

Supplementary Information for:

Assessing different European Carbon Border Adjustment Mechanism implementations and their impact on trade partners

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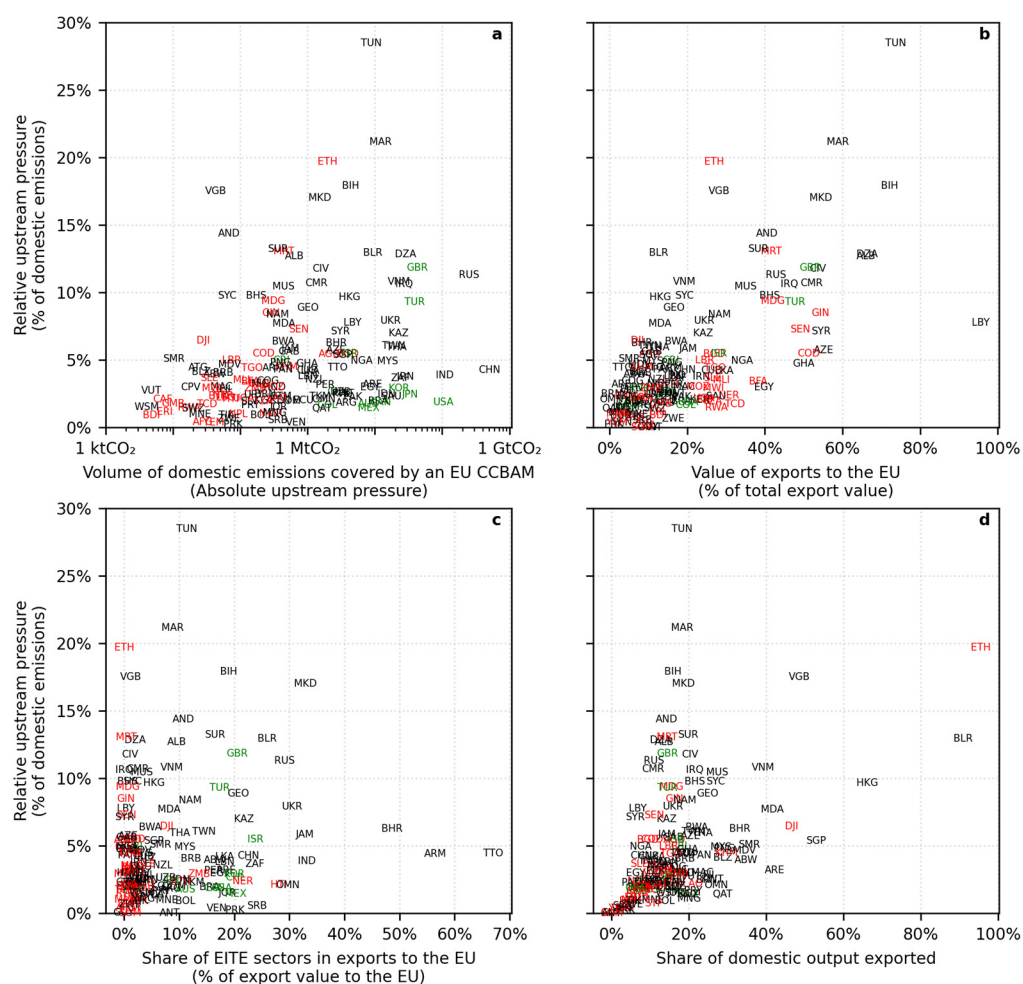
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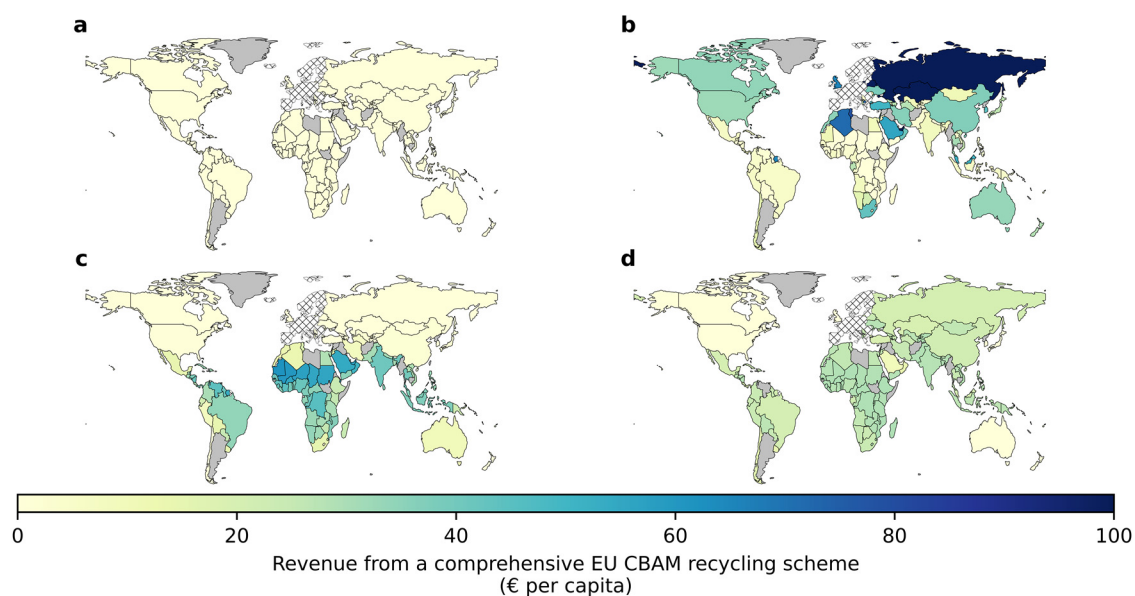
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Supplementary Figure 1. Trade characteristics of the countries exposed to a comprehensive EU CBAM. Each panel shows the relation between the relative upstream pressure a country is exposed to (vertical axis) with some trade characteristics (horizontal axis). Countries members of the Organization for Economic Co-operation and Development (OECD) are shown in green. Least Developed Countries (LDCs) are shown in red. The countries exposed to the strongest relative upstream pressure by the comprehensive EU CBAM are all largely dependent on the EU for their exports (panel B) even though they don't necessarily export a large share of emission-intensive products (figure C). EITE sectors here refer to the "Petroleum, Chemical and Non-Metallic Mineral Products" and "Metal Products" sectors from the MRIO.



Supplementary Figure 2 – Revenue recycled from a comprehensive EU CBAM without export rebates based on different allocation indicators. The proportion of the revenue each country receives is estimated based on the following indicators, assuming the full revenue of the comprehensive EU CBAM without export rebates is internationally recycled (see Materials and Data for details): a. No recycling; b. Emissions covered by the comprehensive EU CBAM; c. Historical impacts of anthropogenic warming on economic output; d. Difference in per capita Gross Domestic Product to the EU average. Grey indicates lack of data, hatchings indicate member countries of the EU ETS.

	Scopes of emissions covered (vertical coverage)	Direct imports only (without export rebates)		Direct and indirect imports (comprehensive depth coverage)	
Sectors covered (horizontal coverage)	CO ₂ emissions covered (Mt CO ₂)	Scope 1 emissions	Scopes 1 and 2 and downstream products	With export rebates	Without export rebates
Conservative coverage	Electricity production	14	205	378	512
	Iron and steel	30	57	72	101
	Aluminium	4	7	9	13
	Fertilizers	4	7	8	11
	Cement	31	52	60	81
Ambitious coverage	Non-metallic minerals (Lime, Glass, Ceramics)	29	49	57	76
	Chemicals	18	30	35	48
	Refining and fuel manufacturing	46	76	89	120
	Pulp and paper	3	6	7	9
Comprehensive coverage	Fugitive emissions from fuels	93	106	89	130
	Other industrial emissions	182	245	249	314
	Inland transportation	46	84	101	134
	Agriculture and Waste	5	8	8	11

Supplementary Table 1. CO₂ emissions covered by an EU CBAM under different implementation options. Columns correspond to different *vertical coverages* (scopes of emissions covered) and rows correspond to different *horizontal coverages* (sectors and products covered). See Figure 1 for more information. IPCC emission categories considered for estimating the emissions from the different sectors are shown in Supplementary Table 2. Numerical values correspond to Mt CO₂ from the corresponding sectors covered by the corresponding CBAM implementation option.

Horizontal coverage	Sector name	IPCC code	Designation
Conservative coverage	Electricity production	1.A.1.a	Fuel combustion electricity and heat production
	Iron and steel	1.A.2.a	Fuel combustion Iron and Steel
		2.C.1	Process emissions for Iron and Steel production
	Aluminum	1.A.2.b	Fuel combustion for non-ferrous metals
		2.C.3	Process emissions for Aluminum production
Ambitious coverage	Fertilizers	2.B.1	Process emissions for Ammonia production
	Cement	2.A.1	Process emissions for Cement production
	Chemicals	1.A.2.c	Fuel combustion in the Chemical industry
		2.B.2-9	Process emissions from Chemical industry (excl. Ammonia production)
	Non-metallic minerals	1.A.2.f	Fuel combustion for non-metallic minerals
		2.A.2	Process emissions for Lime production
		2.A.3	Process emissions for Glass production
		2.A.4	Process emissions for other carbonates
	Refining and fuel manufacturing	1.A.1.b	Fuel combustion for refining
		1.A.a.c	Fuel combustion for the manufacturing of solid fuels
	Pulp and paper	1.A.2.d	Fuel combustion for the Pulp, Paper and Print industry
		2.H.1	Process emissions in the Pulp and Paper industry
Comprehensive coverage	Fugitive emissions from fuels	1.B	Fugitive emissions from fuels
	Inland transportation	1.A.3	Inland road, rail, air and water-borne transportation
	Other industrial emissions	1.A.2.e-m	Fuel combustion for other sectors
		1.C	CO2 transport and storage
		2.C.2,4-7	Process emissions other metals
		2.D-G	Process emissions other industries
		2.H.2	Process emissions food and beverage industry
		2.H.3	Other
	Agriculture and Waste	M.AG	Agriculture and forestry (excl. LULUCF)
		4	Waste

Supplementary Table 2 - IPCC emission categories considered in the different sectoral coverage settings. Emission categories defined by the International Panel on Climate Change (IPCC) are internationally agreed emission classification codes, used to associate Greenhouse Gases emissions to the process that generate them. In particular, reporting of Annex I countries to the United Nation framework Convention on Climate Change (UNFCCC) are based on this classification. We base our estimation of the CO₂ emissions generated to produce exports to the European Union (EU) on these IPCC emission categories (see Data and Methods).