



DECARBONIZING INTERNATIONAL TRADE AND GLOBAL VALUE CHAINS

Jong Woo Kang
Director, Regional Cooperation and Integration Division
Asian Development Bank

6th Regional Trade Group Meeting
18 April 2024

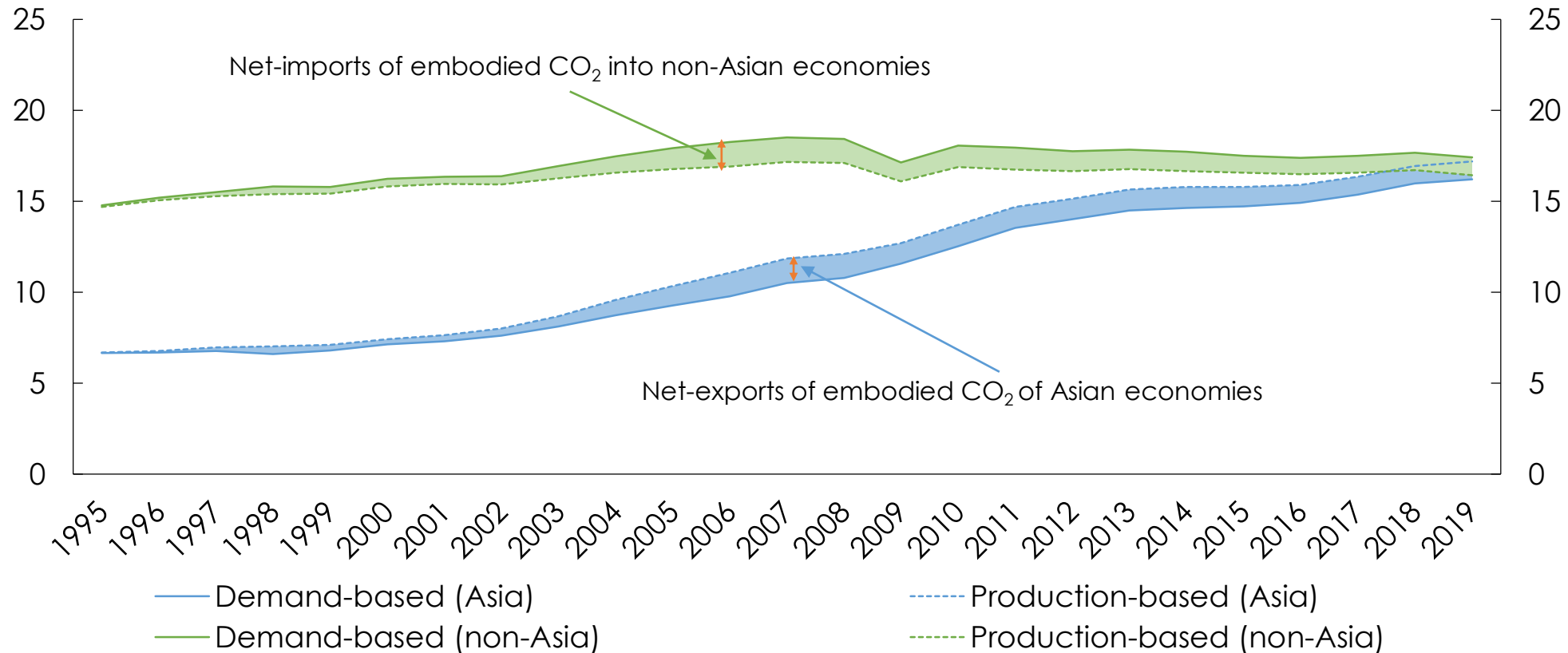


Key Messages

- Facilitating trade in environmental goods and services can help bring down the cost of adopting green technologies and promote knowledge spillovers
- Combining regulations, standards, and certifications with policy incentives can be effective in reducing pollutions and accelerating switch to less-polluting production process
- Trade and investment agreements can promote greener trade and investment through environmental commitments
- Developing Asia's participation in GVCs accounts for an increasing share of the global production of carbon emissions
- The EU's Carbon Border Adjustment Mechanism (CBAM) is estimated to have limited impact on global emissions; but it could significantly reduce exports of some Asian subregions and have negative spillovers to manufacturing production in downstream sectors in the EU
- National and international initiatives to minimize environmental damage from GVCs and globalization should include (i) carbon pricing, (ii) accounting mechanisms for embedded emissions, (iii) trade cooperation, and (iv) developing and applying advanced technologies

Asia's CO₂ emissions embodied in production has exceeded consumption as major provider of products to meet global demand

Production- and Demand-Based CO₂ Emissions—Asia and non-Asia



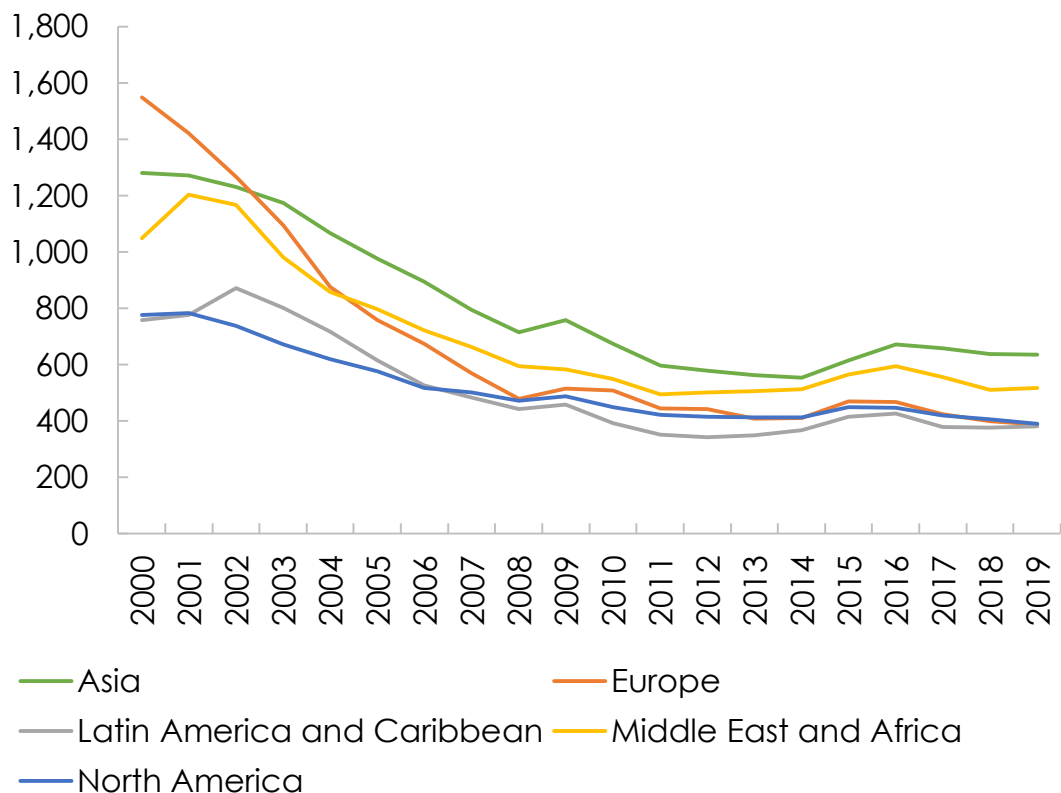
CO₂ = carbon dioxide.

Notes: Aggregate for Asia includes Australia; Bangladesh; Brunei Darussalam; Cambodia; Hong Kong, China; India; Indonesia; Japan; Kazakhstan; the Lao People's Democratic Republic; Malaysia; New Zealand; Pakistan; the People's Republic of China; the Philippines; the Republic of Korea; Singapore; Taipei, China; Thailand; and Viet Nam. The shaded areas in the graph represent the absolute difference between production-based (CO₂ emissions based on production, i.e. emitted by economies) and demand-based (CO₂ emissions embodied in domestic final demand, i.e. consumed by economies) CO₂ emissions.

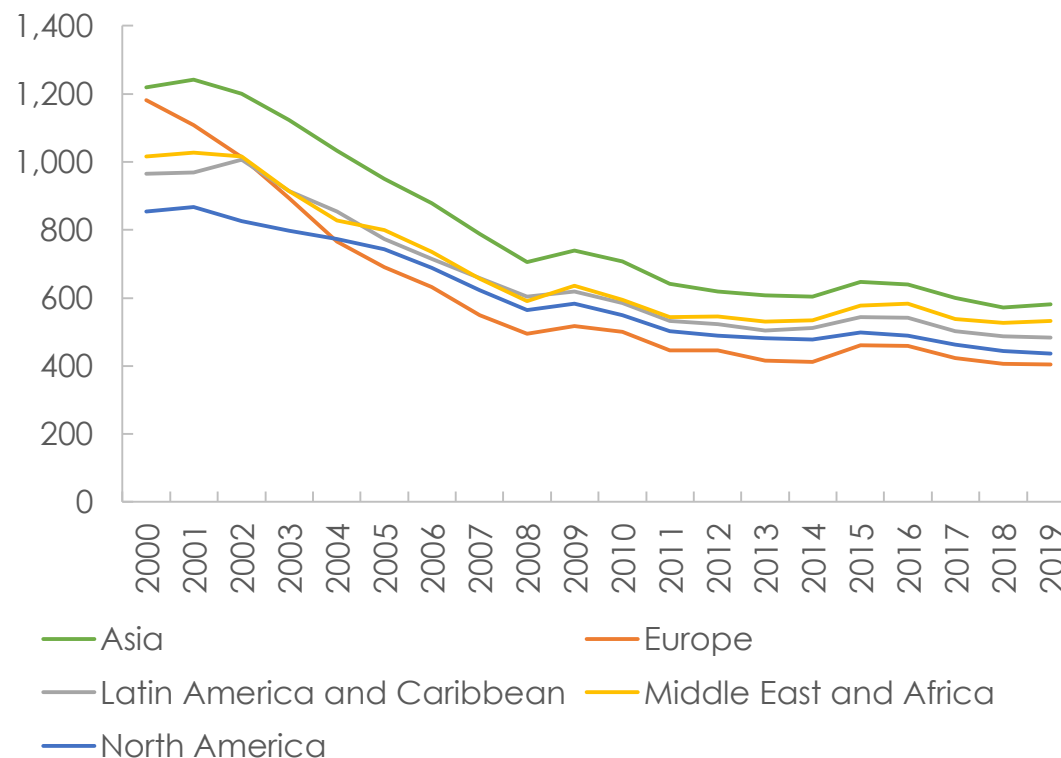
Source: ADB calculations using data from Organisation for Economic Co-operation and Development. Carbon dioxide emissions embodied in international trade (TECO₂) dataset.

In spite of steep declines in the carbon footprint of Asia's trade, the region remains the most carbon intensive exporter and importer

CO₂ Emissions Intensity of Exports ...



... and Imports



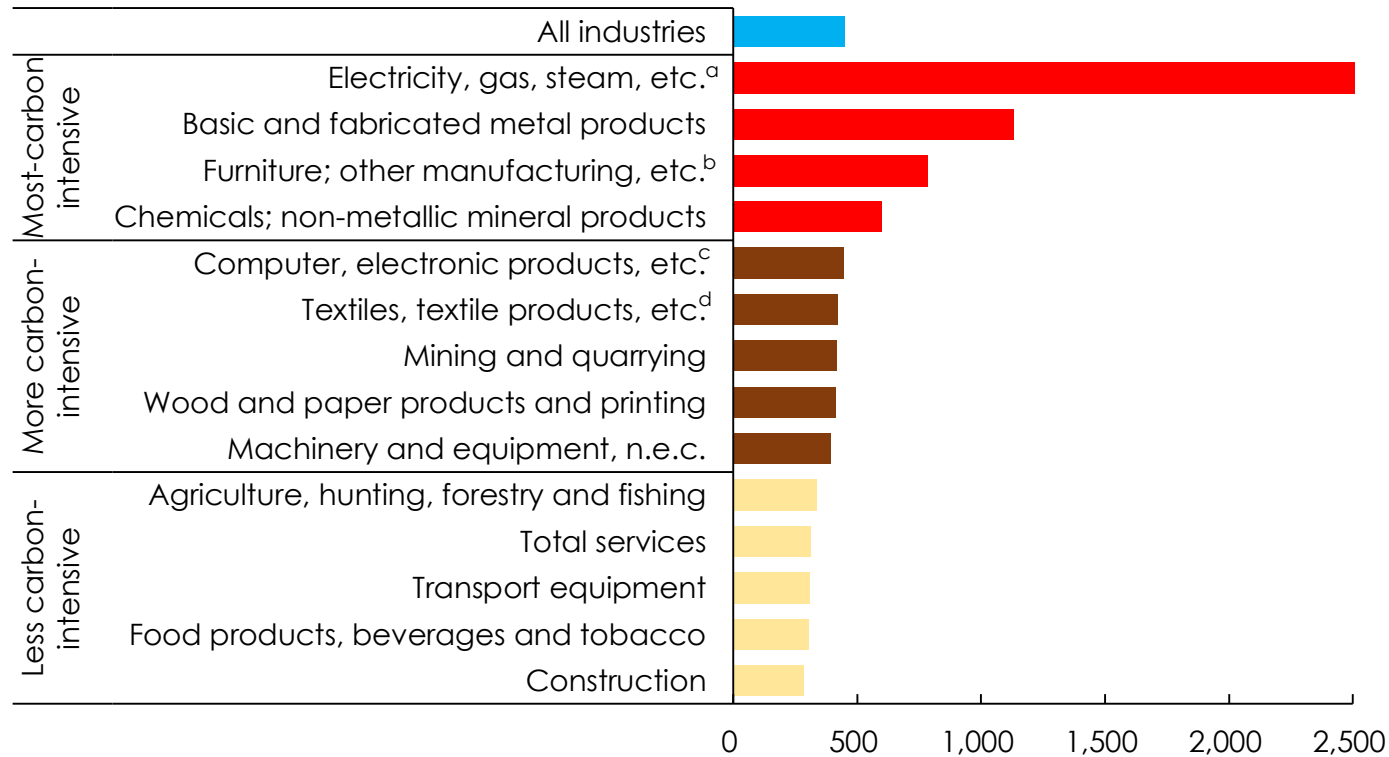
CO₂ = carbon dioxide.

Note: Emission intensity of exports (imports) are CO₂ emissions per export (import) value. In tonnes CO₂ per \$ million.

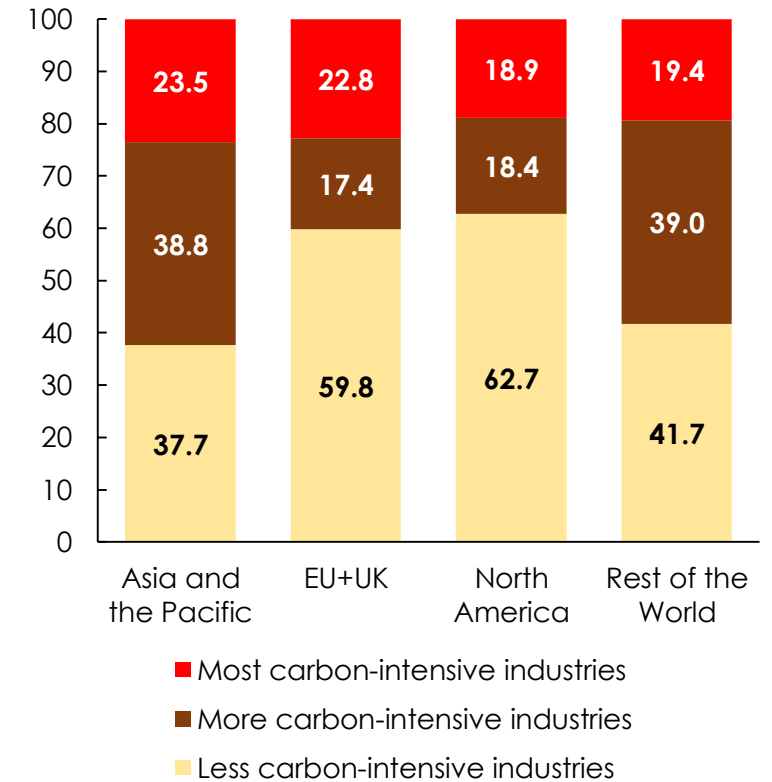
Source: ADB calculations using data from Organisation for Economic Co-operation and Development. Carbon dioxide emissions embodied in international trade (TECO₂) dataset.

Asia's industrial structure matters for overall carbon intensity outcomes

CO₂ Intensity per Industry, Exports



Industry Shares in Exports (%)



CO₂ = carbon dioxide, EU = European Union (27 members), UK = United Kingdom.

^a Includes air conditioning and water supply; sewerage, waste management and remediation activities.

^b Includes repair and installation.

^c Includes optical products and electrical equipment.

^d Includes leather and footwear.

Source: Kang, Gapay, and Quizon (2022) using data from Organisation for Economic Co-operation and Development. Carbon dioxide emissions embodied in international trade (TECO2) dataset (accessed December 2021).

Developing Asia had the highest growth in emissions over 1995–2018, driven by increases in production

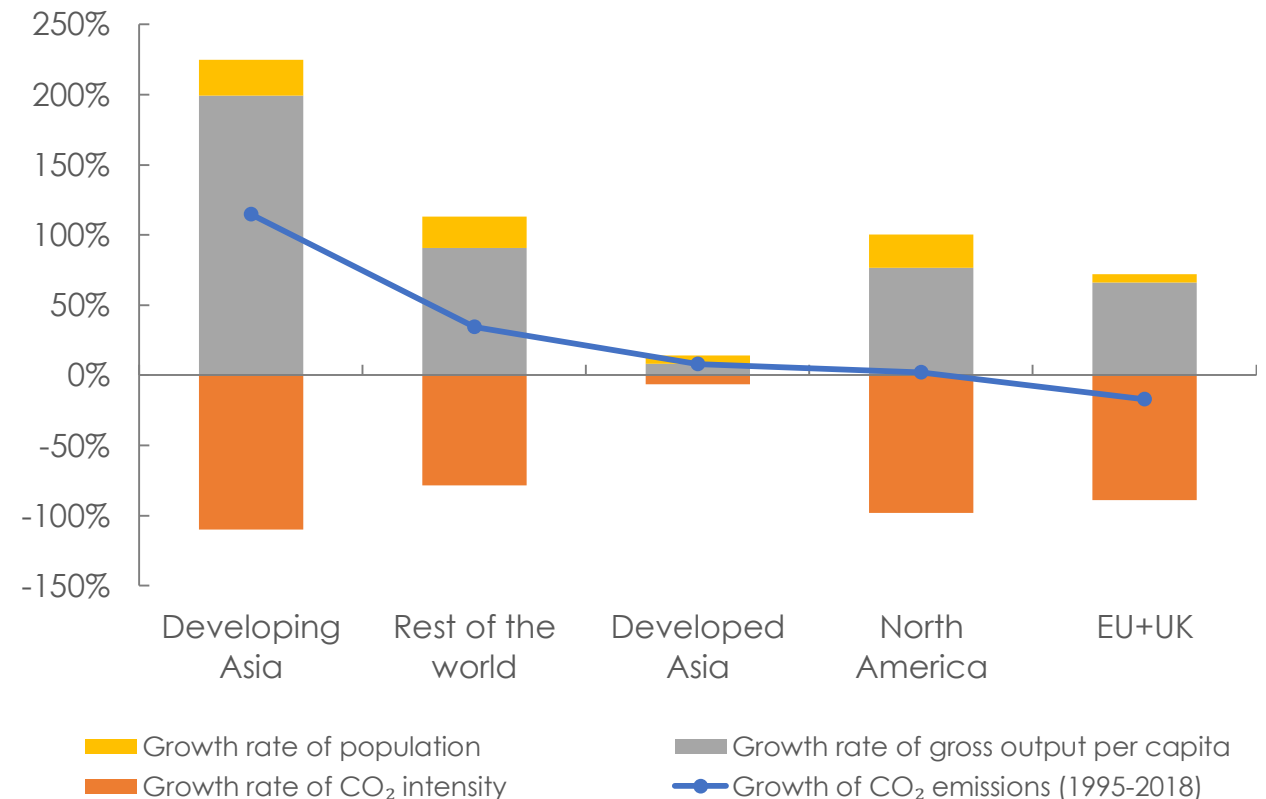
- **The growth rate of CO₂ emissions is driven by three factors:**

- growth rate of production per person (scale effect)
- growth rate of population (scale effect)
- growth rate of CO₂ emissions intensities (efficiency effect)

- **The growth of emissions in developing Asia has been larger than other regions:**

- 1995-2018 emissions growth rate reached 114% despite a 110% reduction in CO₂ emissions intensity
- increases driven by higher levels of production, with output per person increasing by 200%

Growth Rate of CO₂ Emissions by Region, 1995–2018



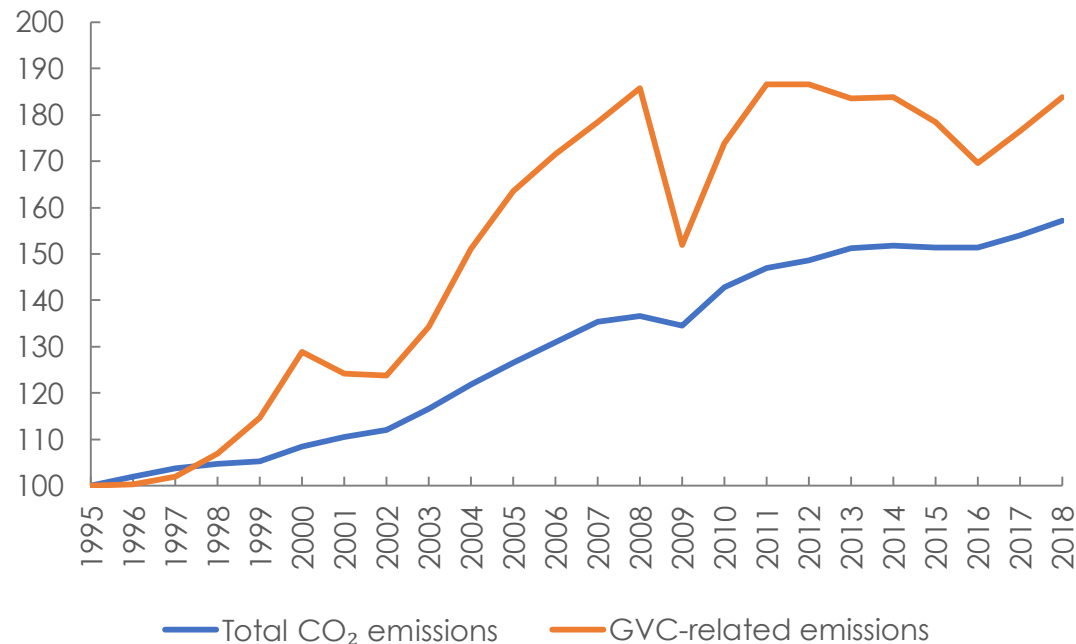
Note: Developed Asia includes Australia, Japan, and New Zealand while developing Asia refers to the developing members of ADB.

Source: ADB calculations using data from Organisation for Economic Co-operation and Development.

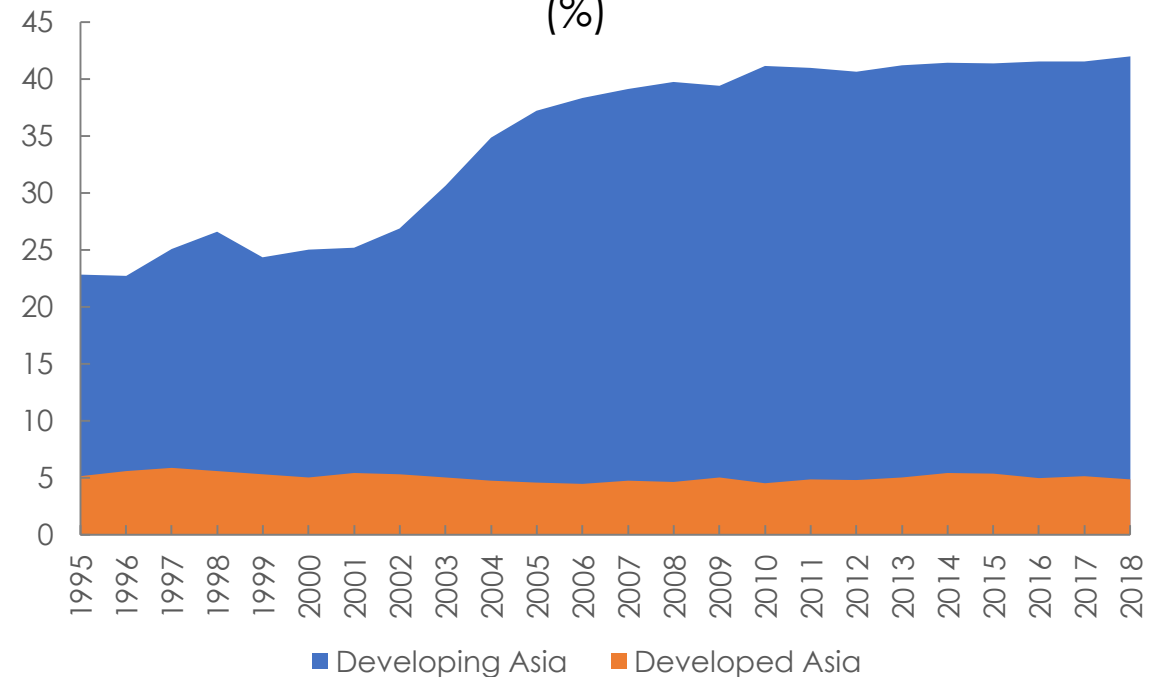
GVC-related emissions have grown more rapidly than other sources, with developing Asia accounting for an increasing share

- Annual global CO₂ emissions increased by 57% between 1995 and 2018...
- ...while emissions due to GVCs increased by 84%
- Developing Asia's share in GVC-related emissions increased from 23% in 1995 to 42% in 2018

Aggregate and GVC-related CO₂ emissions
(1995 = 100)



Share of Asia in GVC-related CO₂ emissions
(%)



Source: ADB calculations using data from Organisation for Economic Co-operation and Development.

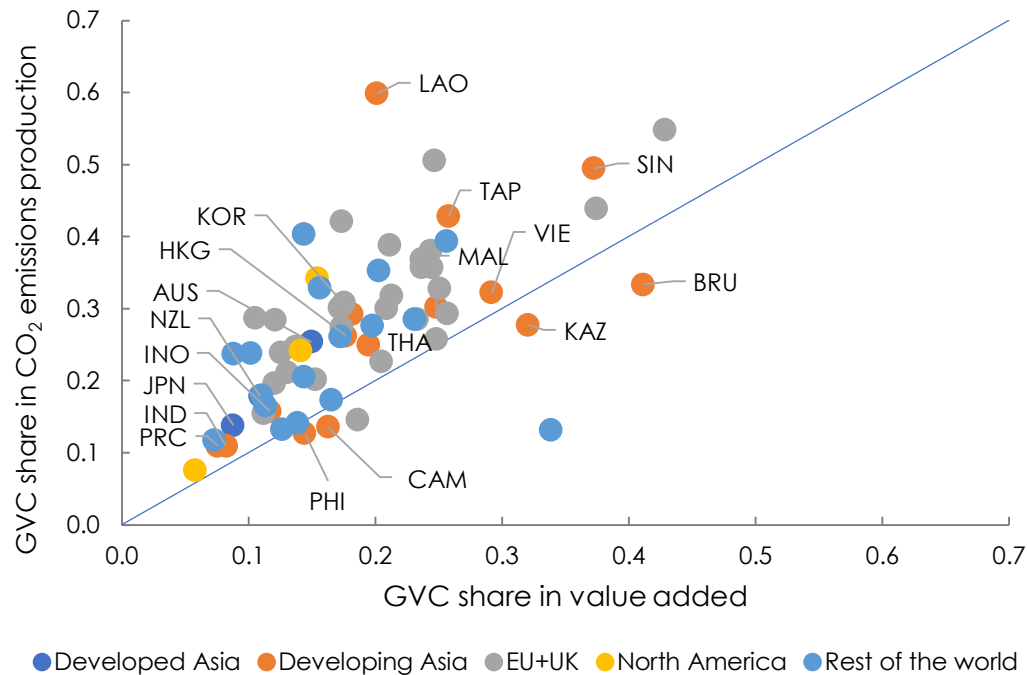
Note: Developed Asia includes Australia, Japan, and New Zealand while developing Asia refers to the developing members of ADB.

Source: ADB calculations using data from Organisation for Economic Co-operation and Development.

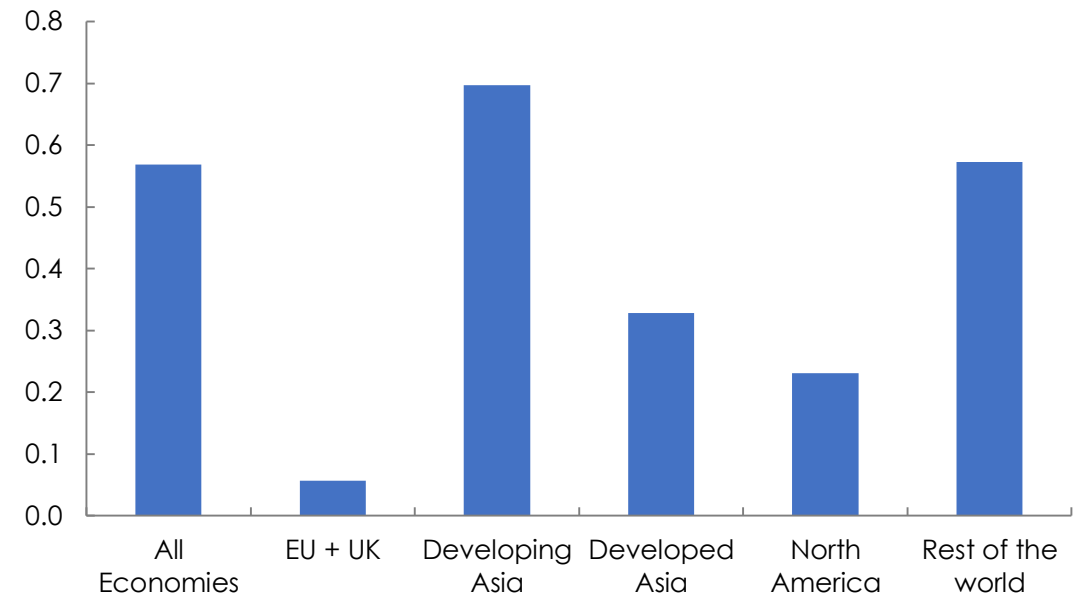
GVC production contributes relatively more emissions than value added, which is associated with a higher emissions intensity in developing Asia

- Shares of GVCs in economywide CO₂ emissions are generally above GVC shares in value-added
- A higher share of GVC value-added is associated with a higher aggregate CO₂ emissions intensity
 - this association is strongest in developing Asia
 - more prosperous regions have decoupled GVC shares from emissions intensities

GVC Value-Added and Emissions Shares



Association between GVC Shares and Aggregate CO₂ Emissions Intensities



GVC = global value chain, EU = European Union (27 members), UK = United Kingdom.
 Note: Developed Asia includes Australia, Japan, and New Zealand while developing Asia refers to the 46 developing members of ADB.
 Source: ADB calculations using data from Organisation for Economic Co-operation and Development.

GVCs' rising contribution to global emissions highlights the need to decarbonize value chains, with several policy options available

Rationales for Decarbonizing GVCs

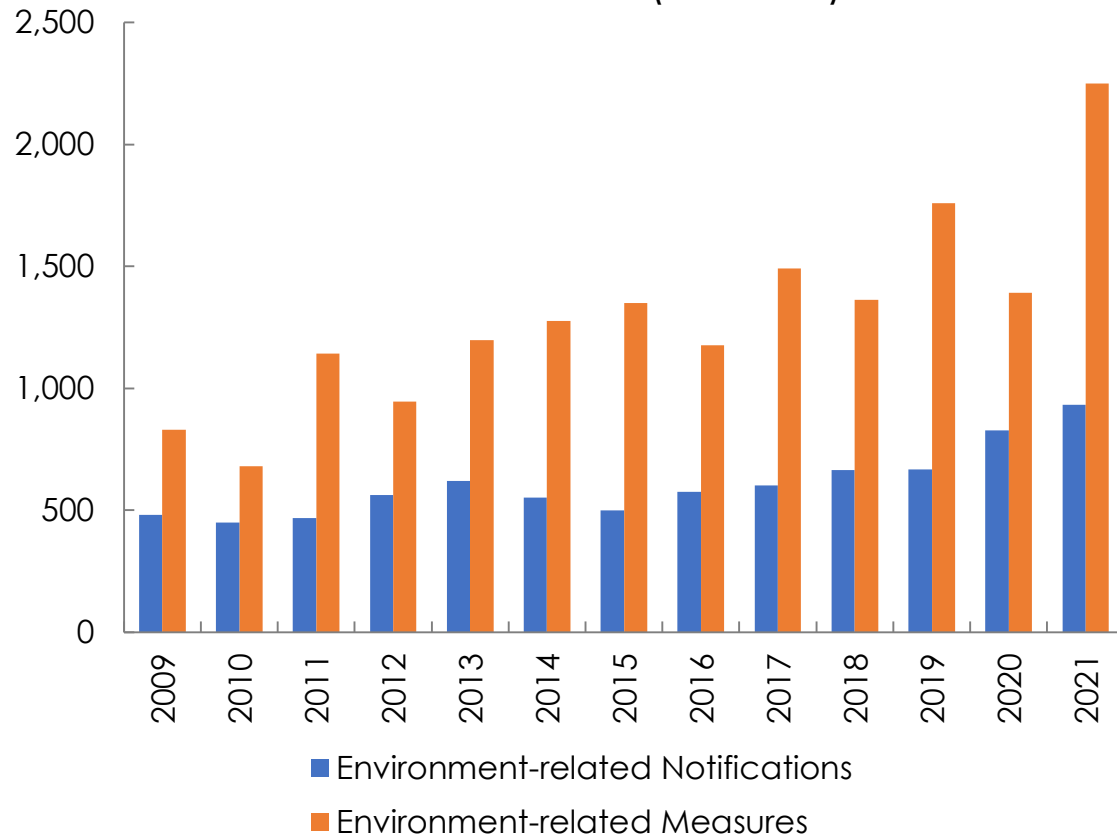
- **GVC production is relatively dirty:** GVC activity tends to be concentrated in sectors with high emissions intensities
- **GVC-related emissions are rising:** Over the past 30 years, emissions associated with GVCs have grown more rapidly than from other sources of production
- **Emissions associated with GVCs are difficult to regulate:** The global, footloose nature of GVC production makes GVC emissions difficult to regulate using national climate policies
- **External pressures:** This difficulty in regulating GVC-related emissions encourages economies to adopt border measures to regulate emissions

Policies for Decarbonizing GVCs

- **Trade policies:** Those related to subsidies, tariffs on clean/dirty goods, regulatory standards, and provisions in trade agreements
- **Carbon pricing:** Domestically through carbon taxes and emissions trading schemes, and internationally through carbon border adjustment mechanisms
- **Technology transfer:** Policies targeting the diffusion of green technologies are an important source for improving emissions efficiency
- **Embedded accounting frameworks:** To decarbonize nationally and globally, appropriate tools for measuring carbon content are crucial

Trade policy is increasingly important for decarbonization strategies

WTO Members' Environment-Related Notifications and Measures (number)

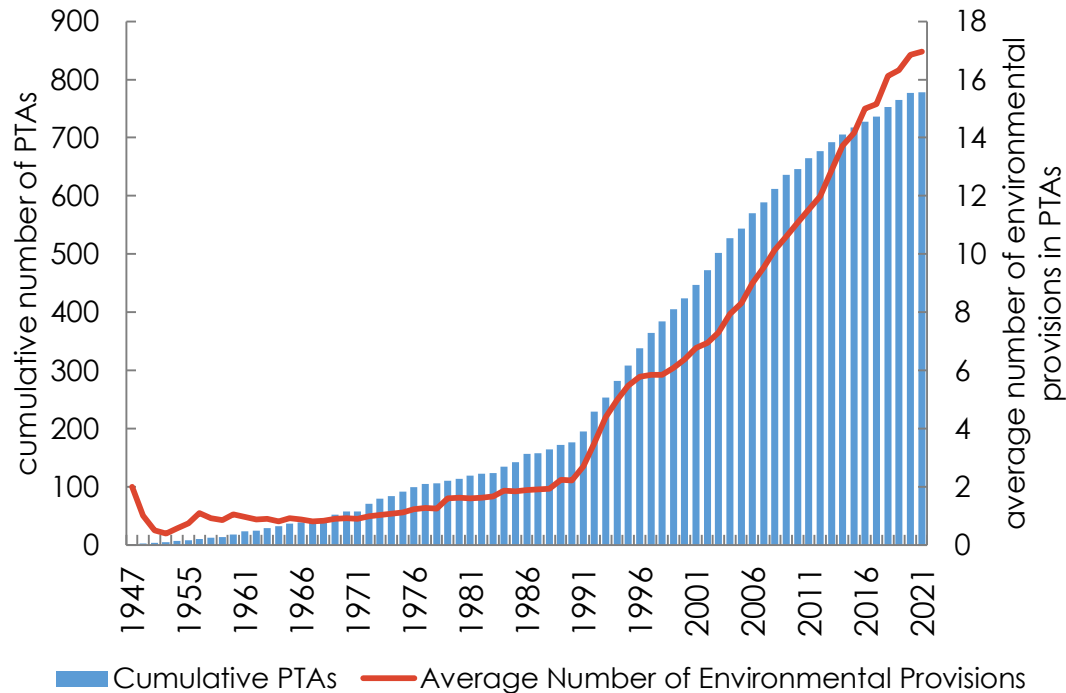


Source: World Trade Organization Environmental Database (accessed November 2023)

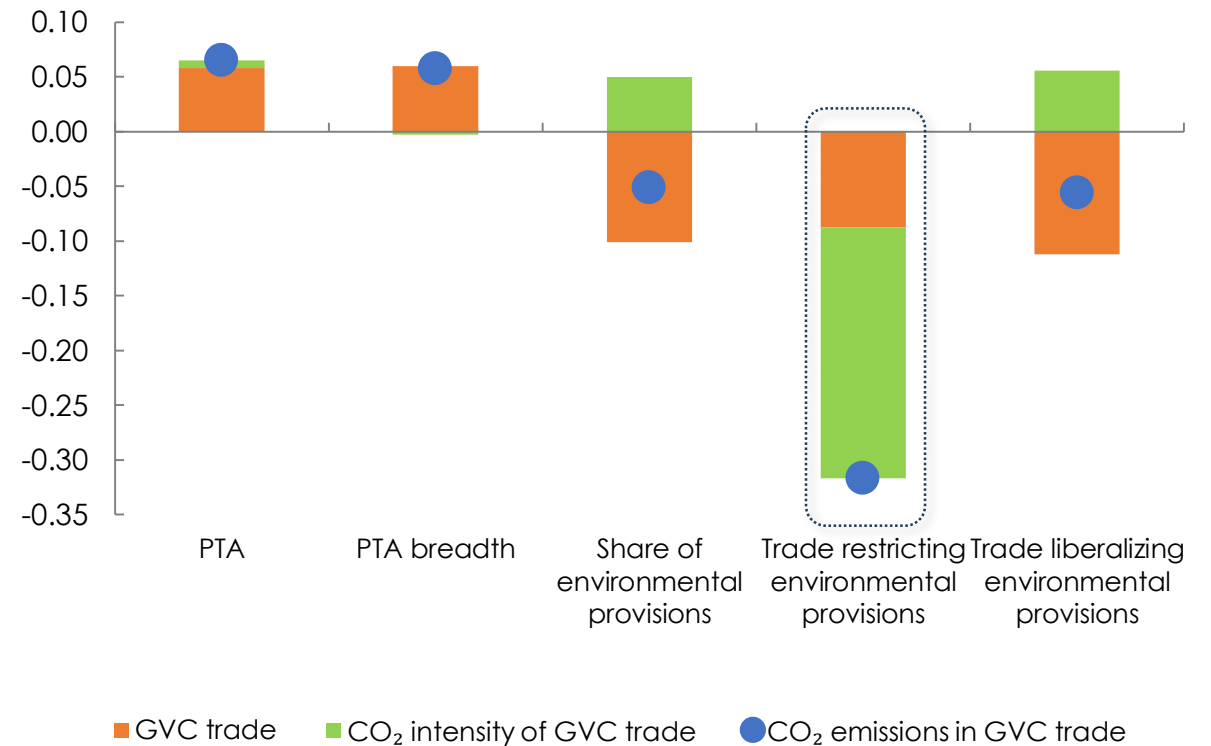
- **Trade policies can mitigate climate change:**
 - Lowering tariff and non-tariff barriers on climate-friendly products
 - Reducing/removing subsidies on carbon-intensive products
 - Encouraging green product transfers
- **Yet current policies favor carbon-intensive trade:**
 - Tariffs and non-tariff barriers are lower in carbon-intensive goods...
 - ...and in upstream production, including raw material extraction...
 - ...meaning high carbon-intensive products are traded more than low carbon-intensive ones
- **Trade policies are increasingly important in decarbonization plans:**
 - Trade-related measures are pervasive in Nationally Determined Contributions
 - Environmental notifications to the WTO are increasing...
 - ...often covering regulatory requirements, preferential tax treatment for green goods, and import licenses for energy efficient imports

Although preferential trade agreements increase bilateral emissions trade through scale effects, environmental PTA provisions can reduce emissions trade

Environmental Provisions in Preferential Trade Agreements



Estimated Impact of Trade Agreements and their Provisions on CO₂ Emissions Exports (% change)

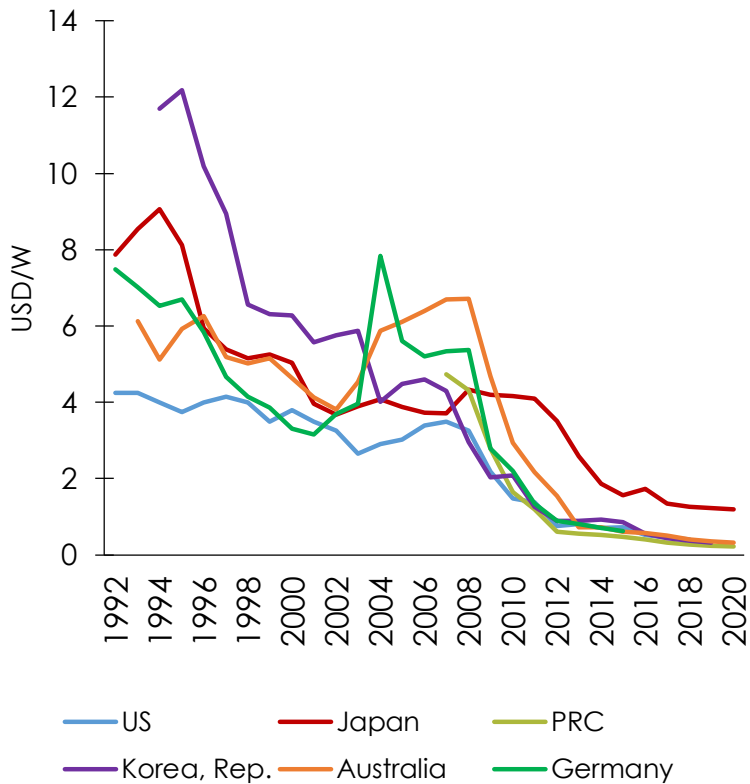


PTA = preferential trade agreement.
 Source: Trade and Environmental Database of Morin et al. (2019) (accessed August 2023).

GVC = global value chain, PTA = preferential trade agreement.
 Note: The figure presents the estimated coefficients on the PTA variables from a structural gravity model. The coefficients are partial elasticities, referring to the percentage change in the dependent variable (GVC variables) in response to a 1 unit change in the PTA variables.
 Source: ADB calculations using OECD and EORA data.

Promoting trade in environmental goods and services could help green production networks

Price of Solar Modules for top producing economies 1992-2020



Sources: National Survey Report of PV Power Application: IEA-PVPS (2021). Snapshot of Global PV Markets 2021, Aisbett et al. (2022) and Taghizadeh-Hesary et al. (2018).



Leveraging EGS trade and investment



Potential

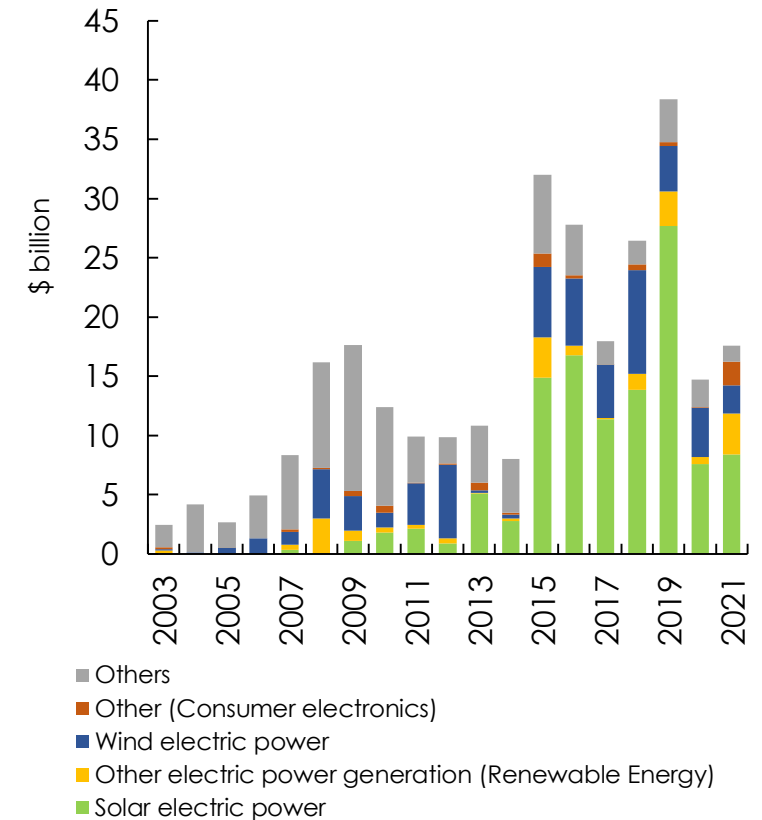
- Green technology adoption
- Reduction of carbon intensity
- Innovation and environmental spillovers



Way forward

- Addressing list-approach limitations
- Considering multilateral initiative for environmental services
- Targeted collaboration and certification

FDI in environmental goods and services – Asia and the Pacific

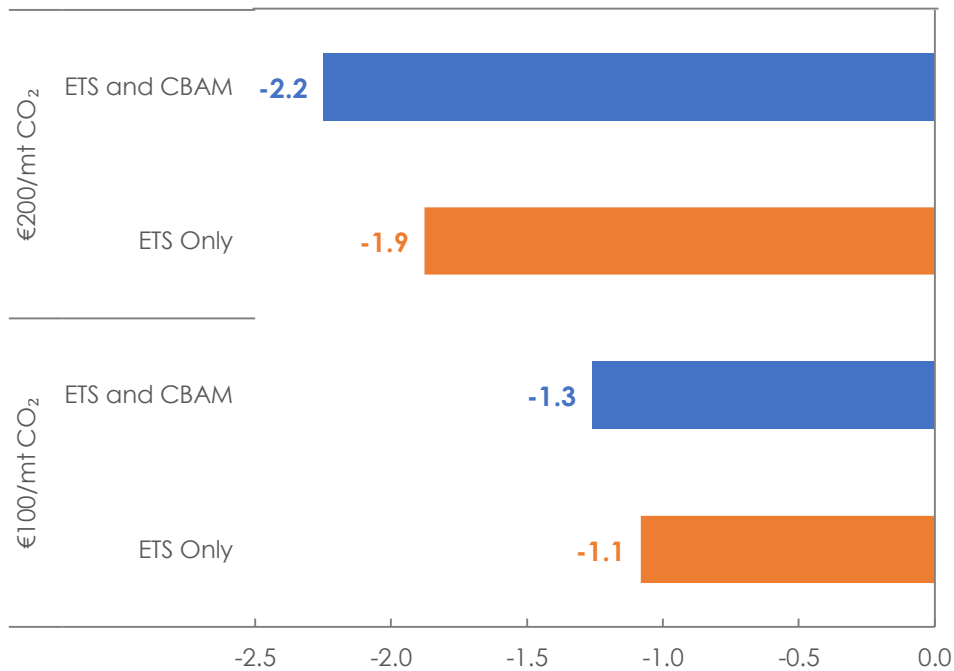


Sources: ADB calculations using classification from Asia Pacific Economic Cooperation (2012) and OECD; and Financial Times. fDi Markets (accessed March 2022).

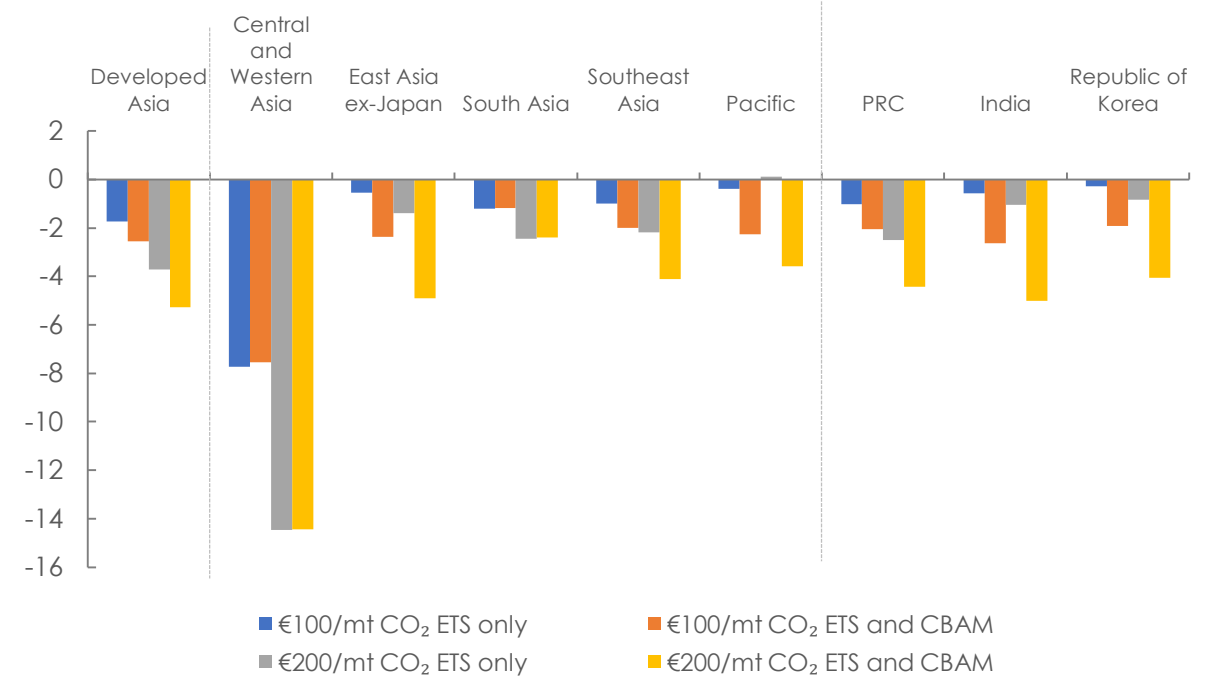
The EU's CBAM is estimated to have limited impact on global emissions, with a negative impact on exports for some Asian subregions

- Relative to an EU Emissions Trading Scheme (ETS) with the same carbon price, CBAM is estimated to reduce global emissions by just 0.2%
- Estimated effects on Asian subregions' exports to the EU are often more substantial

Estimated Change in Global CO₂ Emissions (%)



Estimated Change in Exports to the EU (%)



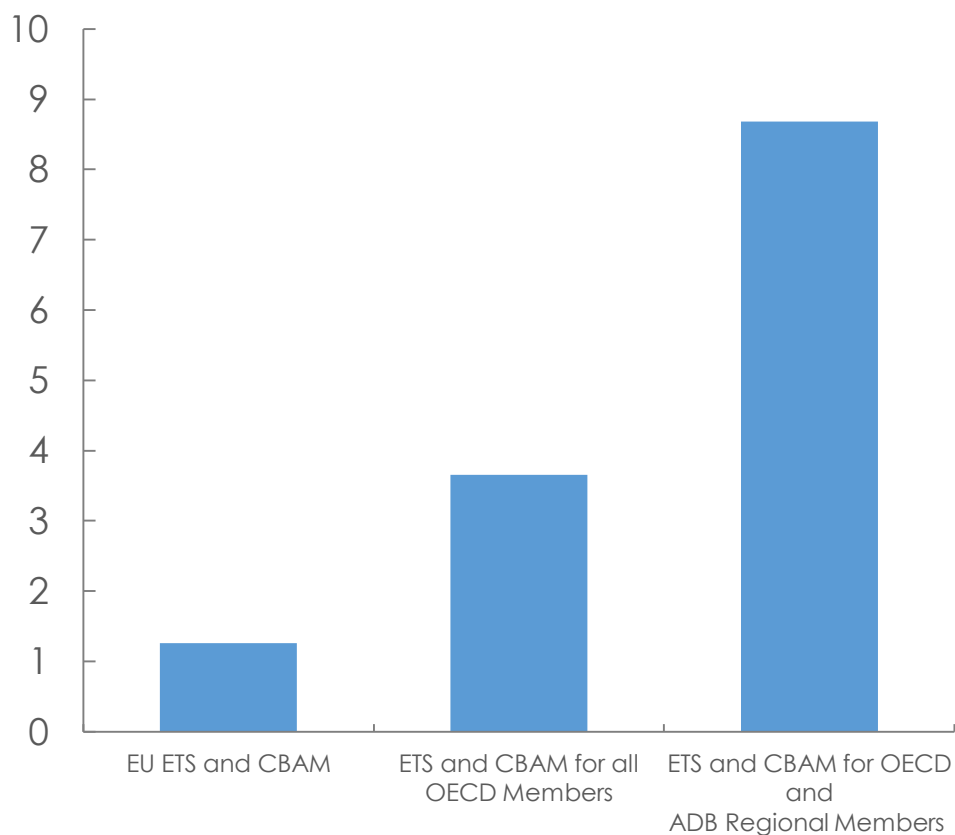
CBAM = Carbon Border Adjustment Mechanism, CO₂ = carbon dioxide, ETS = emissions trading scheme, EU = European Union, PRC = People's Republic of China.

Note: Developed Asia includes Australia, Japan, and New Zealand.

Source: ADB calculations using GTAP 11.0.

Economic impact of an extended ETS and CBAM will be distributed unevenly across regions depending upon the coverage of economies

Estimated Reductions in Global CO₂ Emissions
 (-%, estimated at a price of €100 per metric ton of CO₂)



Change in GDP under Different CBAM Modeling Scenarios
 (% , estimated at a price of €100 per metric ton of CO₂)

	EU ETS and CBAM	ETS and CBAM for all OECD Members	ETS and CBAM for OECD and ADB Regional Members
Developed Asia	-0.106	-1.555	0.075
Central and West Asia	-0.386	0.522	0.984
East Asia ex-Japan	-0.139	0.304	-0.669
South Asia	-0.185	0.517	0.160
Southeast Asia	-0.208	0.312	0.051
Pacific	-0.278	-0.479	0.164
PRC	-0.047	0.205	-1.882
India	-0.044	0.354	-1.921
Republic of Korea	-0.091	-2.256	-0.562
European Union	-1.907	-1.378	0.145
OECD Europe	-0.853	-0.643	0.054
Eastern Europe	-0.365	0.161	1.923
North America	-0.101	-0.574	0.898
Latin America	-0.125	0.239	1.483
World	-0.487	-0.509	0.206

CBAM = Carbon Border Adjustment Mechanism, CO₂ = carbon dioxide, ETS = emissions trading system, OECD = Organisation for Economic Co-operation and Development.
 Note: Developed Asia includes Australia, Japan, and New Zealand.
 Source: ADB calculations using data from Global Trade Analysis Project 11.