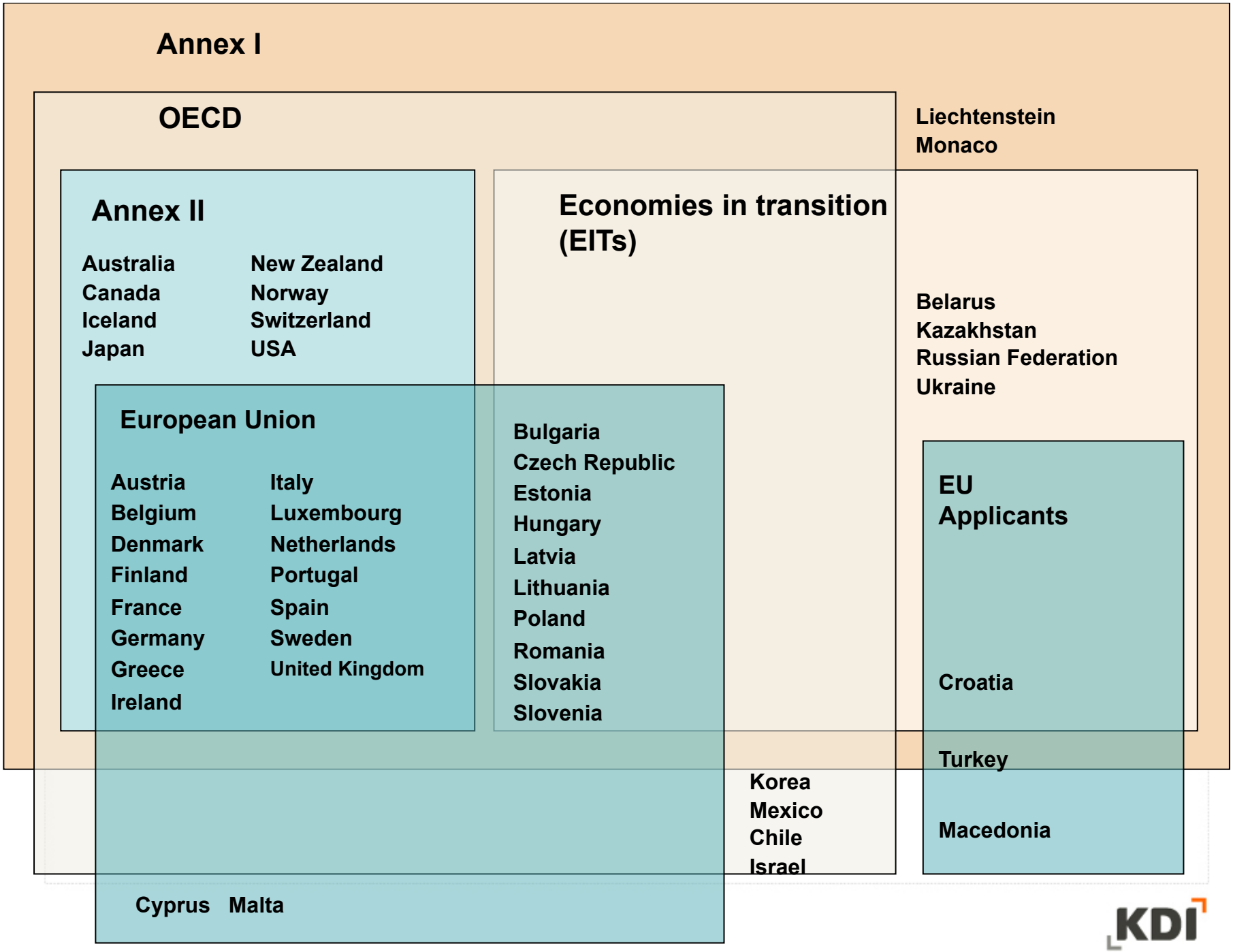



**Cumulative $CO_2$ Emissions, 1965–2035**




**Source: David Wheeler and Kevin Ummel, "Another Inconvenient Truth: A Carbon-Intensive South Faces Environmental Disaster, No Matter What the North Does," CGD Working Paper 134 (Washington, DC: Center for Global Development, 2007), p. 17**

"… In view of the different contributions to global environmental degradation, States have **common but differentiated responsibilities**. The developed countries acknowledge the responsibility that they bear in the international pursuit to sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command."
(Principle 7 of the Rio Declaration, 1992)


Annex I
OECD
Liechtenstein
Monaco
Annex II
Australia
Canada
Iceland
Japan
New Zealand
Norway
Switzerland
USA
Economies in transition (EITs)
Belarus
Kazakhstan
Russian Federation
Ukraine
European Union
Austria
Belgium
Denmark
Finland
France
Germany
Greece
Ireland
Italy
Luxembourg
Netherlands
Portugal
Spain
Sweden
United Kingdom
Bulgaria
Czech Republic
Estonia
Hungary
Latvia
Lithuania
Poland
Romania
Slovakia
Slovenia
EU Applicants
Croatia
Turkey
Macedonia
Korea
Mexico
Chile
Israel
Cyprus
Malta
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# Two-World Perspective: Policy Response

| | *Old ["Kyoto"] Approach* | *New "Greenprint" Approach* |
|---|---|---|
| Narrative | Backward-looking—Industrial countries are to blame. [Historical emissions limit carbon space.] | Forward-looking—Emerging-market countries are more vulnerable to consequences of climate change and thus must take the lead. [This is exactly the opposite of CBDR.] |
| Focus | On emissions cuts, because required cuts are considered attainable at acceptable cost. | On technological progress, because required emissions cuts are not attainable at acceptable cost with current technologies (the "adding-up" problem). [UNFCCC includes technology, too.] |
| Distribution of Burden | Industrial countries must bear nearly all costs. | All countries must contribute to a solution, consistent with their economic situation [and with their cumulative emissions?]. |
| Actions | Industrial countries [mandatorily] and emerging-market countries [voluntarily] cut emissions. [Time-bound mandatory cuts relative to some baseline do not give regard to cost considerations.] Industrial countries compensate emerging-market countries for losses caused by the latter's emissions cuts. | Industrial countries make early emissions cuts. Emerging-market countries<br>• contribute to fund for developing and disseminating new technologies<br>• commit to making future cuts, conditional on development of new technologies [Why conditional on technologies?]<br>• allow industrial countries to take trade actions under WTO auspices against imports from emerging markets where comparable emissions cuts have not been implemented [BTAs are not subject to revenue-recycling?] |
| Results | Aggregate emissions cuts consistent with climate change goals. | Aggregate emissions cuts consistent with climate change goals but attained at lower developmental cost because of technological progress. |

Source: Aaditya Mattoo and Arvind Subramanian, *Greenprint: A New Approach to Cooperation on Climate Chan ge* (CGD, 2013); [Bracketed comments are added by the presenter.]

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# International Perspective: Summary

- Internalize externalities in a fair, effective, and efficient way.
  - Uphold PPP for the past, present, and the future.
  - Apply CBDR in a non-dichotomous way (e.g., 4 groups).
    - Cumulative emissions per capita
    - Income per capita: LICs, LMICs, UMICs, HICs
  - Move from a target-timetable approach to a cost-benefit approach ( price collar: price floor, price ceiling, schedule for price increases).
- Phase out inefficient fossil fuel subsidies.
- Adopt a price for carbon reflecting its social cost, either thro ugh a tax or cap-and-trade with allowance auctions.
  - Signal for a regime change (cf. Marshall Plan)
- Recycle (some of) the revenue, including from BTAs, to add ress existing distortions in resource allocation.

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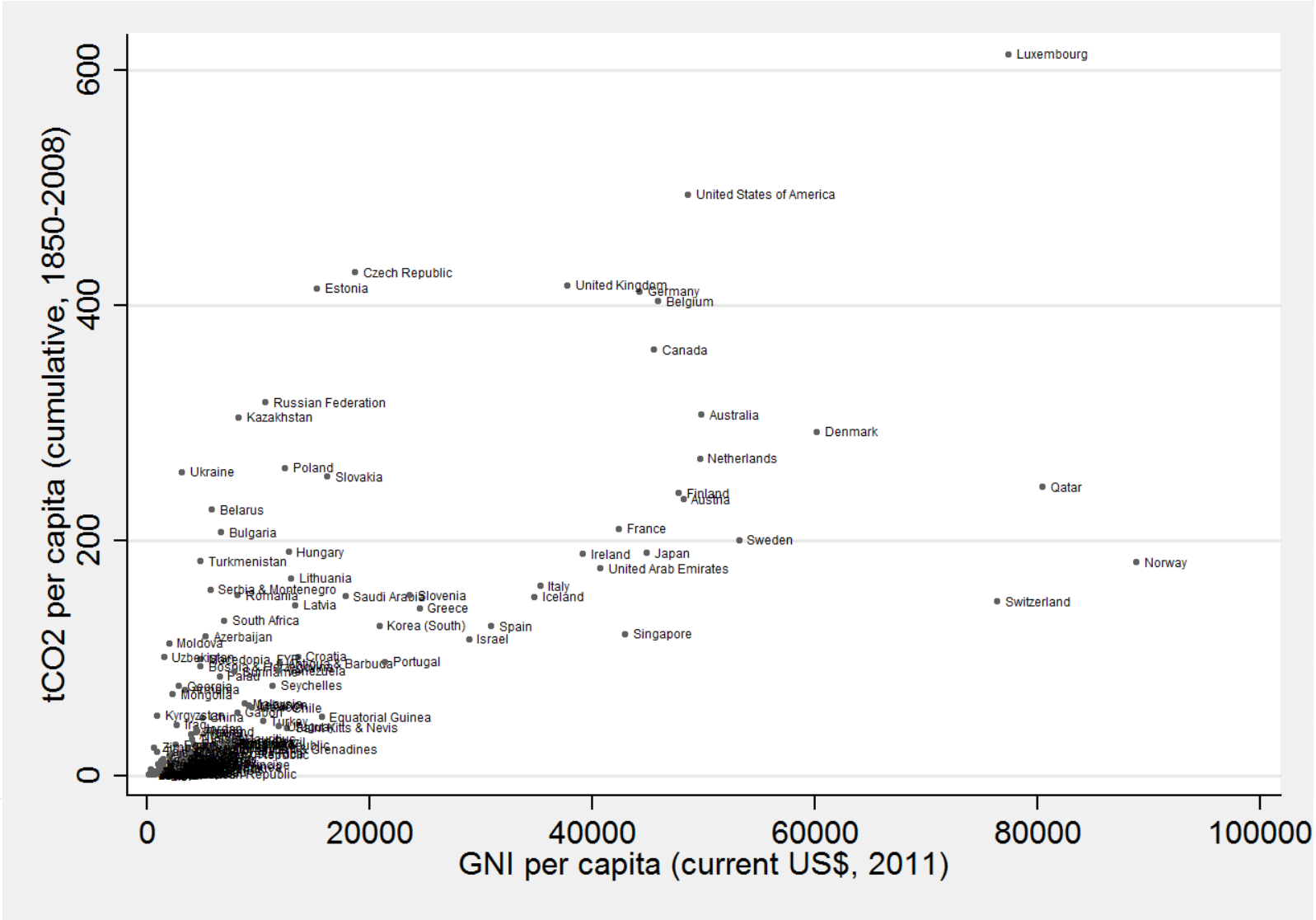
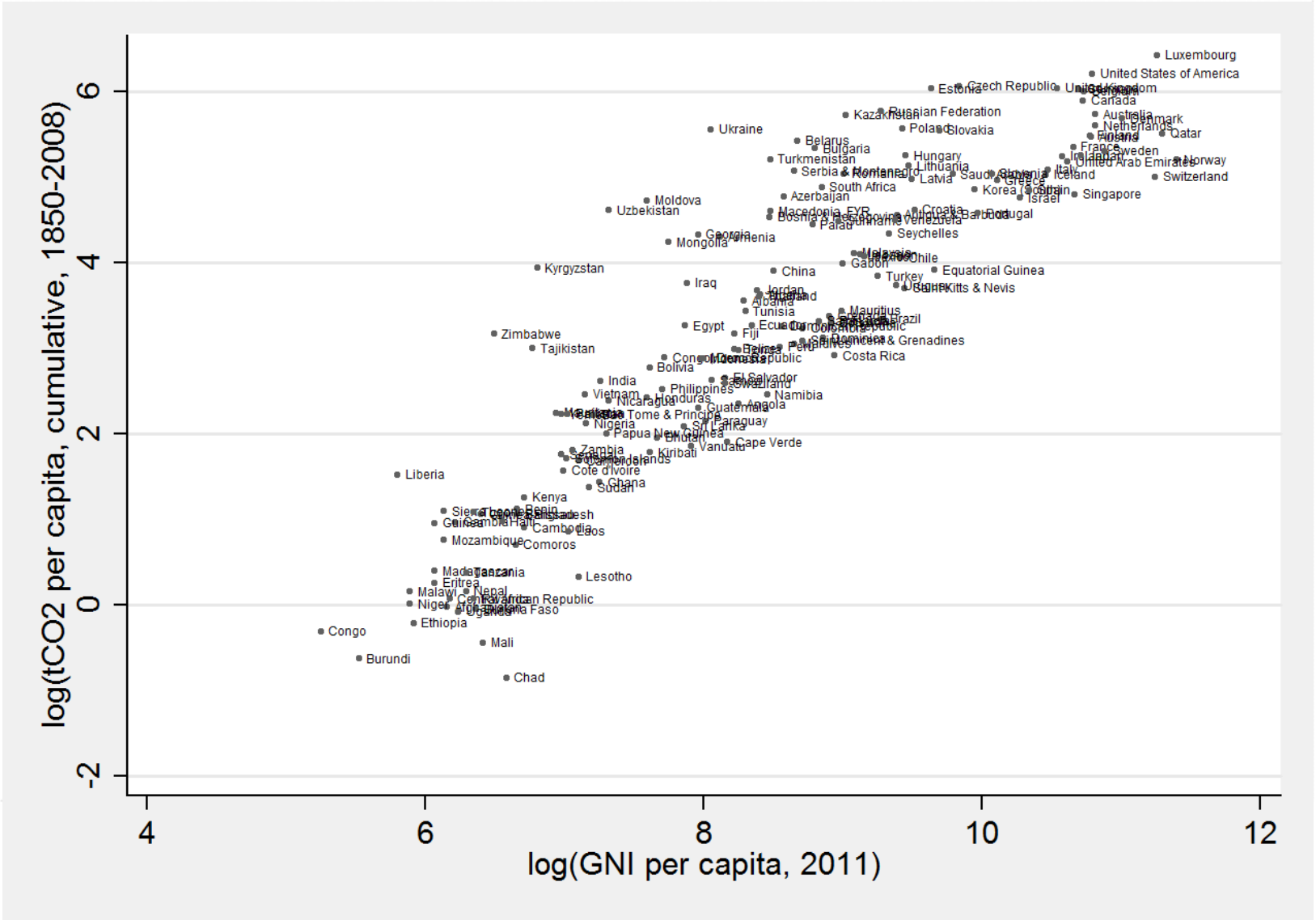
# Per Capita Cumulative Emission (Bern Model) vs. Per Capita Income



# Per Capita Cumulative Emission (Bern Model) vs. Per Capita Income [Log]



# Fossil Fuel Subsidies

- Survey of fossil fuel subsidies in 176 countries (IMF 2013)
  - Pre-Tax (2011): $480 billion (2/3 in oil exporters)
  - Post-Tax (2011): $1.9 trillion (1/3 in oil exporters, 40% in adv. econ. )
  - Removing these subsidies could lead to a 13 percent decline in $CO_2$ emissions.
- Key lessons from 22 case studies (IMF 2013)
  - Comprehensive energy sector reform plan and consultation
  - Extensive communications strategy focused on transparency
  - Appropriately phased price increases
  - Improved efficiency of producers
  - Targeted measures to protect the poor
  - Depoliticized energy pricing (e.g., fuel cost adjustment)

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# Carbon Tax

- Comprehensive Carbon Tax
  - A carbon price of $25 per ton of $CO_2$ in Annex II economies could r aise around $250 billion in 2020 while reducing their $CO_2$ emissions by about 10 percent that year.
  - The economic costs of a $25 price are expected to be around 0.03 percent of GDP on average if domestically retained revenues are u sed productively.
  - Allocating 10 percent for climate finance would meet a quarter of th e $100 billion funding committed for climate change in 2020.
- Feebate (cf. Inframarginal Exemption)
  - Feebates impose taxes (fees) on activities with emission rates abo ve some “pivot point” while providing subsidies (rebates) for activiti es with emission rates below the pivot point.

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# Border Tax Adjustment

- Limits of Unilateral Climate Policy
  - Unilateral action forgoes large savings from “where-flexibility.”
  - It also produces “emission leakage” through the price channel on fo ssil fuels and the competitiveness channel, especially on energy-int ensive and trade-exposed (EITE) industries.
- Border Tax Adjustment Mechanism
  - On the import side, emissions embodied in imported goods and ser vices from non-regulating countries are taxed at the emission price of the regulating region (cf. MFN and NT Principles).
  - On the export side, emission charges paid by domestically regulate d firms are rebated for exports to non-regulating countries (cf. WTO ’s Agreement on Subsidies and Countervailing Measures).

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# Border Tax Adjustment

- Fair, Optimal, or Detrimental Use (Weitzel et al. 2012)
  - BTA can level the playing field in international trade and help to inte rnalize the cost of climate change.
  - Importing countries may impose BTA rates above the fair level to e xploit market power in international trade (optimal strategic tariffs).
  - Exporting countries subjected to carbon tariffs may decide for coun tervailing tariffs which may lead to a detrimental trade war.
- Net Impact of BTA
  - BTA, when pragmatically applied on the average emission content of industries, does not incentivize emission abatement in firms abro ad, and hence the global cost savings of BTA are small.
  - Carbon offset policies (e.g., CDM) can be much more cost-effective than BTA since they (partially) level emission prices abroad.
  - The attribution of tariff revenues to exporting countries can substan tially reduce BTA's adverse distributional impacts.

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