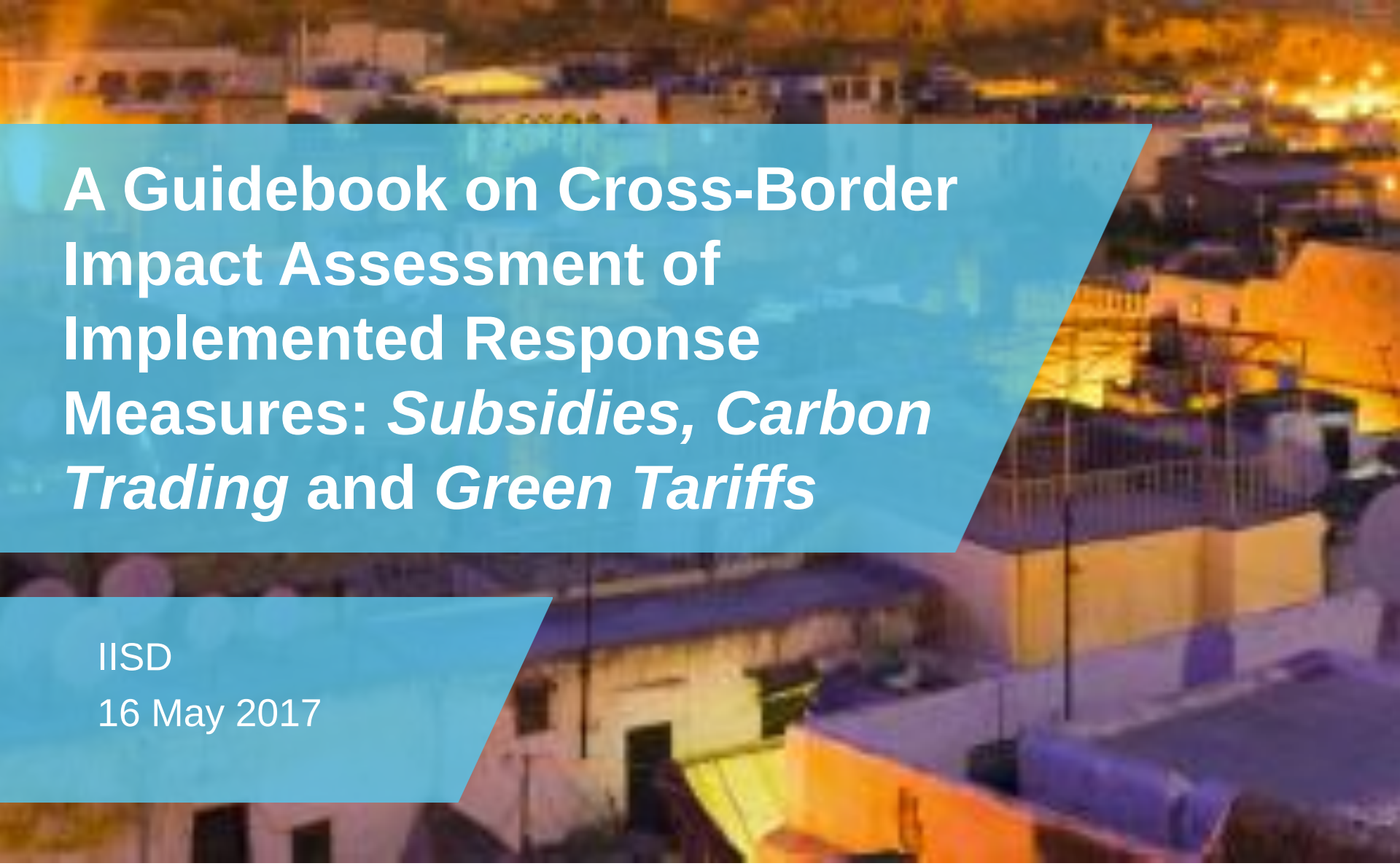


A Guidebook on Cross-Border Impact Assessment of Implemented Response Measures: *Subsidies, Carbon Trading* and *Green Tariffs*

IISD

16 May 2017

IISD
International Institute for Sustainable Development

Overview

Purpose of the Guidebook – Help Countries to…

- Frame their analysis (Guidebook sets out a broad analytical approach)
- Select Appropriate Tools
- Structure Impact Assessments

…for cross-border impacts of 3 key response measures to climate change

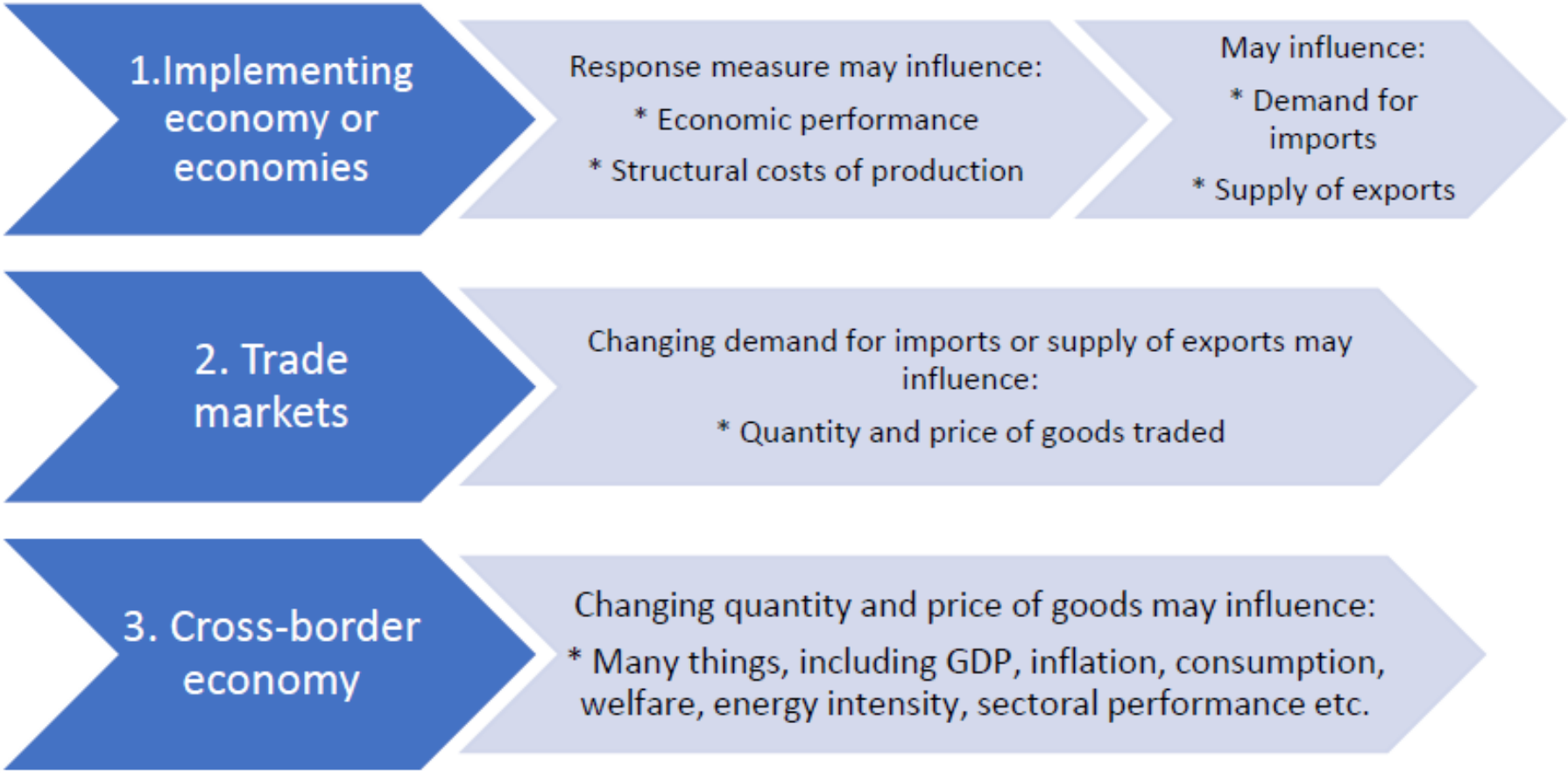
- Subsidy reform (focusing on **removal of energy subsidies**)
- **Carbon cap-and-trade** schemes
- Other trade-related measures
  - **Border Carbon Adjustment (BCA)**
  - Reduced trade tariffs for clean energy products ("**green tariffs**")

Little experience to date with assessing cross-border impacts

- Many response measures prospective/in pilot form only
- Existing analysis focused on literature, implementing countries

Approach for Cross-Border Impact Assessment

Conceptual Framework for how response measures confer cross-border impacts – *Trade Route*



Non Trade-Market Transmission Pathways for Cross-Border Impacts

Guidebook recommends a focus on trade markets as principal interconnection between countries

But a range of other interconnections including

- Flows of finance (capital investment)
- Earnings (remittances)
- People (migration)
- Exernalities (pollution of air and water, natural environment degradation)

These have little short- to medium-term importance for impact assessment

Recommendation: identify any important non-trade-market transmission pathway

Methods for Assessing Impacts

Impacts on trade markets likely to be significant when

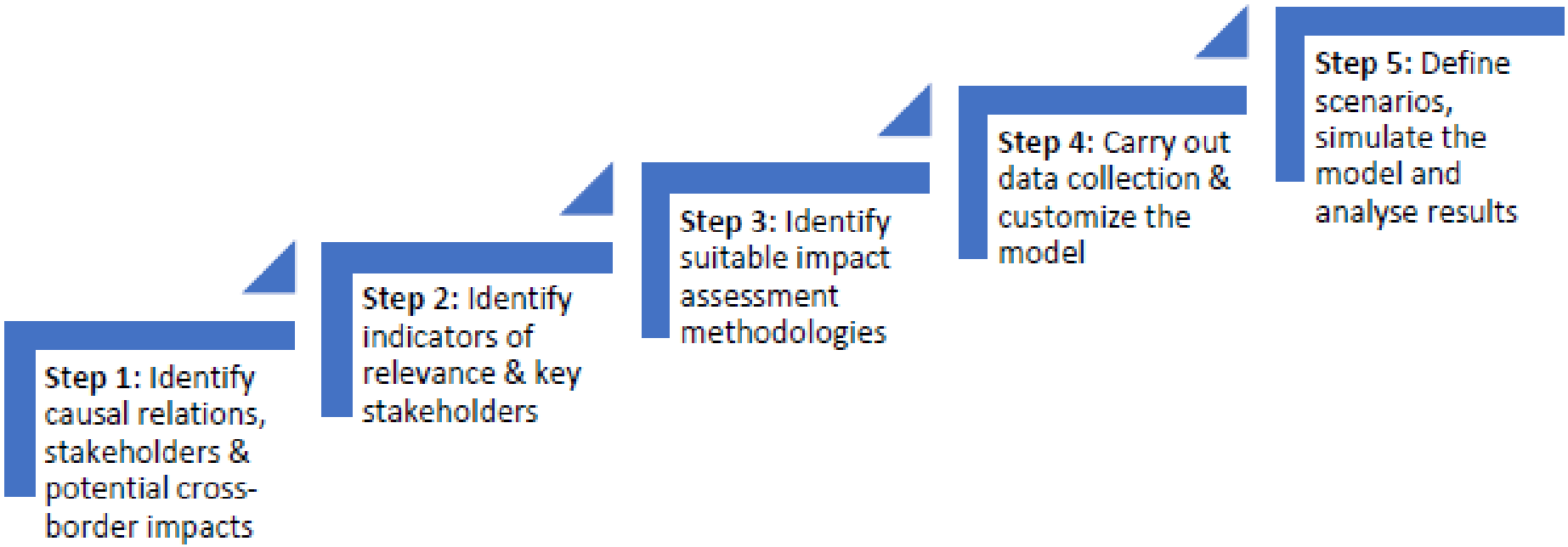
- Implementing country a large source of supply and/or demand
- Implementing country supply hard for other countries to substitute
- Cross-border economy is highly reliant on the good likely to be affected

Tools:

Focus	Approach/Model
Mapping policy outcomes	Delphi analysis
	Tree diagrams
	Causal Loop Diagrams
Households and the economy	Income and expenditure surveys
	Input-Output tables (IO)
	Social Accounting Matrix (SAM)

Sectoral performance (e.g. energy supply)	Numerous models exist, e.g. MARKAL, ORDENA in energy sector
Macro-economic and regional performance	Macro-econometric (e.g. E3MG)
	Computable General Equilibrium (CGE)
	System Dynamics (SD)

5-Step Approach to Response-Measure Cross-Border Assesment



Subsidies

Defining Subsidies: recommend use of WTO ASCM, Article 1.1

Agreement on Subsidies and Countervailing Measures binding on all WTO's Members (164 at present)

- *Direct transfer of funds (e.g. grants, loans, equity infusion) and potential direct transfers of funds or liabilities*
- *Government revenue is foregone or not collected (e.g. tax credits, exemptions)*
- *Government provides goods or services other than general infrastructure, or purchases goods*
- *Government makes payments out of a funding mechanism on entrusts a private body to carry out any of the functions above*

Not necessary to apply ASCM conditions around whether the subsidy is trade-distorting

Other definitions are very similar – differences come more from what scope is applied and how benchmarks are defined and measured

- Not recommended to include Externalities in the scope

Data Sources

Energy consumer subsidies are estimated annually by the IEA (40 developing and emerging economies)

- http://www.worldenergyoutlook.org/resources/energysubsidies/
- extended to more countries by the IMF

Range of assumptions made around benchmark prices (based on deviation from normal tax practice), cost of generating electricity, etc.

OECD inventory of support measures includes support to producers as well

- For its members and major non-member economies
- http://www.oecd.org/site/tadffss/data/

Other country-specific or more detailed data sometimes available in specific studies (e.g. Global Subsidies Initiative (www.iisd.org/gsi), World Bank, etc.

Note that a 2-part indicator is part of the SDG12 indicators – first report 2018

Most important subsidies from Climate Change Perspective

CONSUMER Subsidies

- Fossil fuel subsidies, e.g. for transport fuels, industrial fuels
- Biofuel subsidies (which can be introduced or reformed)
- Retail consumer renewable energy and energy efficiency subsidies

PRODUCER Subsidies

Energy

- Producer subsidies for fossil fuels (dampen process, lead to lock-in)
- Producer subsidies for low carbon energy (stimulate investment in Renewables, Nuclear)
- Producer subsidies for energy efficiency

Agriculture and Forestry

- Carbon-intensive inputs and outputs, land-use changes
  - Biofuel subsidies can be positive or negative for the climate

Key Impacts from Introduction of subsidy for domestic production of a low-carbon good or service*

	Macroeconomy	Businesses
	↓	↓
Direct impacts	• Fiscal costs (if gov. pays for subsidy)	• Businesses start or increase production; or make investments in reducing structural costs of production • Likely increase in profits
		↓
Indirect impacts	• Less fiscal space; may be short- or long-term • Short-term GDP boost if subsidy incentivizes investment and consumption	If good is a production input, increased supply may: • Increase domestic production and supply of linked goods • Lower price of linked goods

*Partial excerpt of table: also includes Cross-Border Impacts (row); Households and Environment (Columns)

Subsidy Reform: Assessment of the adequacy of typical methods

		PRICE EFFECTS CAPTURED				MODEL DISAGGREGRATION		
		1st order	2nd and 3rd order			Economic sectors		
Focus	Method	Direct impact (of price rise)	Indirect impact	Change in demand	Dynamic impacts	Household	Business	Key sectors
Households and the economy	Income and expenditure survey	Yes	No. Can if used with IO table data	No	No	Disagg. by income & location. May include informal.	No	No
	Input-output (IO) table	Yes	Yes	Yes, and can calibrate to maintain overall demand	No, static answer for base data year only	Included, but no disagg. by income or location	Included	Included but very simple, economic rather than physical
	Social Accounting Matrix (SAM)	Exp. on goods or services not generally explicit. Extra calculations required	Calculated, but exp. on goods or services is generally not explicit.		No, static answer for base data year only	Included, but no disagg. by income or location	Included	
omic nal nce	IO table	Yes, but as	Yes, but as part of		Typically	Included, but generally not	Included	

*Partial excerpt of table: also includes macro-, sectoral models; SD impacts

Case Study: Multilateral Fossil Fuel Subsidy Reform (1)

OECD *(reported in Burniaux, Chateau and Sauvage [2011])* performed a multilateral impact assessment of fossil-fuel consumer subsidy reform - in support of 2009 FFSR commitments by G20 and APEC Economies in 2009

STEP 1: Identify Causal Relations, Stakeholders and Cross-Border Impacts

- Hypothesis: FFSR would lead to significant impacts on trade of energy
- Assumed that trade markets' import:export ratios would remain constant
- "Carbon leakage" would occur as FFSR reduced global energy prices

STEP 2: Identify Indicators of Relevance

- Limited set, medium- and long-term (to 2050). Focused on:
  - Traded energy prices and product volumes (aggregated)
  - Trade balance, import and export volumes of aggregated products
  - Real exchange rates, GDP, GHG emissions (global, by country)

Case Study: Multilateral Fossil Fuel Subsidy Reform (2)

STEP 3: Identify suitable impact assessment methodologies

- Used a global macro-economic model (only technique possible)
- OECD's ENV-Linkages model (CGE, disaggregated by sectors and countries/regions)
- Includes recursive dynamics to allow for behaviour change (to 2050)

STEP 4: Carry out data collection & customize the model

- Used IEA database of 40 countries' consumer fossil fuel subsidies
  - Energy disaggregated into 4 wedges: coal, gas, oil products, electricity
  - IEA: this covers 95% of consumer FFSR
- Data collected on price elasticities for each energy type
  - Coal price elasticity of demand = 10, crude oil = 1.0, gas = 0.8

Case Study: Multilateral Fossil Fuel Subsidy Reform (3)

STEP 5: Define scenarios, simulate the model and analyse results

Scenarios modelled

- Unilateral subsidy reforms
- All countries reformed gradually and in unison 2013-2020
- Extension of scenario to 2050

Results

- Unilateral reform created national welfare gains 0.3%-4%
  - Highest in oil-exporting countries (where exchange rates fell)
- Multilateral scenarios showed slight welfare gains globally, with net welfare losses from energy exporters more than offset by gains in importing countries (e.g. India)
- Long-term analysis showed 3% GHG emission reductions in 2020 increasing to 10% reductions by 2050

Carbon Trading and Border Carbon Adjustment (BCA)

Must account for Design Specifics

Carbon trading impacts have much in common with Energy Subsidy Reform and are not considered further in this presentation

- Need to understand production costs, volumes and prices before tax introduction; carbon embedded and how calculated; etc.

Border Carbon Adjustment policy design variables (after Cosbey, 2012):

- Levy on imports, rebate on exports, or both?
- Is the BCA enacted on a historical carbon trading system or are the two implemented together (more likely)?
- Will actual data on carbon embedded in goods be needed?
- How much of the value chain is included (upstream, transport, disposal, etc.)?
- Are there exemptions for certain countries? What are the rules?
- How will the revenues be used? (notably whether some/all goes back to the regulated sectors in some form, e.g. investment in energy efficiency)?

Case Study: Shipping & Aviation (1)

Anger et al (2013) looked at how a global ETS for shipping and aviation would influence a range of case study countries:

- Mexico, China, India, Trinidad and Tobago, Togo, Kenya, Maldives, Samoa, the Cook Islands, Chile

STEP 1: Identify Causal Relations, Stakeholders and Cross-Border Impacts

- Authors assumed carbon trading would increase transport costs
- Leading to increased trade and tourism costs and increased energy efficiency in these sectors
- Weren't sure exactly how carbon costs would increase these costs

STEP 2: Identify Indicators of Relevance

- Key first stage of analysis: how Carbon costs affect Transport costs
- Countries include: highly dependent on transport or air tourism; remote

Case Study: Shipping & Aviation (2)

STEP 3: Identify suitable impact assessment methodologies

- Authors used 3 sectoral models:
  - Marginal Abatement Cost Curve (MACC) model, to project efficiency improvements in the shipping sector
  - Ship Freight Costs and Emissions model (linked to MACC model)
  - AERO model (changes in efficiency, costs and demand)
- Used a global macro-econometric model (E3MG) for large economies
  - Direct, indirect impacts and feedback loops
- New macro-econometric model for smaller economies
  - direct impacts only

STEP 4: Carry out data collection & customize the model

- International sources: IEA, IMO, ICAO, CONTRADE; W. Bank, UN Statistics Division

Case Study: Shipping & Aviation (3)

STEP 5: Define scenarios, simulate the model and analyse results

Scenarios modelled

- International shipping emissions capped 20% below 2005 between 2015-25, international aviation capped 10% below
- CDM \$30/tCO_2 2025, 15% auctioning, revenue lowers social security payments in participating countries, 100% carbon cost pass-through
- Sensitivity for carbon trading at \$10, \$30 and \$50/tCO_2

Results

- Efficiency reductions v low (0.2% of reduction in shipping, 1.5% aviation)
- Global GDP impact very small but significant variation by economy
  - Samoa (-0.91%), the Cook Islands (-0.45%), Trinidad & Tobago (-0.16%) [N.B. slightly higher reduction without revenue recycling]
  - Driven primarily by reductions in airborne transport (1.9-4.5% down)
- Authors recommended policies to reduce impacts for low income economies