Carbon Border Adjustment Mechanism (CBAM) in the Transition to Net-Zero Emissions: Collective Implementation and Distributional Impacts

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Presentation Agenda

- Research Background
- Model, Data Base & Scenario Development
- Results
- Conclusions

Research Background

- A more stringent abatement policies to limit global warming (below 2-degree);
- A new EU target for 2030 of reducing GHG by at least ***55%*** compared to levels in 1990, in line with climate neutrality in 2050
- ***Fit for 55 Package*** - to revise where necessary, all relevant policy instruments.
- A carbon border adjustment mechanism (‘***CBAM***’), to address risks of carbon leakage as a result of the increased Union climate ambition.

Research Background

- EU contributions are still limited to make meaningful differences in global emissions targets without equal effort from the big emitters such as China and the US;
- EU: 8%, the US: 12% and China 29% of global GHG emissions in 2020;
- Carbon cost discrepancy has been expanding dramatically in the EU ETS sectors, indicating a higher growing burden of the European industries compared to other regions (Mathieu et al. 2021);
- **Examining** : Implementation of **CBAM in a Climate Alliance** (club) as proposed by Nordhaus (2015).

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Research Background

- **CBAM club potentials** :

“The EU will engage with third countries whose trade to the EU is affected by this Regulation to explore … and possibilities for concluding agreements to take into account their carbon pricing mechanism.”

The US and China also commit to a more stringent climate approach:

- China - carbon neutrality in 2060 (Dong et al. 2021);
- The US new commitment with Biden’s administration (Blinken 2021).

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Research Questions

The impact of CBAM on the EU, the US, and China ***collectively as a club***, based on the current climate policies and targets.

Addressed Questions:

- How Significant Leakage will potentially be reduced?
- Does CBAM improve competitiveness in the club? In what sectors?
- Is there any welfare improvements: positive terms-of-trade spillover effects for EU, US or China?

Model, Data Base & Scenario Development

- **GEMINI E-3** (Bernard & Vielle 2008);
- **GTAP 10 Database** (Aguiar et al. 2019);
- Emissions Data from **CEDS** (Hoesly et al., 2018) and **PRIMAP** dataset (Gütschow et al., 2019) for N_2O;

Scenario Development

1. Baseline Scenario/ Current Policies Scenario (**Giarola et al.2021**)
2. Climate Policy Scenarios.
   a. Without CBAM
   b. With CBAM
      - EU, US and China implement CBAM as **import tariff**. Imposed to **imported goods** of non-coalition countries equal to projected carbon price.
      - Focus on **Energy Intensive Industries** (EII).
      - Comparative Analysis
        - Basis Measurement of Carbon Contents:
          - **Scope 1 (Direct)**
          - **Scope 2 (Direct + Electricity Used)**
          - **Scope 3 (Direct + Indirect)**

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The Club

Table 1: Key indicators in % of global figure about the Club - Year 2020

	USA	EU	China	ROW
Population	4%	7%	18%	71%
GHG emissions	12%	8%	29%	51%
CO_2 emissions	15%	9%	29%	47%
GDP[3]	15%	15%	17%	54%
Coal consumption[4]	8%	6%	52%	34%
Oil Consumption	22%	13%	14%	51%
Natural gas consumption	22%	12%	7%	59%
EII production[5]	12%	17%	38%	33%
EEI exports[5]	13%	21%	16%	50%
EEI imports[5]	14%	15%	17%	55%

[3] IMF database GDP in PPP

[4] IEA energy balances

[5] GEMINI-E3 outputs

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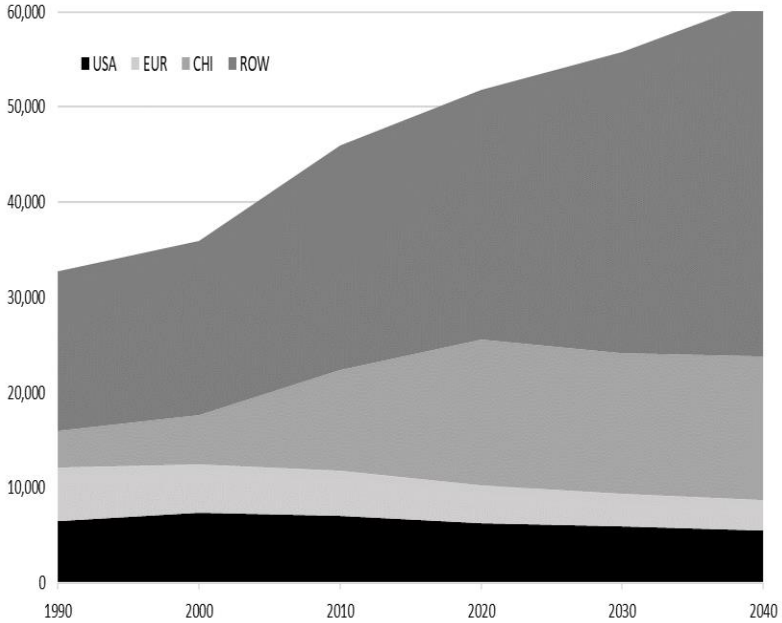
Baseline - Current Policies Scenario

- Includes a subset of the high impact policies collected and analysed within the H2020 Paris-Reinforce Project (2015 to 2030)
- **EU Target**: **-43%** emissions decrease with respect to 2005 for ETS and the **-30%** for non-ETS emissions for 2030.
- After 2030 we assume that the two carbon prices are increasing with GDP per capita



Climate Policy Scenario

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Policies Design in the Club

	2030	2035	2050	2060
EU global GHG w.r.t 1990	-55%		-100%	
EU ETS w.r.t 2005	-65%			
EU ESD w.r.t 2005	-40%			
China CO_2				-100%
USA GHG w.r.t 2005	-50%		-100%	
USA CO2 from Electricity Generation		-100%		

CO_2 Prices (USD 2014 per ton of CO_2)

	2025	2030	2040
EU ETS price	50	77	131
EU ESD price	149	776	3353
USA ETS price	56	161	275
USA carbon tax	43	170	1080
China Carbon price	10	25	132

Climate Policies Scenario – No CBAM

Regional Impacts on Stringent Climate Policy without CBAM

Change International Trade in EEI goods w.r.t current policies scenario

Exporters \ Importers	USA	EUR	CHI	IND	BRA	RUS	CSA	ASI	MID	AFR	ROW	Total
USA		-21%	-33%	-41%	-39%	-47%	-28%	-36%	-41%	-42%	-27%	-29%
EUR	-20%		-31%	-41%	-38%	-50%	-34%	-36%	-43%	-45%	-30%	-32%
CHI	-19%	-16%		-36%	-33%	-44%	-29%	-29%	-38%	-41%	-30%	-27%
IND	6%	1%	-13%		-14%	-28%	-9%	-16%	-18%	-23%	-11%	-9%
BRA	-4%	-12%	-27%	-27%		-33%	-14%	-30%	-36%	-33%	-17%	-18%
RUS	27%	31%	15%	-2%	-5%		4%	8%	-5%	-14%	11%	17%
CSA	3%	-12%	-24%	-42%	-26%	-39%		-32%	-27%	-35%	-14%	-12%
ASI	-5%	-4%	-17%	-30%	-24%	-40%	-18%		-28%	-31%	-19%	-15%
MID	-1%	7%	-13%	-19%	-25%	-38%	-11%	-12%		-26%	-6%	-8%
AFR	8%	6%	-9%	-18%	-16%	-36%	-10%	-11%	-10%		-1%	-4%
ROW	16%	11%	-18%	-14%	-19%	-36%	-8%	-23%	-20%	-24%		-2%
Total	-4%	-1%	-18%	-27%	-28%	-43%	-23%	-25%	-25%	-34%	-21%	-16%

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Climate Policy Scenario – No CBAM

Results of Climate Policies Scenario (w.r.t Baseline)

	Δ Welfare (% HH Cons)	Δ GDP	Δ EEI Production	Δ CO_2 Emissions	Δ GHG emissions
USA	-3.7%	-1.8%	-8.9%	-2914	-3674
EU	-4.5%	-3.5%	-12.2%	-1564	-1849
China	-4.3%	-1.8%	-4.8%	-6246	-7452
India	-0.2%	0.0%	0.7%	19	22
Brazil	-1.0%	0.1%	3.7%	9	1
Russia	-3.1%	1.0%	22.9%	119	109
Central South America	-1.3%	0.1%	6.8%	48	67
Asia	-0.5%	0.1%	2.7%	126	136
Middle East	-2.5%	1.0%	12.5%	130	135
Africa	-1.5%	0.1%	3.2%	75	63
Rest of the World	-2.1%	0.3%	9.9%	95	84
World	-2.7%	-1.1%	-1.8%	-10103	-12358

Leakage Rate: 5.8%

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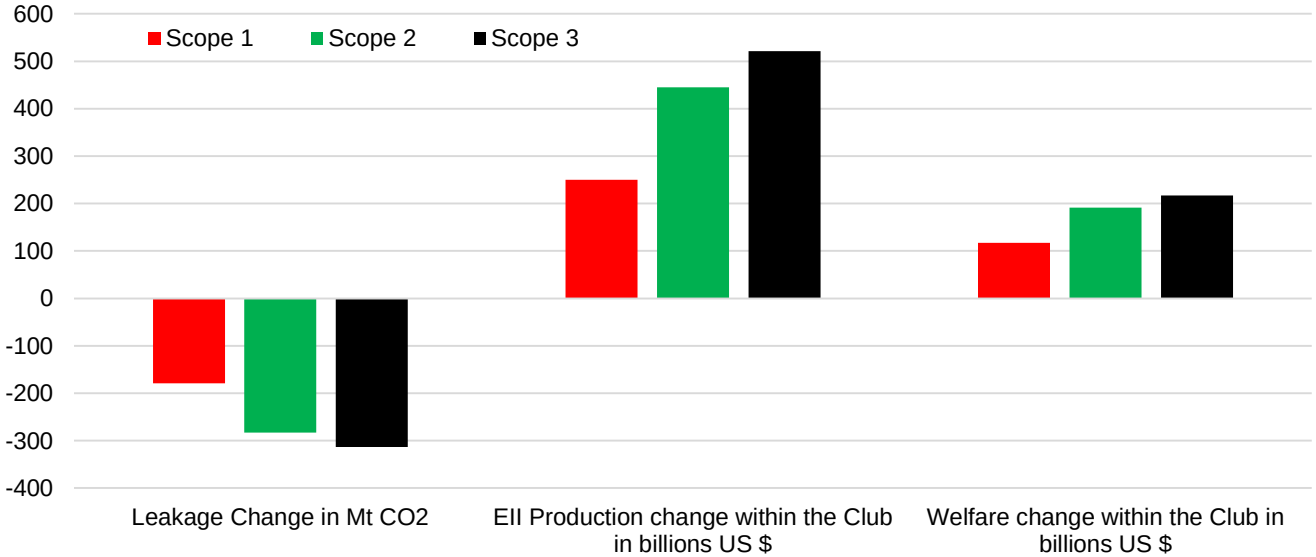
Climate Policies Scenario - With CBAM

Climate Policy with CBAM (Implemented in EU, US, China)

- Change on Leakage, EII Production and Welfare w.r.t scenario without CBAM

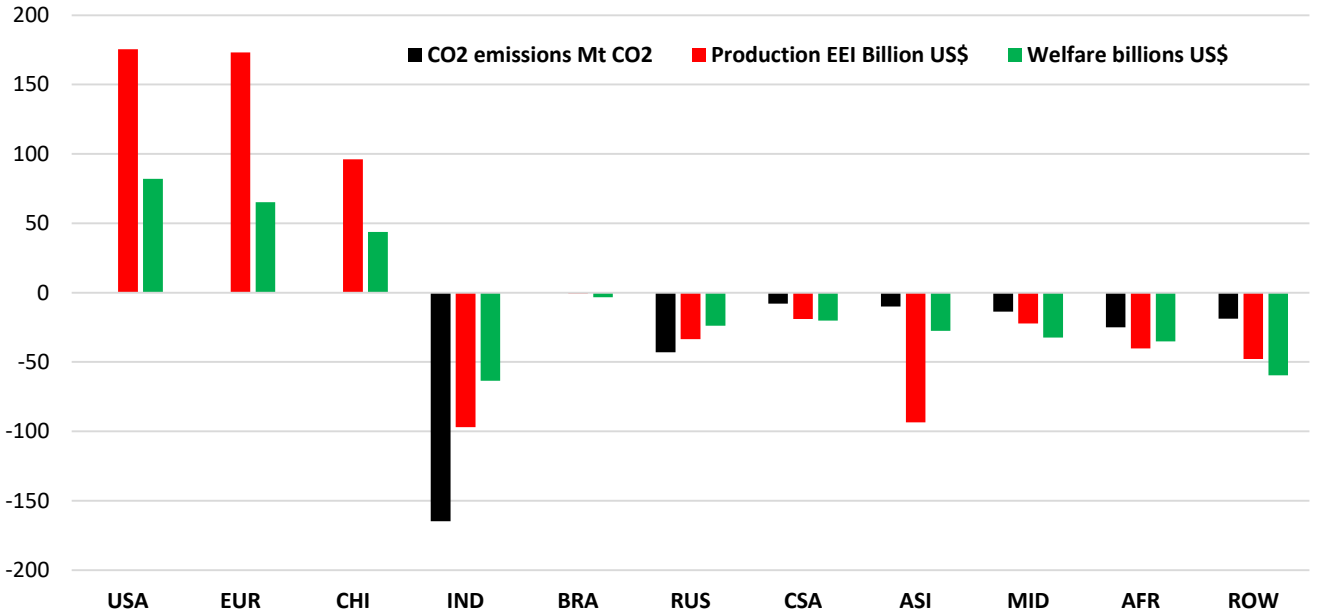


- Scope 2 (Direct Carbon Contents + Electricity Used) is effective and cost efficient .
- Leakage Rate using Scope 2 : **3.2 %**

Climate Policies Scenario - With CBAM

Regional Impacts on CBAM Scope 2

- Change on CO2 Emissions, EII Production and Welfare w.r.t scenario without CBAM



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Climate Policies Scenario – With CBAM

Regional Impacts on CBAM Scope 2

Change International Trade in EEI goods w.r.t current policies scenario

Exporters \ Importers	USA	EUR	CHI	IND	BRA	RUS	CSA	ASI	MID	AFR	ROW	Total
USA		-31%	-47%	-74%	-58%	-73%	-52%	-59%	-66%	-68%	-56%	-49%
EUR	-9%		-37%	-70%	-52%	-70%	-49%	-53%	-62%	-65%	-51%	-44%
CHI	4%	-7%		-64%	-42%	-63%	-39%	-42%	-54%	-59%	-45%	-31%
IND	-90%	-66%	-63%		23%	-21%	26%	11%	0%	-12%	14%	-30%
BRA	-6%	-8%	-28%	-53%		-49%	-16%	-35%	-46%	-46%	-25%	-20%
RUS	-85%	-55%	-53%	-26%	10%		19%	19%	-5%	-19%	18%	-23%
CSA	-31%	-25%	-36%	-64%	-28%	-54%		-38%	-39%	-49%	-23%	-31%
ASI	-30%	-13%	-27%	-54%	-22%	-53%	-17%		-37%	-43%	-24%	-27%
MID	-57%	-25%	-36%	-41%	-16%	-47%	-2%	-6%		-33%	-5%	-25%
AFR	-38%	-11%	-22%	-38%	-1%	-42%	3%	-1%	-9%		6%	-12%
ROW	-15%	1%	-27%	-42%	-16%	-49%	-5%	-24%	-29%	-36%		-16%
Total	-23%	-18%	-30%	-52%	-28%	-58%	-31%	-30%	-30%	-44%	-32%	-29%

- CBAM reduces more of EII exports products. More distortion in exports for the EU, US, and China than the absence of CBAM.
- Protective measures in CBAM may increase comparative advantages and competitiveness, but reduce the output value due to the negative Income Effect.

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Conclusion

- Stringent climate ambitions in the EU, China, and the US result in positive GHG emissions change in all other regions, confirming the leakage.
- Switching from a direct carbon content basis (scope 1) to include the electricity consumption (scope 2) significantly reduces leakage and increases EII production.
- CBAM improves welfare in member of coalition (EU, US, China). Non coalition regions are worse off.
- CBAM reduces further EII product exports. CBAM may increase the comparative advantage and competitiveness, but reduces the output value due to the negative Income Effect of post-import tariff on imported intermediate goods

-End-
Thank You