ERCST

September 9, 2024 | Accra, Ghana

Tools and approaches for reporting on Response Measures

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Background on response measures

Economic impacts	• Trade or production impacts, growth/reduction in different sectors, competitiveness, carbon leakage, cost structures etc.
Social impacts	• Job losses/gains, need for retraining, democratic/political aspects, health impacts etc.
Environmental impacts	• Non-GHG emissions, water use, water pollution, biodiversity, air quality, deforestation, land use change etc.

Tools

Response measures	Impacts in country undertaking the response measure	Possible impacts in other countries	Sectors vulnerable (negative impacts)
Carbon taxes	decreased demand for carbon-emitting goods; increased demand for low-carbon emitting goods	Negative effects: fossil fuel producers, carbon-intensive goods producers. Positive effects: low-carbon goods producers (e.g., renewable energy/EV components)	crude oil, refined oil, natural gas, coal
Subsidies			
for low-carbon transport	decreased demand for goods associated with internal combustion engines.	Negative effects: producers of fossil fuels, lead. Positive effects: producers of EVs, cobalt, lithium, vanadium.	crude oil, refined oil, lead, conventional automobiles
for low-carbon energy production	decreased demand for thermal fuels	Negative effects: coal, natural gas, oil producers. Positive effects: low-carbon energy technology (e.g., PV solar cells) and inputs (e.g., steel and cement for wind turbines)	coal, natural gas
removal of, for fossil fuel production	decreased production of fossil fuels	Positive effects: fossil fuel producers, alternative tech producers. Negative effects: fossil fuel consumers.	crude oil, refined oil, coal, natural gas
removal of, for fossil fuel consumption	decreased consumption of fossil fuels	Negative effects: fossil fuel producers. Positive effects: fossil fuel consumers, alternative tech producers.	crude oil, refined oil, coal, natural gas
for energy efficiency in buildings	decreased energy consumption, increased employment in construction sector	Effects depend on fuel source used in implementing country buildings. If imported fossil fuels used, negative effects on foreign producers.	any fuel source used for residential and commercial heating
Green procurement			
of energy	decreased demand for thermal fuels, increased demand for low-carbon energy technologies	Negative effects: coal, natural gas producers. Positive effects: coal and natural gas consumers (price decrease), producers of alternative energy tech.	coal, natural gas
of automobiles	decreased demand for goods associated with internal combustion engines.	Negative effects: fossil fuel producers. Positive effects: cobalt, lithium, vanadium producers, EV producers.	crude oil, refined oil
Cap and trade schemes	decreased demand for carbon-intensive goods; increased demand for low-carbon goods	Negative effects: fossil fuel producers. Positive effects: renewable energy/low-carbon transport tech producers; fossil fuel consumers.	coal, natural gas
Liberalization of trade in environmental goods	boost in consumption of green goods	Positive effects: producers of covered environmental goods	conventional competitors to liberalized green goods
Border carbon adjustment	decreased demand for high-carbon goods (aluminum, steel, cement, plastics, pulp & paper); increased demand for substitutes.	Depends on carbon intensity, and regime details, but likely: Negative effects: aluminum, steel, cement, plastics, pulp & paper. Positive effects for low-carbon producers.	steel and associated products, aluminum, cement, basic plastics, fuels, nitrate fertilizers, high-GHG electricity, pulp & paper and associated products
Standards and labelling requirements			
for agricultural goods, involving GHG intensity	depends on details of the scheme, but likely loss of market share for non-certified air-frieghted goods, inter alia.	Depends on details of the scheme, but possible: Negative effects for producers of perishable fruits such as berries, high-value horticulture	air-freighted produce; agricultural goods that involve deforestation and/or high use of nitrate fertilizers
mandatory efficiency performance standards for consumer goods, industrial equipment	restricts the market to high-efficiency products; reduces demand for fuel	Negative effects: fossil fuel producers; producers of low-efficiency consumer goods and industrial equipment. Positive effects: fossil fuel cosnumers; producers of high-efficiency goods/equipment	white goods, machinery
for basic materials, involving GHG intensity	restricts the market to low-GHG intensity products in basic materials; reduces demand for fuel	Negative effects: depending on GHG intensity, may restrict market access for basic materials in metals, minerals, chemicals sectors	steel and associated products, aluminum, cement, basic plastics, fuels, nitrate fertilizers, pulp & paper and associated products
International aviation levies	n/a - international	Negative effects: flight-based tourism sectors (e.g., hotels, restaurants); producers of air-freighted (perishable) goods.	national airlines; hotels, restaurants, tour operators
International maritime levies	n/a - international	Negative effects: increased costs of imports and exports using maritime transport	sectors with high share of imported intermediate goods, capital goods; sectors that rely on maritime transport for export

Tools

- The first tool in the toolkit is the Roundhouse Table, which allows us to focus analytical efforts on which to focus other tools. Like a train roundhouse, this table allows us to start from multiple places and get to multiple destinations.
- If we are looking for the response measures likely to impact a given country, we can start by looking at that country's major sectors and then go into the table via column 4, identifying vulnerable sectors and going from there to look for any associated response measures (column 1) in the country's major export destinations.
- If, on the other hand, we are looking for the impacts of the implementation of response measures by a particular country, we start in column 1 at the response measures in question, find the types of sectors affected (column 4), look for the main exporters of those goods to the implementing country and identify the types of impacts those exporters will face.
- In either case, we can also see the types of impacts we can expect to see (column 2 or 3), which is a first step to trying to quantify those impacts.

Overview: ERCST RM methodology

Step 1: Country description

Step 2: Identify the top 15 sectors in terms of value added.

Step 3: Collect data on characteristics of top 15 sectors.

Step 4: Building on Steps 2 and 3, identify vulnerable sectors, using <u>two methods</u>:

- » **Method 1:** Threshold method.
- » **Method 2:** Weighted scores method.

Identifying the vulnerable sectors

Overview: ERCST RM methodology

Step 5: Stakeholder input to identify anything which was missed in Step 4.

Step 6: Identify the response measures that might impact sectors from Step 4. (Country-level discretion whether to include positive as well as negative impacts.)

Step 7: Once completed further employing stakeholder input, to identify RM identified in Step 6.

Step 8: Assess the impacts of response measures on identified sectors.

Step 9: Look at possible domestic and international tools and support which may be needed to address the impacts.

Step 2: Identifying the vulnerable sectors

- Step 2 identifies the main sectors of the economy - which will subsequently be assessed for vulnerability to Response Measures (Steps 3 & 4).

- Using the activity classification system appropriate to the country (ISIC Rev 4, in the case of Chile), at a high level of disaggregation (4-digit level, in the case of ISIC), list the top 15 sectors in the economy ranked by **total value added**.

Step 3: Sector characteristics through key variables.

Describe the sectors' key characteristics. For each sector identified in Step 2, collect the data on the following key variables. These will be used in Step 4 to identify vulnerable sectors.

- Sectoral employment at fulltime equivalency (FTE), or labour input value.
- Sectoral emissions per value added (Tonnes C02e/million of USD).
- Exports (USD), (based on concordance between ISIC classification and HS codes at 6-digit level) as share of national exports.
- Exports (USD), as share of world exports).
- Top 5 Export Destinations (+% of total exports of product).
- Domestic production.

Step 4: Using the two methods below, determine which are the vulnerable sectors

- Step 2 identified the most significant sectors for the country, describing some of their relevant characteristics.
- Step 4 acts as a filter to identify the sectors which are:
  - vulnerable to response measures, and
  - significant to the national economy.

  These are the sectors which will be focused on in the study.
- There are two possible methods to do so:
  - Method 1: Threshold method
  - Method 2: Weighted scores method

Step 4: Method 1: Thresholds

- This method involves testing whether a sector passes each of the three listed threshold conditions.
  - If it does pass the three thresholds, the sector will be considered vulnerable to RMs.
- The thresholds are to be considered to be in series giving them equal weight.
- The first two determine vulnerability, and the third determines significance.
- This method therefore incorporates a process of elimination from the very first threshold, allowing for more efficient gathering and analysing data

Step 4: Method 1: Thresholds

- The three sectoral thresholds are:
  1. Trade intensity
     - First we look at trade exposure of the sectors by calculating the level of trade intensity:

$$Trade\ intensity = \frac{\text{exports}}{\text{domestic production}}$$

     - The higher the trade intensity, the higher the relevance and vulnerability of the sector for our analysis
       - Higher than 19%: high trade intensity
       - Between 10 and 19%: medium trade intensity
       - Lower than 10%: low trade intensity: sector does not pass the threshold

Step 4: Method 1: Thresholds

- The three sectoral thresholds are (continued):
  2. Energy cost per unit of value added
     - Proxy for GHG intensity of the sector.
     - The suggested threshold will be 5 %.

  3. Value added as a percentage of GDP
     - Importance of the sector in the economy of the country.
     - If greater than 1%: sector passes third threshold

- Thresholds might need to be adjusted depending on the country being assessed
  - For example, due to differences in structure of economies between developed and developing countries.

Step 4: Method 2: Weighted scores

- The second method, the **weighted scoring method** provides a systematic process for selecting the vulnerable sectors based on the same three criteria seen above:
  - trade intensity (calculated through trade intensity: exports/domestic production),
  - energy costs per unit of value added, or GHG intensity (grams of $C0_2e$/value added), depending on the available data, and
  - national sectoral significance, which will be calculated by looking at the value added relative to GDP.
- Whereas in Method 1 these values were categorised as thresholds, in this Method the values are used in a weighted average formula.

Step 4: Method 2: Weighted scores

- Each criterion is assigned a weight based on its level of importance to calculating the sector's vulnerability to RM.
  - Trade intensity and energy costs per unit of value added are each assigned a weight of 40%.
  - National sectoral significance through value added relative to GDP is assigned a weight of 20%.
- For a sector to be classified as vulnerable to RMs, it must achieve a certain cut-off score (***TBD***) in this weighted assessment.
- Possible to define a minimum score range to determine whether a sector should be perceived as relevant or not.

Step 6: Identify the response measures

Four-part procedure:

1. For the vulnerable sectors identified in Step 4, identify top 3 importers (top export destinations)
2. For the vulnerable sectors, identify the types of response measures likely to impact (country-level discretion whether to include positive as well as negative impacts)
3. Search in identified trading partners for identified types of response measures
4. Search international initiatives for identified types of response measures

Step 6: Identify the response measures
Part 2: Search for vulnerable sectors in third column

Response measures	Impacts in country undertaking the response measure	Possible impacts in other countries	Questions on possible impacts on Chile?
Carbon taxes	decreased demand for carbon-emitting goods; increased demand for low-carbon emitting goods	• Negative effects: fossil fuel producers. • Positive effects: low-carbon goods (e.g., renewable energy/EV components)	•Effects on low-carbon goods exports?
Subsidies			
for low-carbon transport	decreased demand for goods associated with internal combustion engines.	• Negative effects: producers of fossil fuels, lead. • Positive effects: producers of EVs, cobalt, lithium, vanadium.	•Ex: Effect on Chile as a lithium exporter: continue to export raw materials like lithium? Is Chile looking to become a downstream manufacturer of batteries?
for low-carbon energy production	decreased demand for thermal fuels	• Negative effects: coal, natural gas, oil producers. • Positive effects: low-carbon energy technology (e.g., PV solar cells)	
removal of, for fossil fuel production	decreased production of fossil fuels	• Positive effects: fossil fuel producers. • Negative effects: fossil fuel consumers.	
removal of, for fossil fuel consumption	decreased consumption of fossil fuels	• Negative effects: fossil fuel producers. • Positive effects: fossil fuel consumers.	
for energy efficiency in buildings	decreased energy consumption	Effects depend on fuel source used in implementing country buildings. If fossil fuels used: • negative effects on producers; • positive effects on consumers.	

Step 6: Identify the response measures
Part 2: Search for vulnerable sectors in third column

Response measures	Impacts in country undertaking the response measure	Possible impacts in other countries	Questions on possible impacts on Chile?
Green procurement			
of energy	decreased demand for thermal fuels	• Negative effects: coal, natural gas producers. • Positive effects: coal and natural gas consumers.	
of automobiles	decreased demand for goods associated with internal combustion engines.	• Negative effects: fossil fuel producers. • Positive effects: cobalt, lithium, vanadium producers, EV producers.	•Same question on lithium export + manufacture of batteries?
Cap and trade schemes	decreased demand for carbon-emitting goods; increased demand for low-carbon emitting goods	• Negative effects: fossil fuel producers. • Positive effects: renewable energy/EV components producers; fossil fuel consumers.	
Liberalization of trade in environmental goods	boost in consumption of green goods	• Positive effects: producers of covered environmental goods	

Step 6: Identify the response measures
Part 2: Search for vulnerable sectors in third column

Response measures	Impacts in country undertaking the response measure	Possible impacts in other countries	Questions on possible impacts on Chile?
Border carbon adjustment	decreased demand for high-carbon goods	Depends on carbon intensity, and regime details, but likely: • Negative effects: aluminum, steel, cement, plastics, pulp & paper. • Positive effects for low-carbon producers.	•For example: Energy efficiency of copper + wood pulp production in comparison with that of other global players?
Standards and labelling requirements			
for agricultural goods, involving GHG emissions	depends on details of the scheme, but likely loss of market share for non-certified air-frieghted goods, inter alia	Depends on details of the scheme, but possible: • Negative effects: perishable fruits such as berries, high-value horticulture	•What sorts of environmental standards and labelling present market access barriers for Chilean agricultural exports?
mandatory efficiency performance standards for consumer goods, industrial equipment	restricts the market to high-efficiency products; reduces demand for fuel	• Negative effects: fossil fuel producers; producers of low-efficiency consumer goods and industrial equipment. • Positive effects: fossil fuel consumers; producers of high-efficiency goods/equipment	

Step 6: Identify the response measures
Part 2: Search for vulnerable sectors in third column

Response measures	Impacts in country undertaking the response measure	Possible impacts in other countries	Questions on possible impacts on Chile?
International aviation levies	reduction in air travel consumed	• Negative effects: flight-based tourism sectors (e.g., hotels, restaurants)	•For example: In the agricultural sector, what goods tend to be air freighted? Possible changes and/or trends? •Possible effects on tourism?
International maritime levies	increase in shipping costs	• Negative effects: increased costs of imports and exports using maritime transport	•Which agricultural goods are shipped? Possible changes/trends?

Step 6: Identify the response measures

Parts 3 & 4: Where to look for response measures

Looking at domestic measures from international trading partners, as well as international measures at the end from ICAO and IMO:

- EEA database: climate change mitigation P&Ms in Europe
- OECD database of environmental measures
- Party NDCs
- WTO environmental database
- IEA Building Energy Efficiency Policy Database
- ICAP carbon market database
- FAOLex database of food and agriculture laws and regs
- Global Climate Legislation Database
- IEA/IRENA Joint Policies and Measures Database
- ITC Sustainability Map, Standards Map
- UNFCCC compilation report on response measures
- ICAO and IMO climate actions

Step 7: Once completed further employing stakeholder input, to assess RMs identified in Step 6.

- Stakeholder consultations assess:
  - whether any relevant RMs have been missed, or
  - whether too many RMs have been listed as relevant for the list of sectors.
- The research team will contact key sectoral stakeholders (business, government and unions) to identify policies and impacts and verify our findings.
- To be carried out through workshops where the methodology and the main findings are presented, followed by requests for input and feedback, as well as inviting stakeholders to identify other policies (out-of-jurisdiction and international) and other negative impacts on their sector.

Step 8: Assess impacts of response measures

- Assessing the impacts of the identified response measures.
  - Finding quantitative data where available and developing any additional data where feasible.
  - Quantitative data would be sourced from policies, impact assessments and other available studies related to any environmental, economic and social impacts, looking at:
    - Type of impact (positive or negative, economic, social or environmental)
    - Size of impact
    - Timeline of impact
    - Possible contributing factors that might compound the problem.
- Each of the impacts identified above needs an in-depth discussion.
- A central issue is the quantification of impacts
  - Dependent on available information and methodologies!

Step 8: Assess impacts of response measures

Quantitative and Qualitative Assessment

- The nature, and extent of vulnerability will be analysed through quantitative and qualitative assessment, looking at economic, social and environmental factors.
- Depending on the data and resources available, quantitative analysis could be carried out through ex post empirical work by concentrating on the data series of the economic activity of the sector before, and after the operationalization of the RM.
- Qualitative overview will concentrate on a basic description of vulnerability, and the causal chain, including positive or negative, and intended or unintended impacts. Challenges/barriers to addressing vulnerability will also be looked at.

Impacts on Government Revenue

- The impacts will also be assessed by looking at royalties, corporate income taxes, and concession fees.
- This method will only be relevant for extractive sectors and other primary sectors, such as mining, oil and gas, and possibly forestry and fisheries.