REGIONAL ECONOMIC OUTLOOK

WESTERN HEMISPHERE

Trade Integration and Implications of Global Fragmentation for Latin America and the Caribbean

BANCO DO ESPANA – WORLD BANK WORKSHOP

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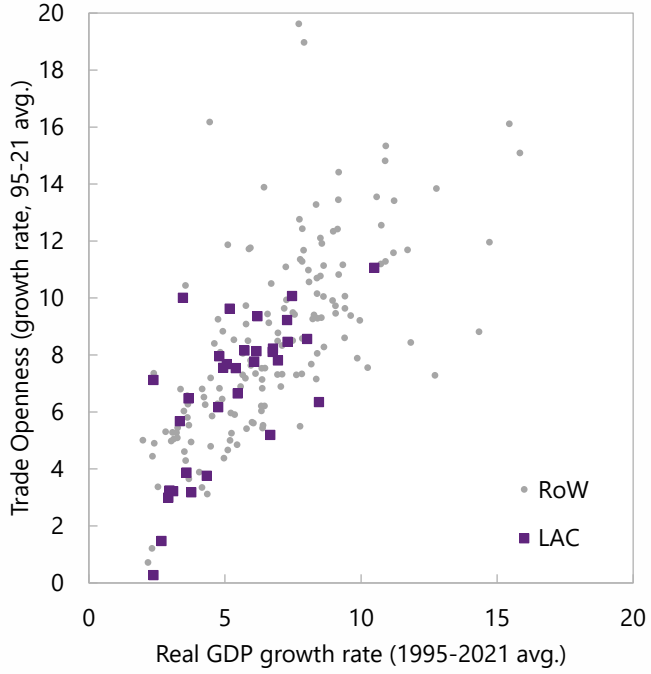
Motivation

Higher trade openness has been associated with higher GDP growth

Growth vs. Trade Openness in the Long Run

(Percent)

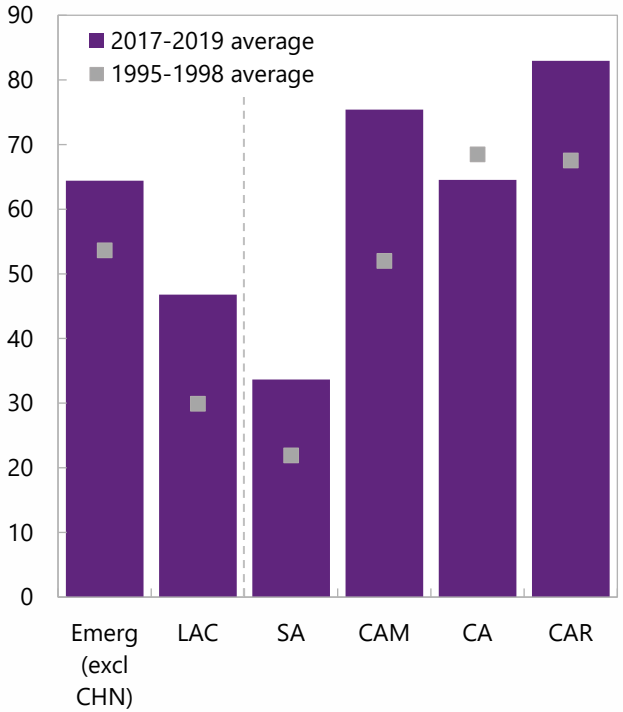


Sources: IMF BoP and IMF staff calculations.

LAC lags peer regions, despite progress in trade openness

Trade Openness Across Regions

(Exports plus imports of goods and services over GDP, percent)

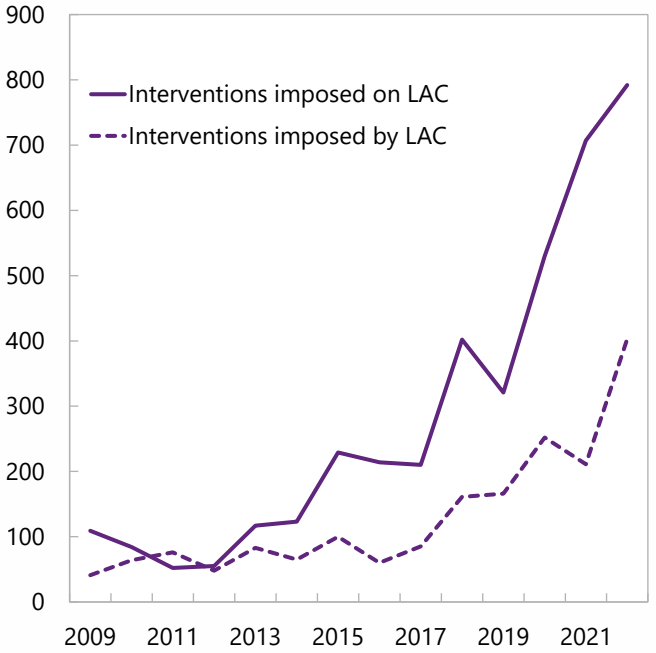


Sources: IMF BoP and IMF staff calculations. Notes: Includes intra-regional trade. SA=South America; CAM=Central America and Mexico; CA=Central America; CAR=Caribbean.

The recent increase in trade barriers threatens to reduce welfare globally and in LAC

New Harmful Trade Interventions

(Number)



Sources: Global Trade Alert (2022). Notes: Data adjusted for reporting lag as of Dec 31st. Interventions represent the harmful policy instrument, following GTA's classification. Example: the announcement of a new production subsidy to steel producers.

Key Questions

- How have the structure of LAC's trade and its degree of regional and global integration changed over time?
- What are the main obstacles to LAC's trade and what is the region's potential for trade integration?
- How could global fragmentation affect the region?

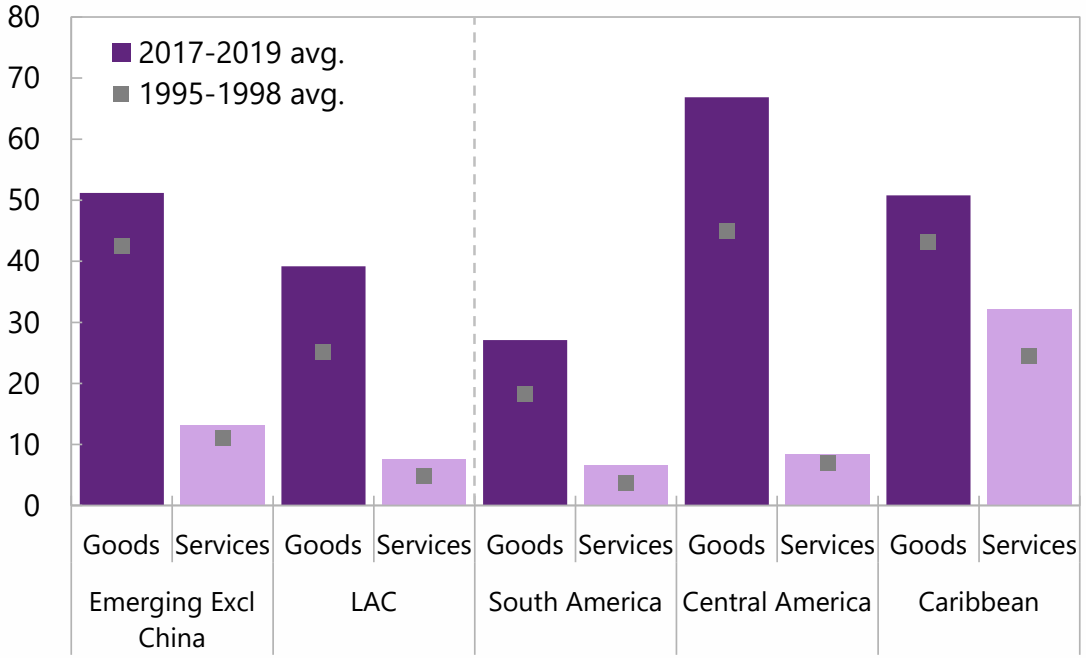
A. The Structure of Trade in LAC

LAC's trade integration has risen, but lags other EMDEs

LAC's trade openness lags peer regions in both **goods and services**

Trade Openness over Time

(Total trade of goods and services in percent of GDP)

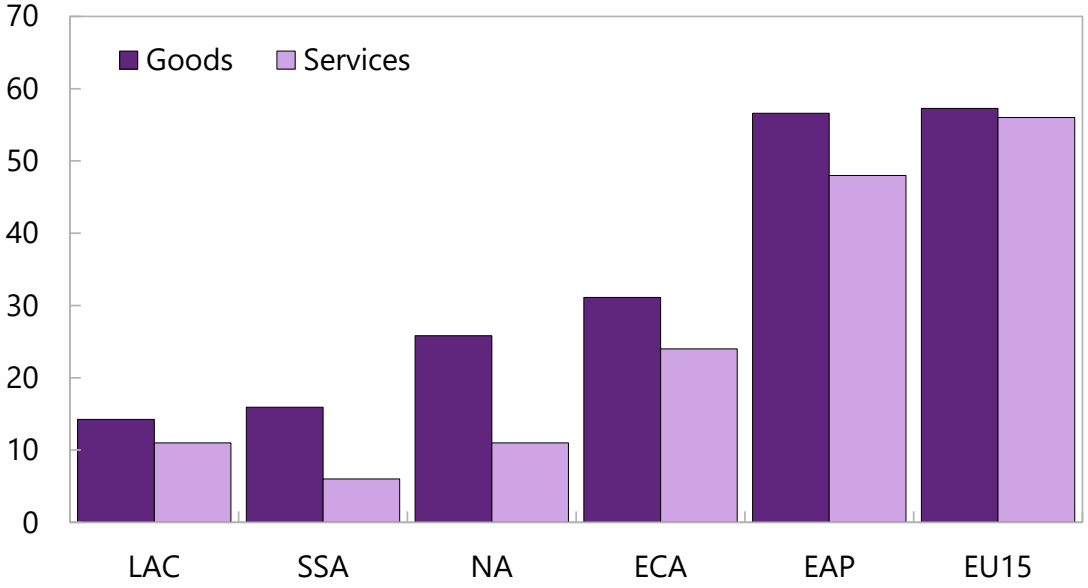


Sources: IMF BoP and IMF staff calculations. Notes: Includes intra-regional trade.

Intra-regional trade in goods and services has stagnated at low levels and is now substantially lower than other regions.

Intra-regional Trade of Goods and Services, 2019

(Percent)



Sources: IMF DOTS and IMF staff calculations. Notes: LAC = Latin America and the Caribbean; SSA = Sub-Saharan Africa; NA = North America; ECA = European and Central Asia; EAP = East Asia and Pacific; EU15 = European Union 15 extended.

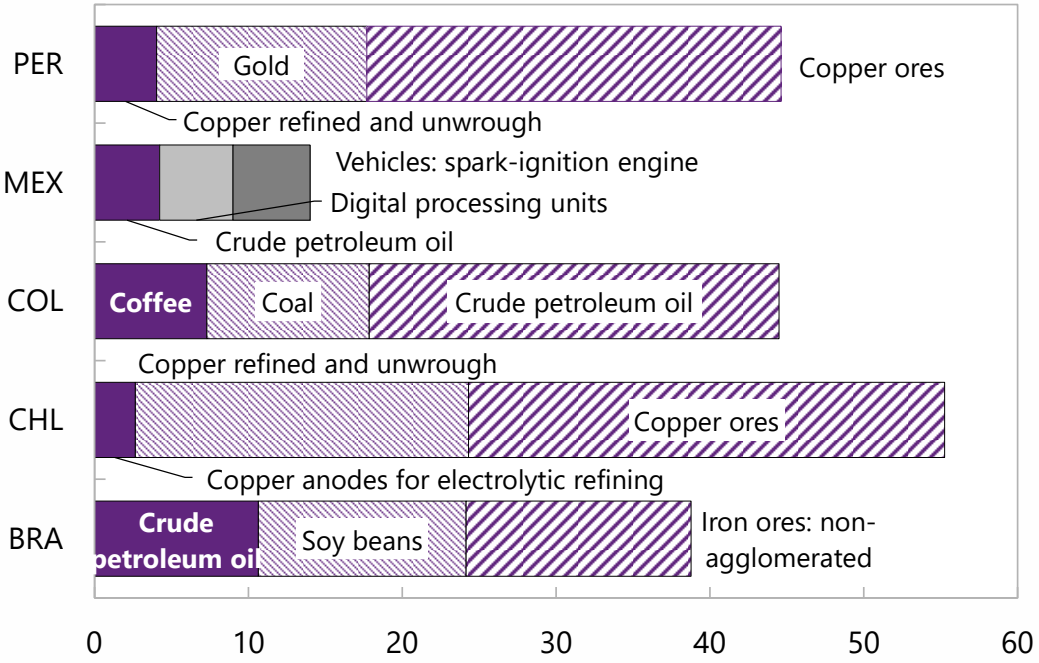
► Intra-regional basket ► 2000s ► Services

Exports are concentrated in commodities, and China has become an important consumer

Aside for Mexico, the top-3 products are **commodities**, accounting for 40+ percent of exports.

Top-3 Export Products in LA5, 2021

(Percent of goods exports)

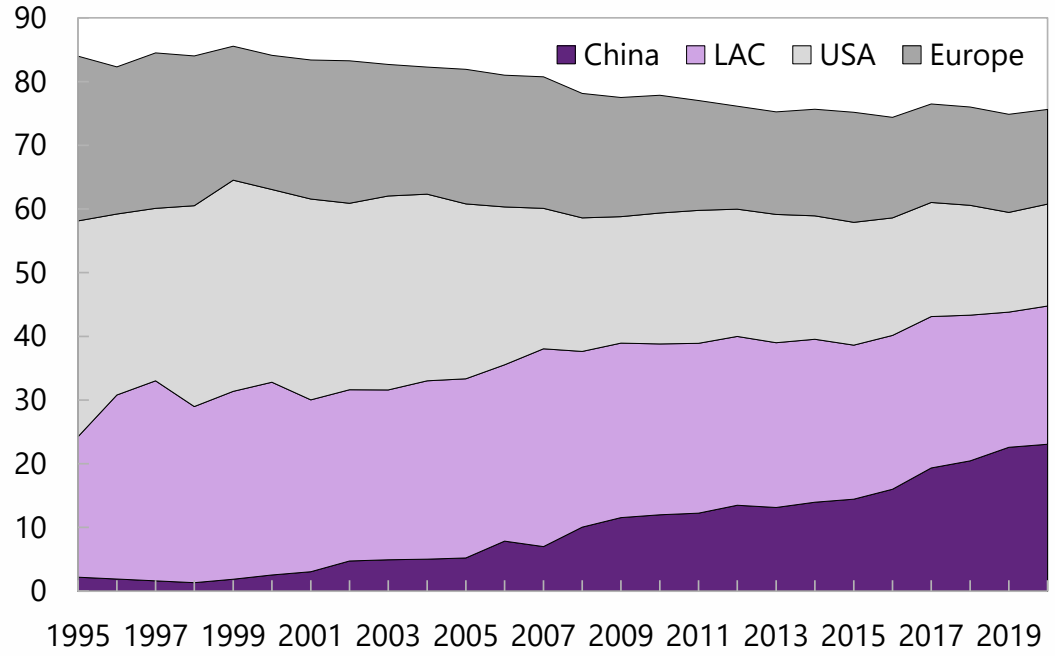


Sources: BACI and IMF staff calculations.

While intra-regional trade has remained stable, **China** is becoming an increasingly important **export destination**

China as Main Consumer of LAC's Exports

(Percent of total goods exports, excluding Mexico)



Sources: BACI and IMF staff calculations.

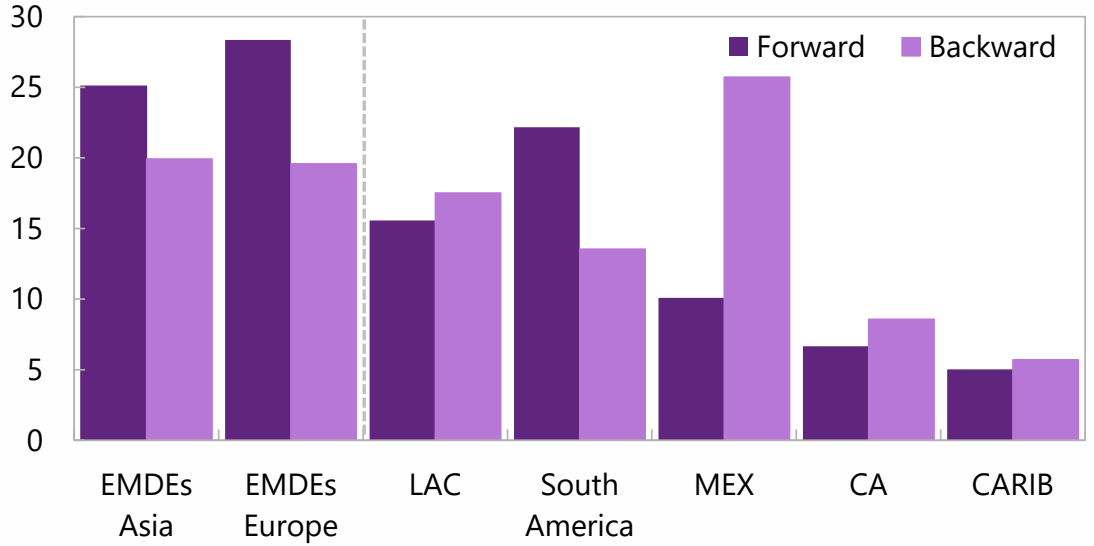
► Complexity ► Exports across destinations ► Incl. MEX ► Products to CHN ► Alternative Measures

LAC's exports lag in Global Value Chains participation

- The region lags in both **backward** (BP) and **forward** (FP) GVC participation
  - BP: the use of imported inputs in LAC's exports
  - FP: the use of LAC's exports as inputs in other countries' exports
- Large **heterogeneity** across subregions:
  - SA: commodity producers with relatively high FP but low BP
  - **MEX**: high BP due to manufacturing exports, but low FP suggests US as final destination
  - CA and CAR: little insertion into GVCs

Forward and Backward GVC Participation

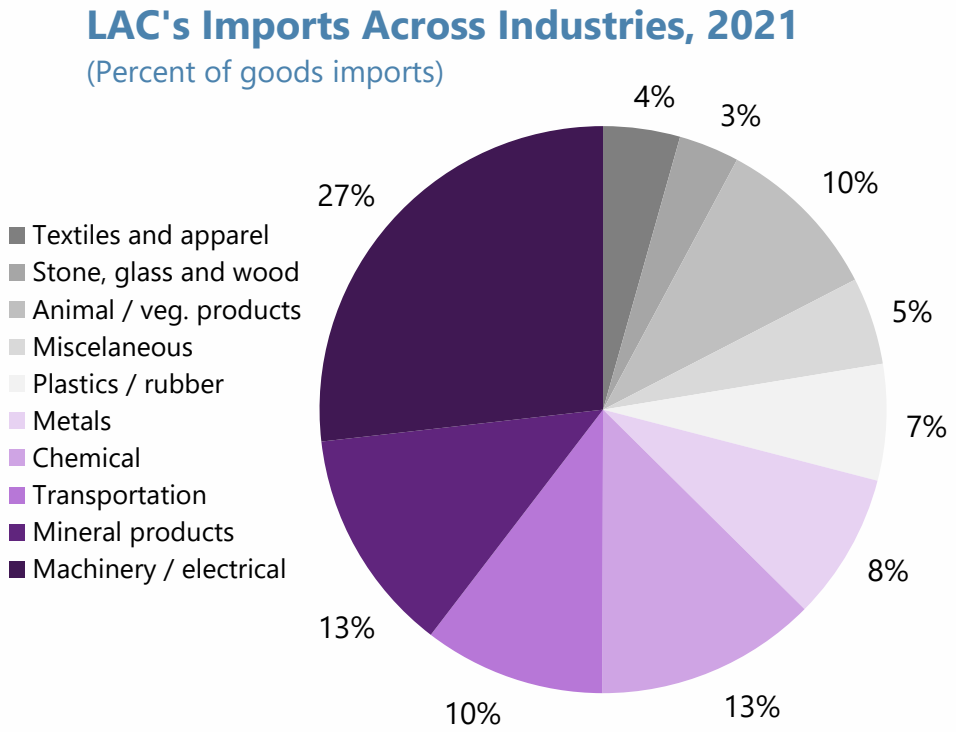
(Percent of gross exports of goods and services, 2015-2018 average)



Sources: EORA and IMF staff calculations. Notes: Backward participation refers to the use of imported inputs in exports; Forward participation refers to the export of inputs used in the importing country's exports.

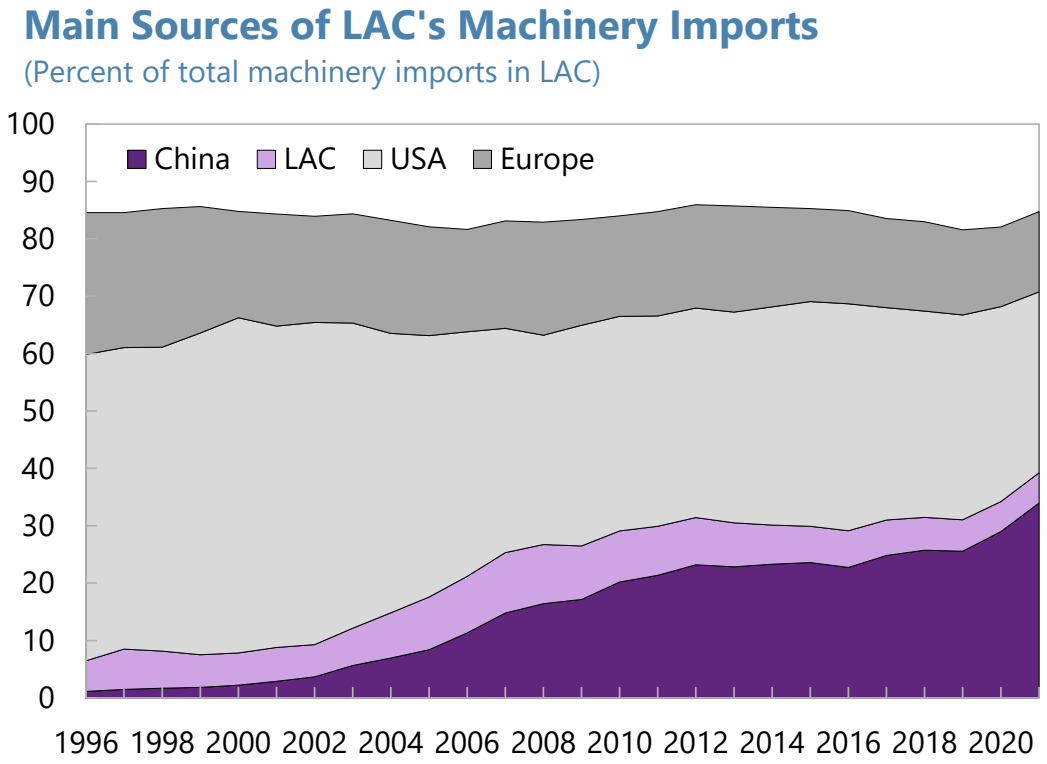
Large and growing role of China in LAC's imports

Nearly a third of the region's imports are in **machinery, electrical, and transportation** goods.



Sources: BACI and IMF staff calculations.

China supplies 1/3 of LAC's machinery imports (and 1/5 of overall imports).



Sources: BACI and IMF staff calculations.

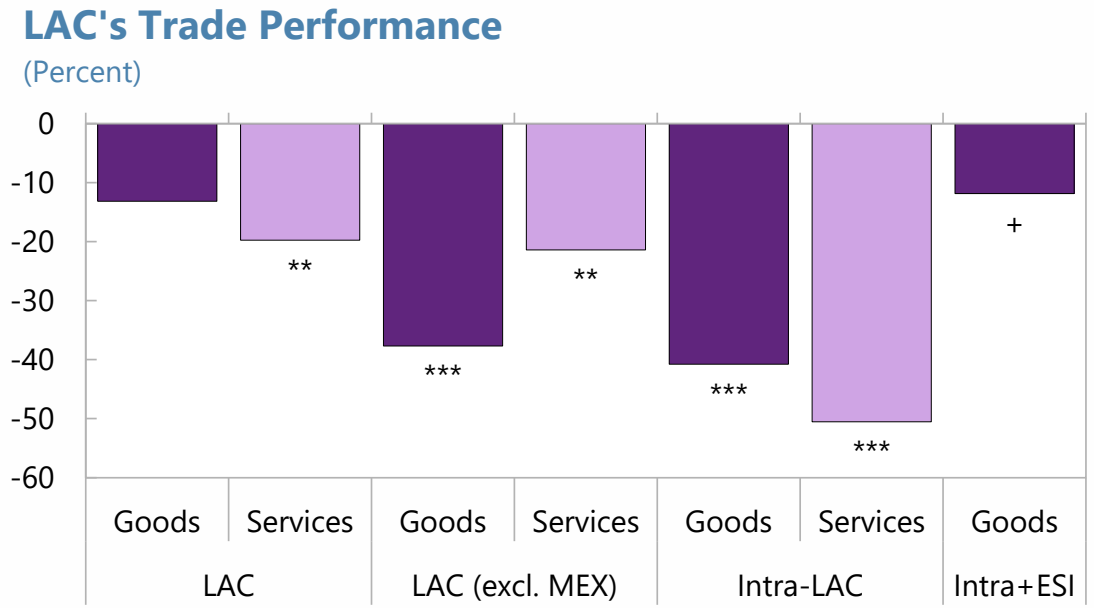
► CHN export similarity ► Total imports

B. Obstacles to Trade and Potential for Trade Integration

LAC under-trades in goods and services

Baseline gravity model: $X_{ij}^{s} = \exp\left(\boldsymbol{\beta^{s}} \cdot I\{i \; or \; j \; in \; LAC \; region\} + \delta^{s\prime}\text{Gravity}_{ij}^{s}\right) \times \varepsilon_{ij}^{s}$

- **Gravity** variables: GDP, population, distance, border, language and landlocked
- LAC trades considerably less than countries with similar economic and geographic characteristics
  - In both goods and services trade
- This underperformance is even larger at the intra-regional level
  - In part due to similarity in trade baskets



Sources: Bhattacharya and Pienknagura (2023). Notes: Percent difference in trade flows in LAC vs. non-LAC regions, conditional on population, GDP, distance, border, common language and landlocked: 100*(exp(β^{s})-1). ESI=Export similarity index is the Spearman index for goods trade at the product level. ***p<1%, **p<5%, *p<10%, +p<20%.

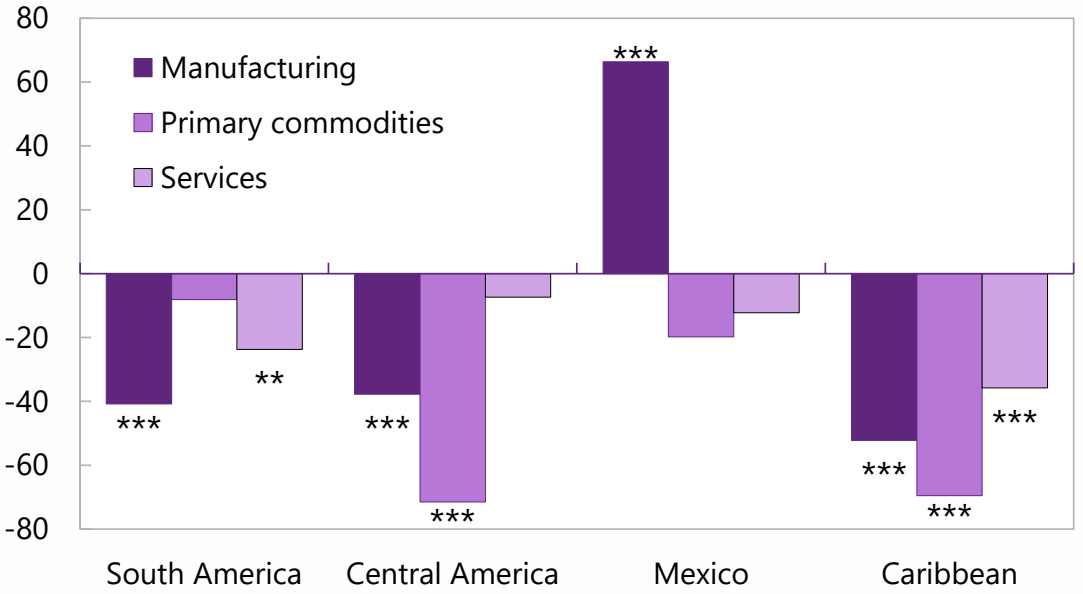
► ESI coef.

LAC under-trades in specific subregions and subsectors

- SA under-trades in all sectors but commodities.
- CA under-trades in all sectors but services.
- CAR under-trades in all sectors.
- **MEX is this exception**

Trade Performance in LAC's Regions and Sectors

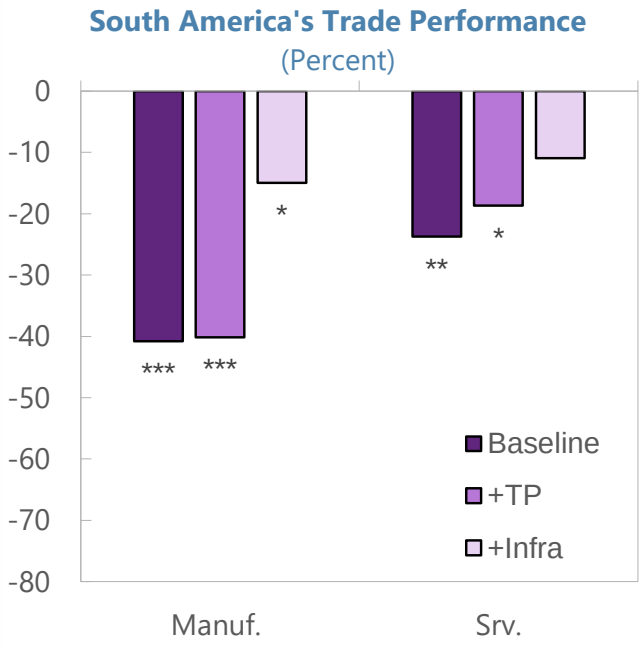
(Percent)

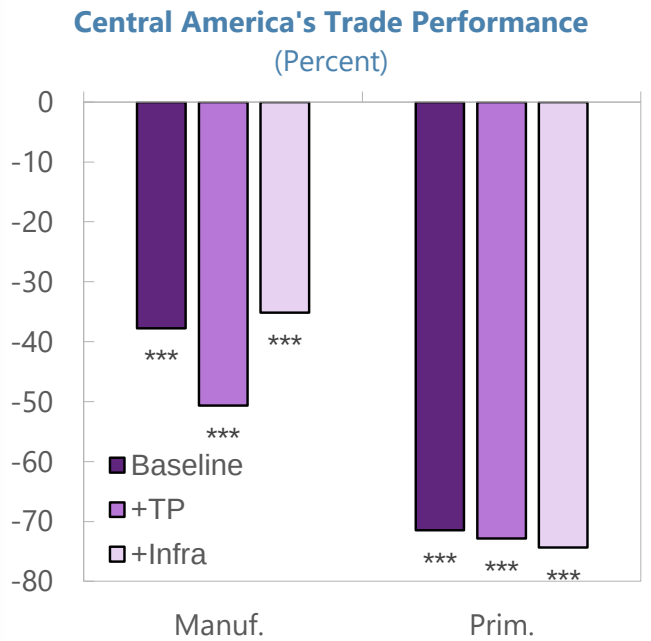


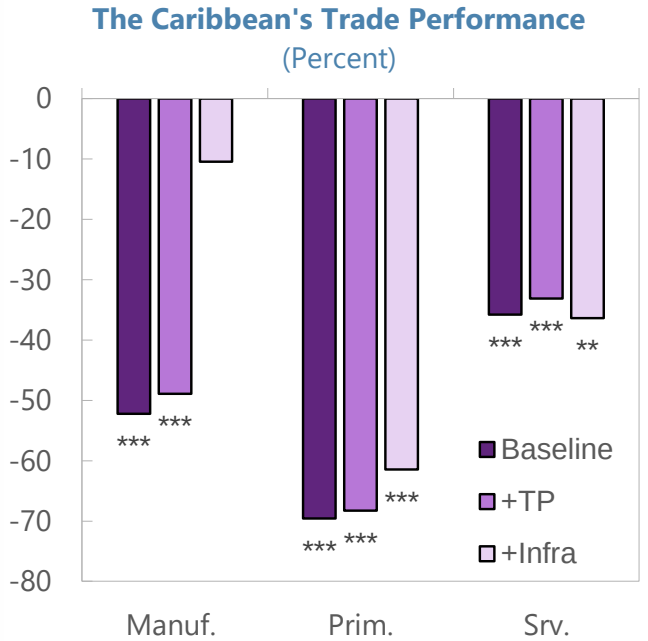
Sources: Bhattacharya and Pienknagura (2023). Notes: Percent difference in each region's trade flows relative to non-LAC trade flows, conditional on baseline gravity variables: 100*(exp(β^S)-1). ***p<1%, **p<5%, *p<10%.

Infrastructure is a key factor behind LAC's under-trading in manufacturing

- Trade policy: MFN tariffs, non-tariff trade barrier index and bilateral trade agreement dummies.
- Infrastructure: WB's Logistics Performance Index for **transportation** and **customs**. ▶
- Augmented gravity: $X_{ij}^{s} = \exp\left(\boldsymbol{\beta^{s}} \cdot I\{i \text{ or } j \text{ in LAC region}\} + \lambda' \text{Infra}_{ij}^{s} + \theta^{s\prime} \text{TradePolicy}_{ij}^{s} + \delta^{s\prime} \text{Gravity}_{ij}^{s}\right) \times \varepsilon_{ij}^{s}.$







- Annex: governance and factors of production (e.g., human capital and electricity access) also help explain under-trading in South America. ▶

▶ Mercosur ▶ Tariffs ▶ Table (+tp) ▶ Table (+infra)

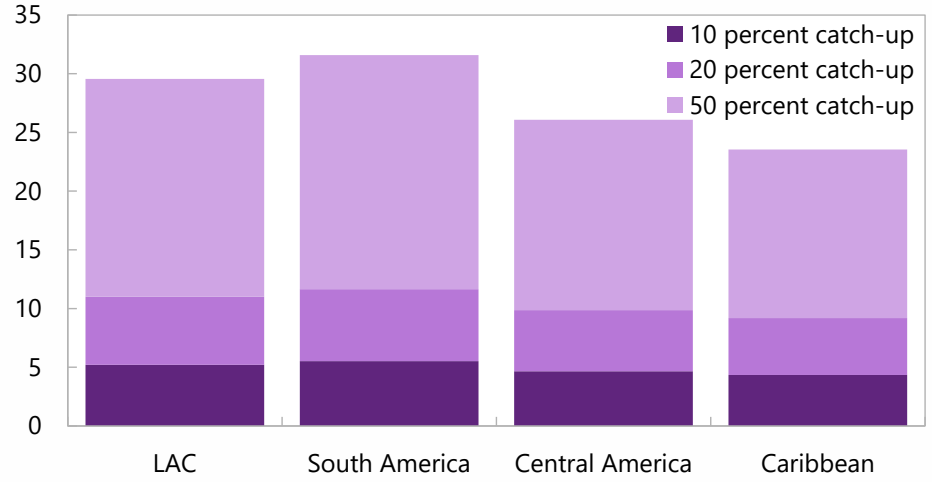
Large potential trade and output gains from improving infrastructure

What are the trade and output gains from closing the infrastructure gaps in the region? ▶

Closing LAC's infrastructure gap could increase exports between 5 and 30 percent…

Export Gains from Closing Infrastructure Gaps Between LAC and AEs

(Percent increase in exports relative to baseline)

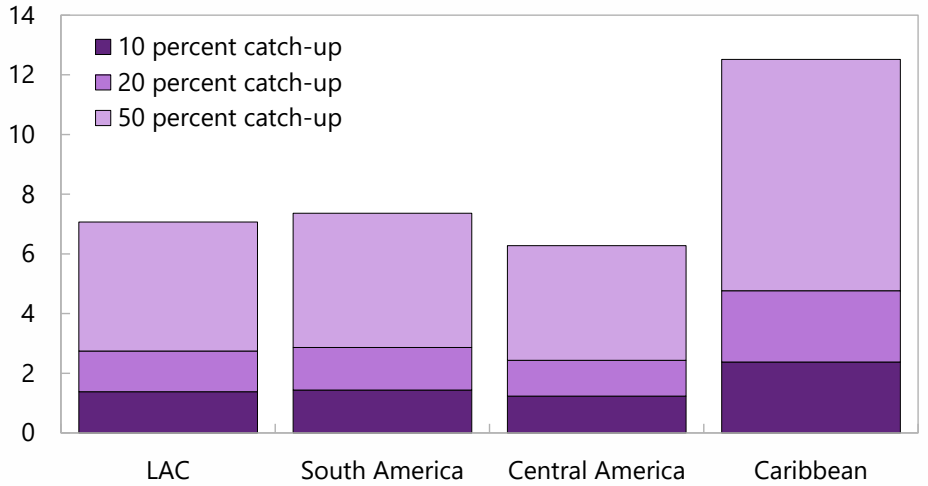


Sources: IMF staff calculations. Notes: LAC = Latin America and the Caribbean; SA = South America; CAM = Central America and Mexico; CAR = The Caribbean.

…leading to sizeable output gains, depending on each country's initial infrastructure quality and gravity forces

Output Gains from Closing Infrastructure Gaps Between LAC and AEs

(Percent increase in output relative to baseline)



Sources: IMF staff calculations. Notes: LAC = Latin America and the Caribbean; SA = South America; CAM = Central America and Mexico; CAR = Caribbean.

▶ Contributions ▶ LPI and policy

C. Global Fragmentation: Implications for LAC

The risk of global fragmentation has increased

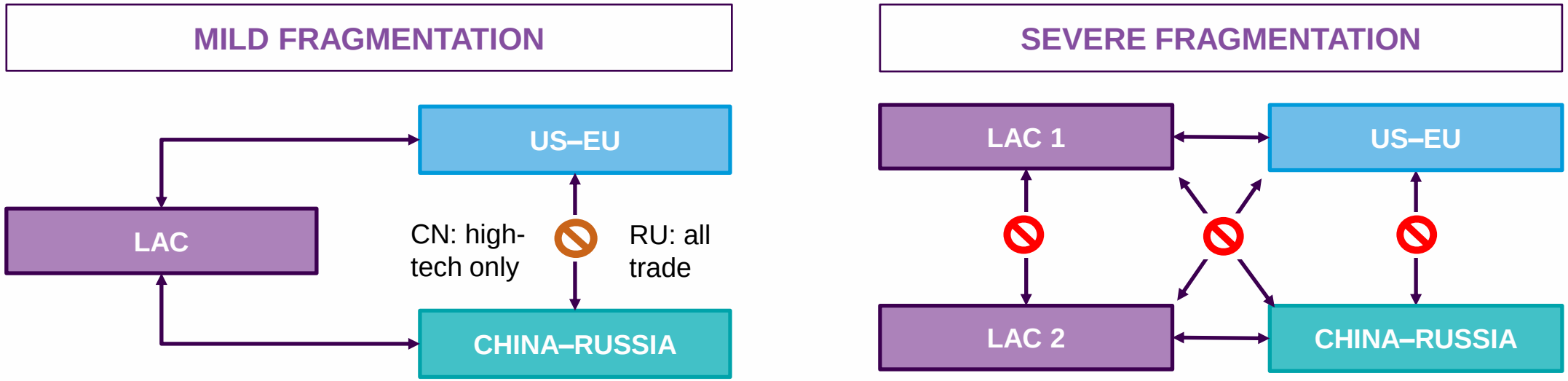
- **Risks of global fragmentation have sharply risen in recent years**
  - "Geoeconomic Fragmentation" refers to any policy-driven reversal of integration, including reversals guided by **strategic considerations** such as national security

- **Fragmentation could reverse the gains from globalization, affecting LAC via several channels**
  - Trade and financial flows could be disrupted, impairing capital allocation and technological diffusion
  - Spillovers: remittances, migration, and international cooperation on climate change.

- **Changing trade landscape could also provide trade diversion opportunities for LAC**
  - Companies could choose to relocate parts of their supply chain operations to countries where disruption risks are lower
    - MEX and Vietnam ('connectors') benefitted from trade diversion during 2018 US/China trade tensions ▶
  - LAC's fossil fuel, mineral, and agricultural producers could also benefit from a reorientation of demand as well as temporarily higher commodity prices (WEO 2023)

The likely impact of fragmentation on LAC will depend on the degree of fragmentation

- **Uncertainty** regarding the degree and shape of fragmentation
- **Two illustrative scenarios**, following (Bolhuis et al. 2023, IMF 2023):

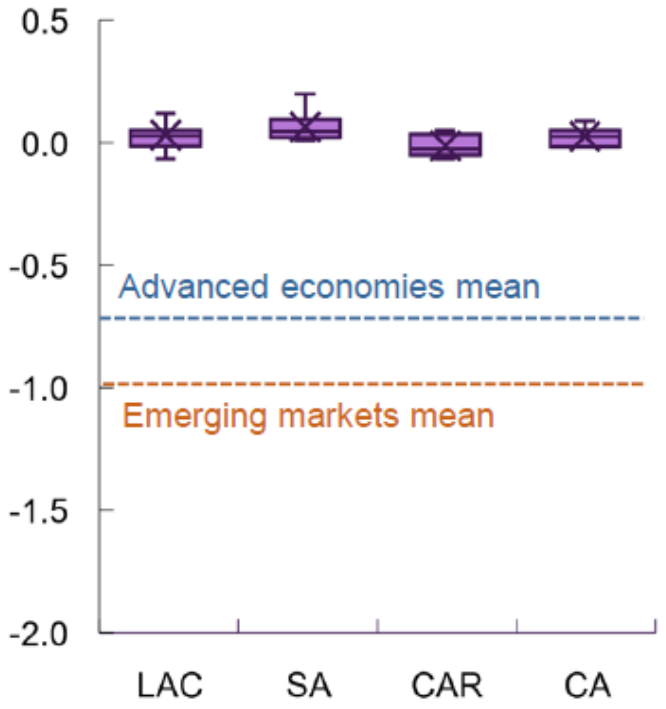


- But how do we **split LAC1 and LAC2** in the severe fragmentation scenario?
  - Option 1: based on **trade shares** with US-EU vs China-Russia
  - Option 2: based on **geopolitical proximity** on UN General Assembly voting patterns

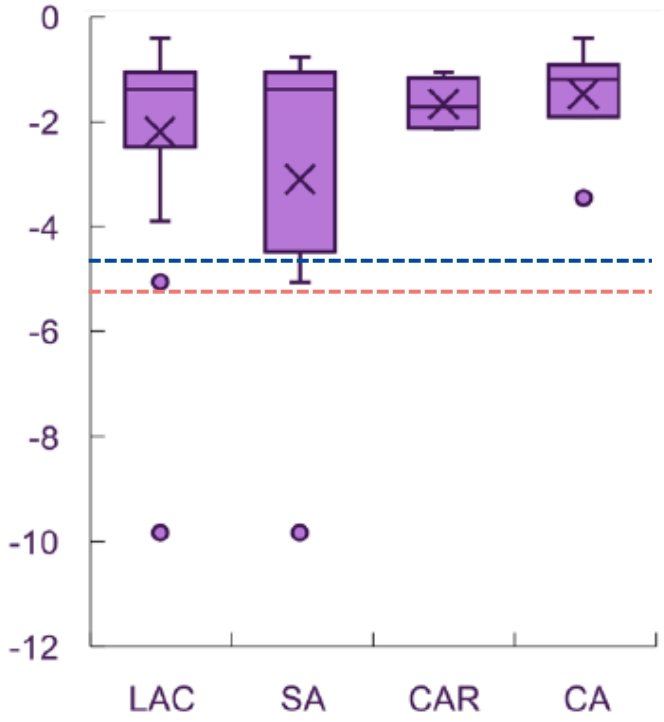
►Measures ►Map

LAC can weather mild fragmentation but faces much larger losses in case of severe fragmentation scenarios

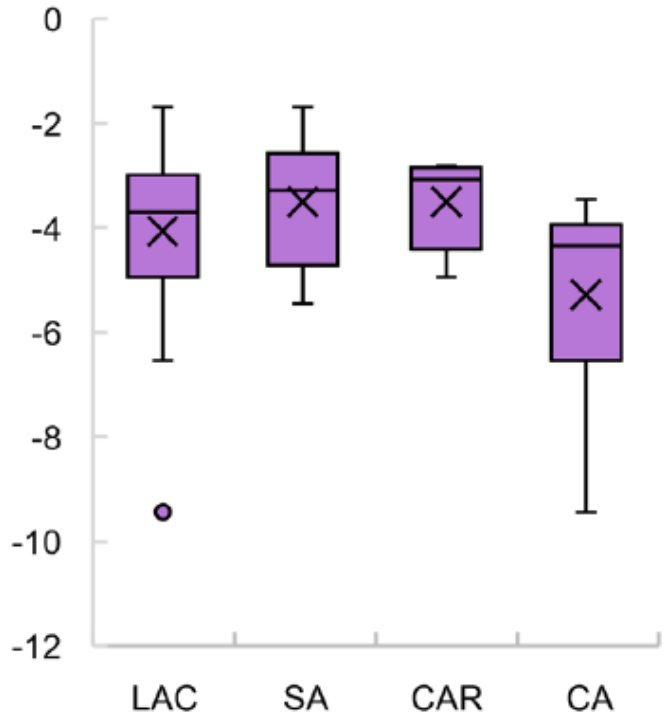
1. Mild fragmentation scenario where LAC is neutral
(Percent change in output relative to baseline)



2. Extreme fragmentation scenario with blocs based on trade proximity
(Percent change in output relative to baseline)



3. Extreme fragmentation scenario with blocs based on geopolitical proximity
(Percent change in output relative to baseline)



Source: IMF staff calculations.
Note: In all panels, the horizontal lines in the bars represent the median, for the countries in the group, the cross the average, the bars the interquartile range, the whiskers the min and max, except for outliers (dots) lying outside 1.5 times the interquartile range away from the median. Emerging markets refer to emerging markets and developing economies excluding low-income countries. The horizontal lines are unweighted means. CA = Central America including Mexico; CAR = Caribbean; LAC = Latin America and the Caribbean; SA = South America.

Concluding Remarks

Takeaways and Concluding Remarks

- **LAC's trade is (still) concentrated in few sectors – commodities in particular –, with China as main partner**

- **LAC's degree of trade integration is low** given its geographic and economic features
  - Intra-regional trade has remained limited, including in services
  - Inadequate infrastructure in the region explains its low trade performance, particularly in manufacturing

- **Potential for substantial gains from improving infrastructure**. ►
  - Closing gaps on transport and customs infrastructure could boost trade by 11 percent and output by 3 percent.
  - Complementary policies (education) and digitization (e.g. Pix) could help develop trade in services

- **The region is well placed to withstand mild fragmentation scenarios** if LAC can remain neutral
  - More significant losses in severe scenarios, with substantial heterogeneity across countries.

- **Strengthening trade integration,** would help reaping gains from trade and mitigating the risks of global fragmentation, including policy uncertainty.
  - MERCOSUR ongoing discussions with EU, Canada, Singapore, UAE
  - Regional initiatives could start with narrow focus: e.g. critical minerals, Amazon

Appendix

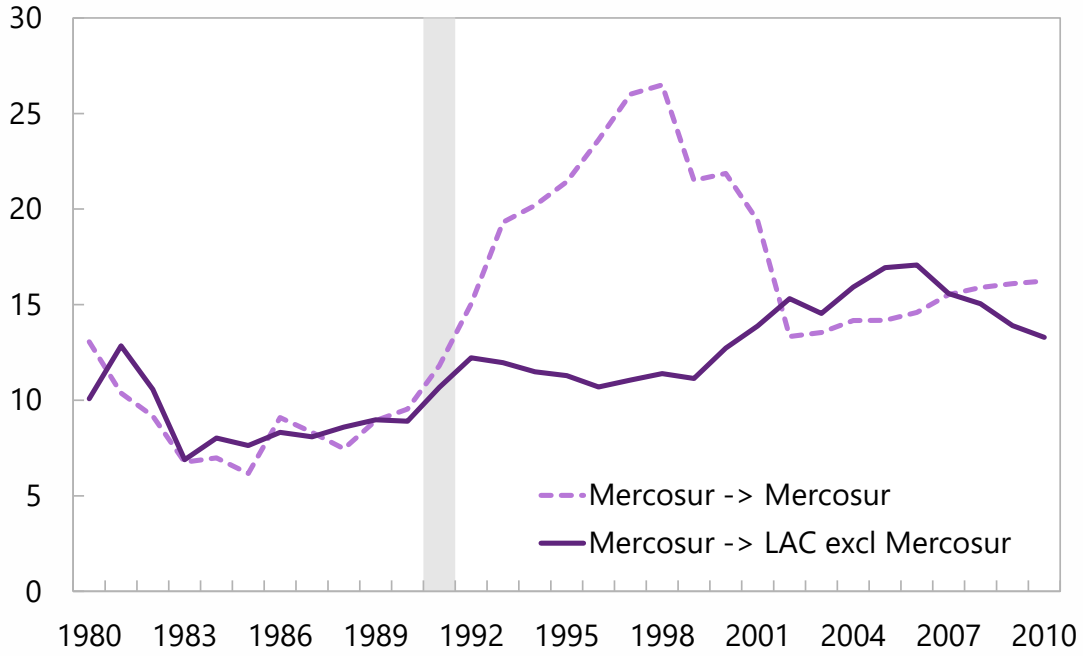
The case of Mercosur

Mercosur **initially boosted** trade but its long-term impact appears to have been limited

Currently, the bloc under-trades in goods; partly reflecting **transportation frictions**, and factors of production (education)

Exports from Mercosur to Mercosur and to rest of LAC

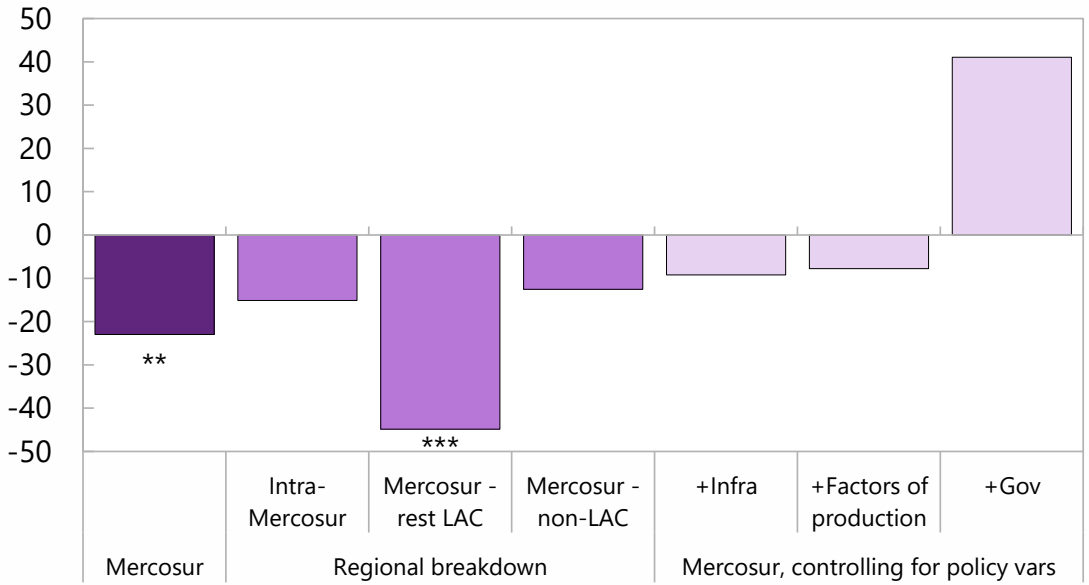
(Share of goods trade, percent)



Sources: IMF DOTS and IMF staff calculations. Mercosur=ARG,BRA,PRY,URY.

Mercosur's Goods Trade Performance

(Percent)



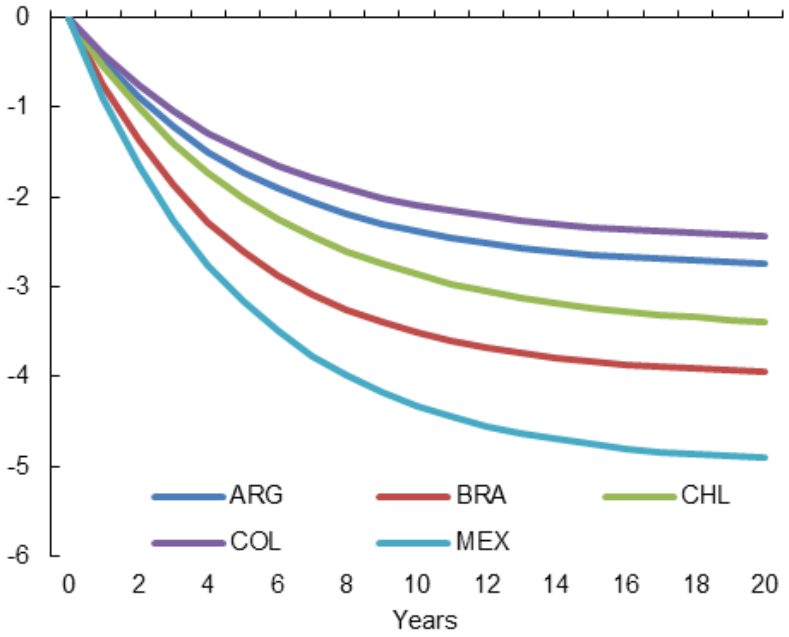
Notes: Percent difference in trade flows in Mercosur vs. non-LAC regions, conditional on population, GDP, distance, border, common language, landlocked, MFN tariffs, trade agreements and non-tariff trade barriers. ***p<1%, **p<5%, *p<10%.

Back

Investment channel can amplify the cost of fragmentation

- **Declining prices of capital goods has been a major driver of productivity growth** in EMDEs during globalization (WEO 2019). ▶
- **Fragmentation could depress investment**, given LAC's dependence on China for machinery/equipment.
- Quantify the impact of fragmentation on capital accumulation in a dynamic multi-country trade model
  - Focus on severe fragmentation + trade share country assignment
- **Fragmentation** would result in:
  - i) higher prices of capital goods ii) lower investment rates, and capital-output ratios iii) lower productivity
  - Capital accumulation channel amplifies the cost of fragmentation by about 40 percent.

Capital-Output Ratios after an increase in Trade Barriers



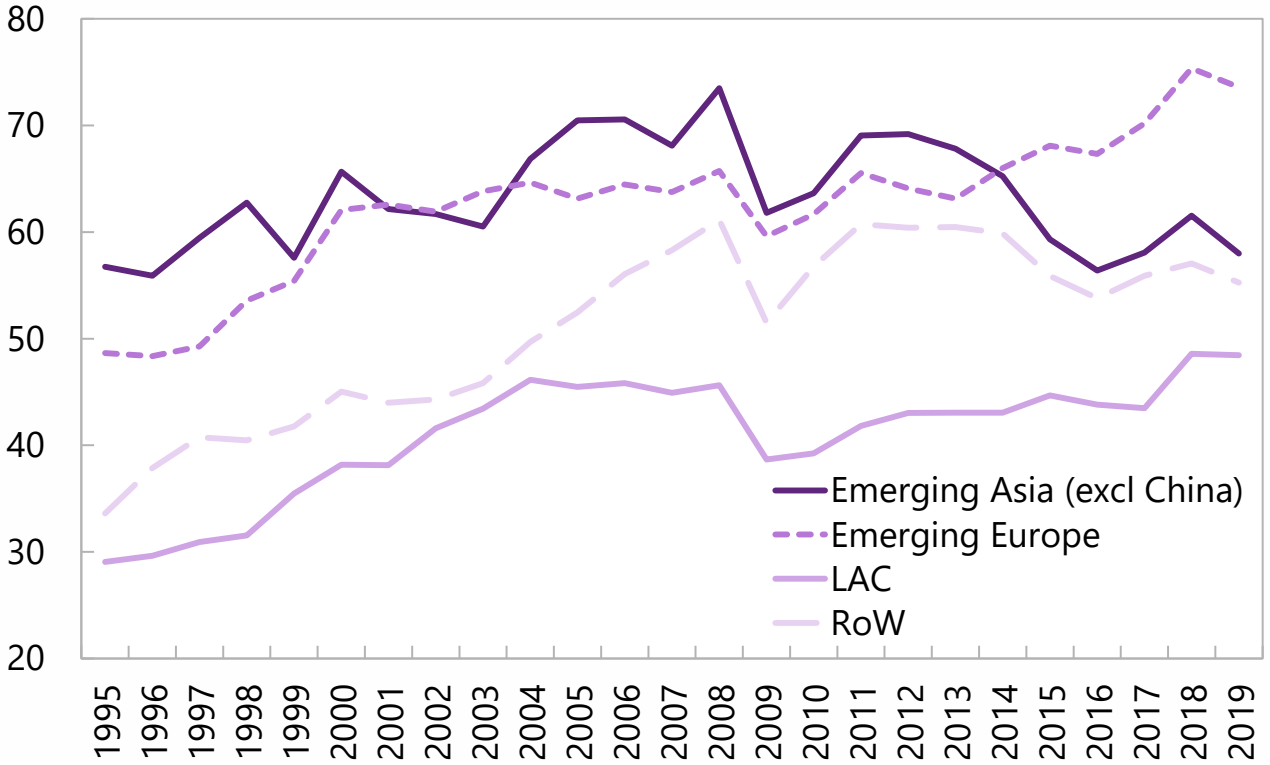
Source: EORA, BACI, and IMF staff calculation

Note: Evolution of capital-to-output ratio over time after trade is fragmented into blocks. Percentage losses relative to the capital-to-output in the baseline equilibrium with no fragmentation

Trade openness over the 2000s

Trade as Share of GDP

(Total trade in goods and services in percent of GDP)



Sources: IMF BOP and IMF staff calculations.

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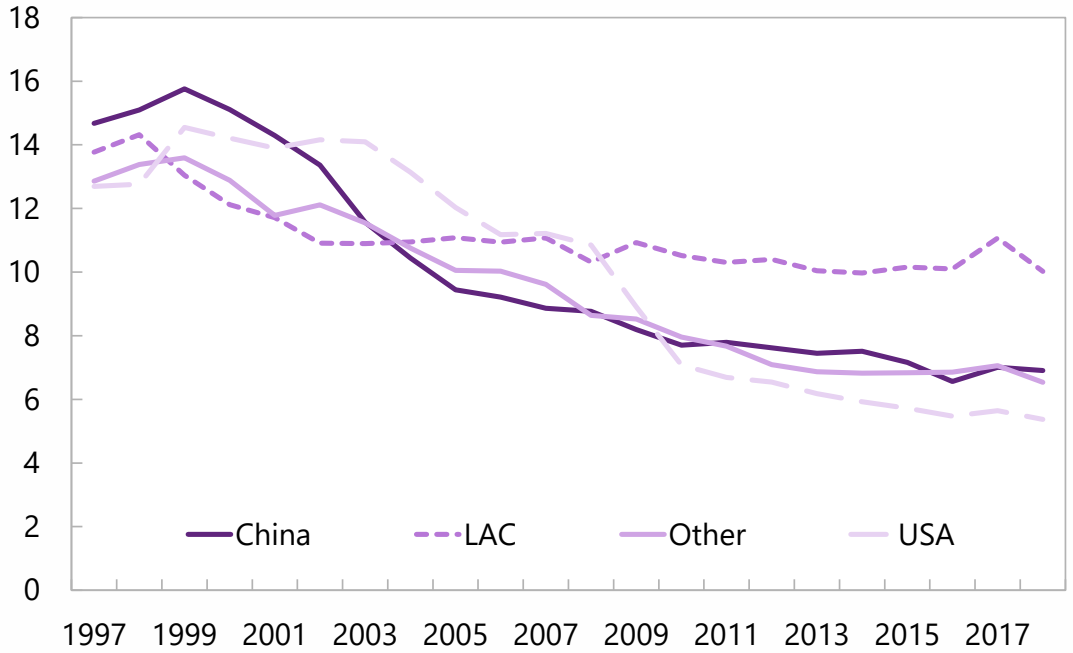
Bilateral import tariffs

LAC's MFN Import Tariffs

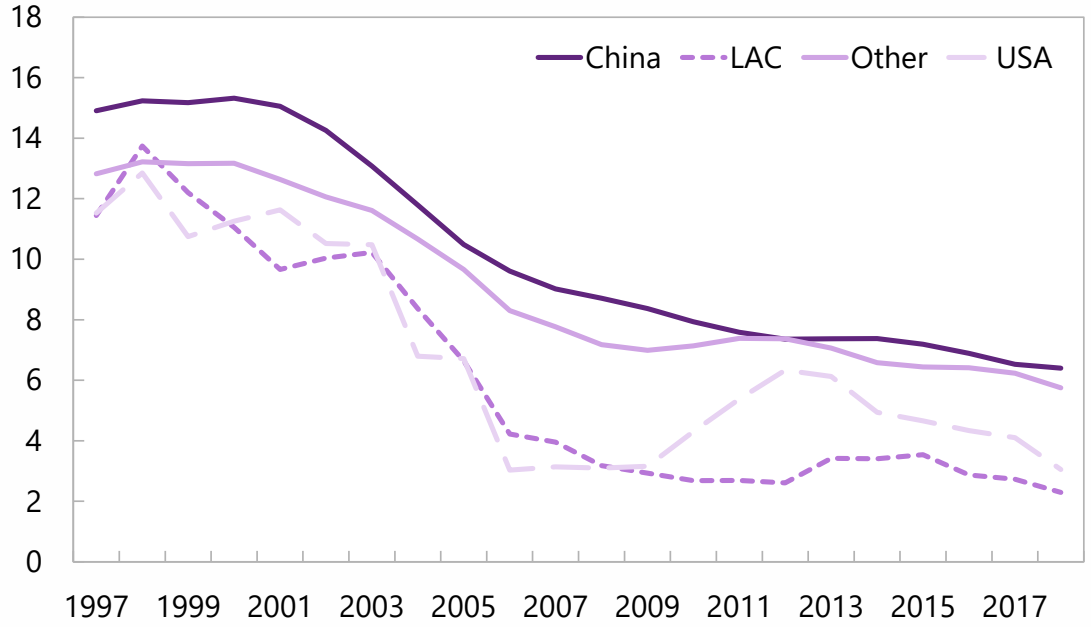
(By trade partner, percent)



Sources: TRAINS, ITPD-E and IMF staff calculations.

LAC's Effectively Applied Import Tariffs

(By trade partner, 3-year moving average, percent)



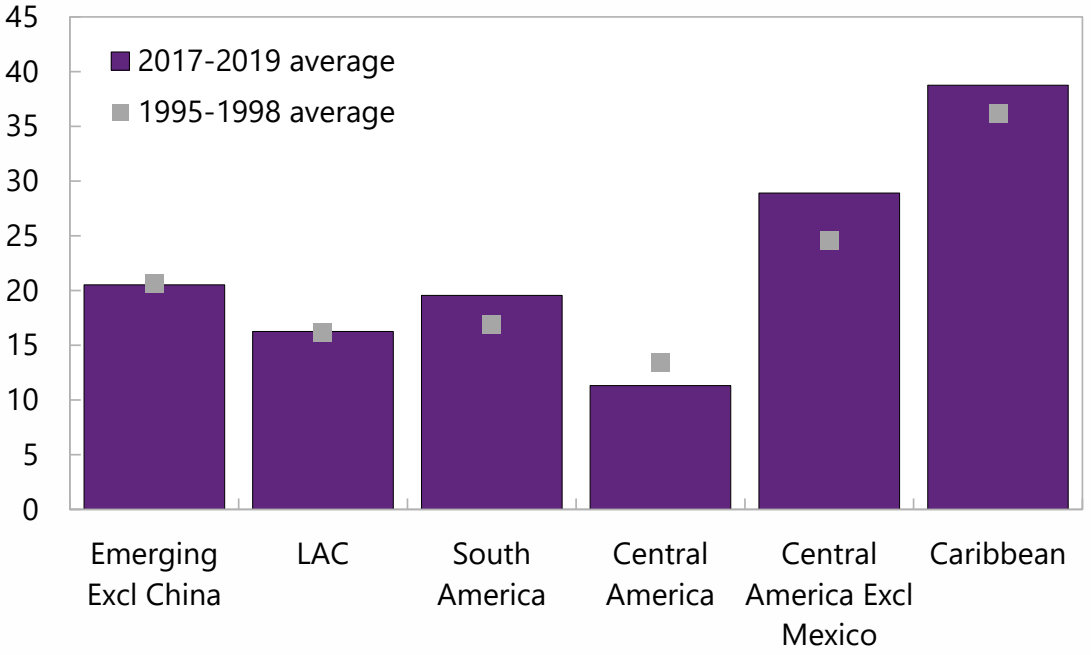
Sources: TRAINS, ITPD-E and IMF staff calculations. Notes: Effectively applied tariff is the lowest available tariff rate for each country pair.

Back

Trade in services accounts for 16 percent of trade in LAC

Trade in Services in Total Trade

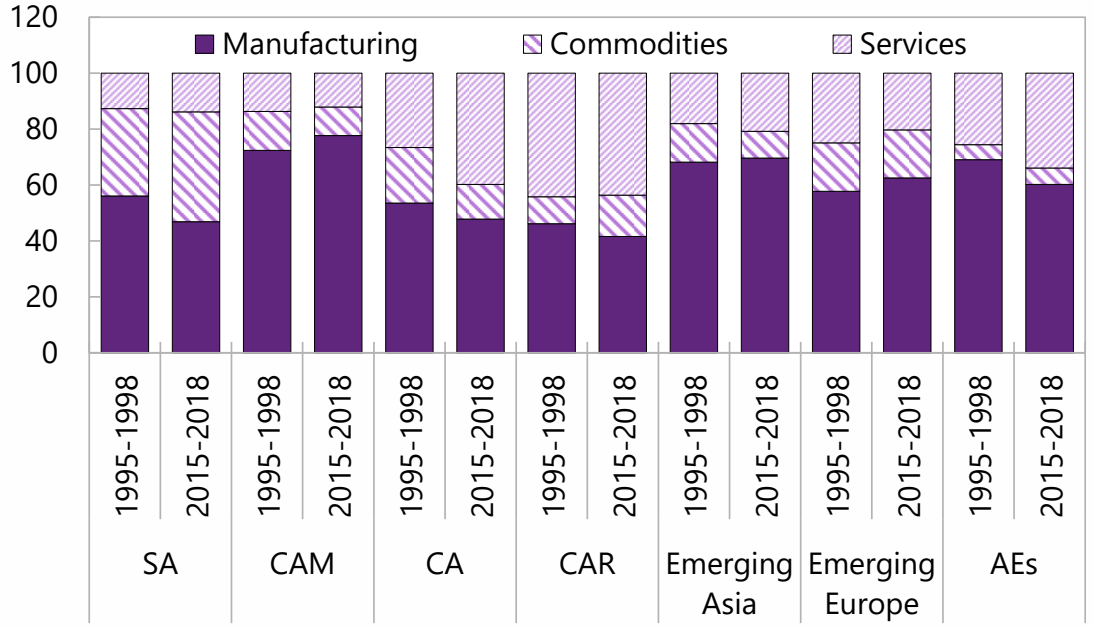
(Percent)



Sources: IMF BoP and IMF staff calculations. Notes: Includes intra-regional trade.

Exports by Sector

(Percent of total exports of goods and services)



Sources: ITPD-E and IMF staff calculatins. SA=South America; CAM=Central America; CA = Central America excl. Mexico; CAR=The Caribbean; AEs=Advanced Economies.

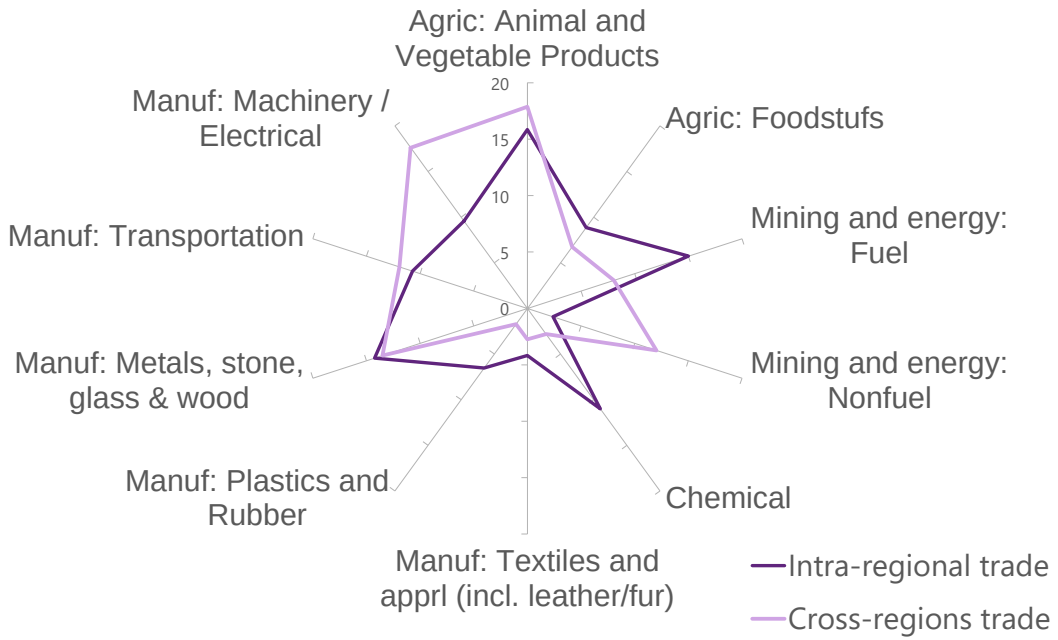
Back

LAC trades in industries with high distance elasticities, hindering regional integration

Intra-regional trade basket is shifted towards fuel and low-tech manufacturing…

LAC's Intra- and Cross-regional Export Baskets

(Percent)

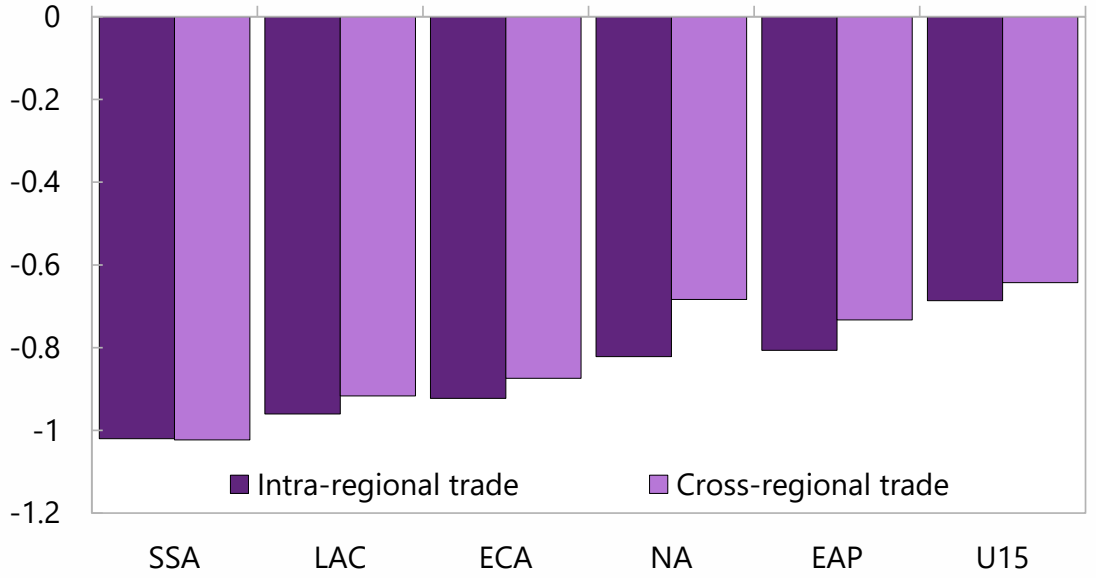


Sources: BACI and IMF staff calculations.

…and concentrated in industries with high distance elasticities

Distance elasticity of intra- and cross-regional trade flows

(Gravity coefficients, average across industries)



Sources: ITPD-E and IMF staff calculations. Notes: averages are weighted by each region's intra- and cross-regional trade baskets. 170 industries, including agriculture, mining and energy, manufacturing and services.

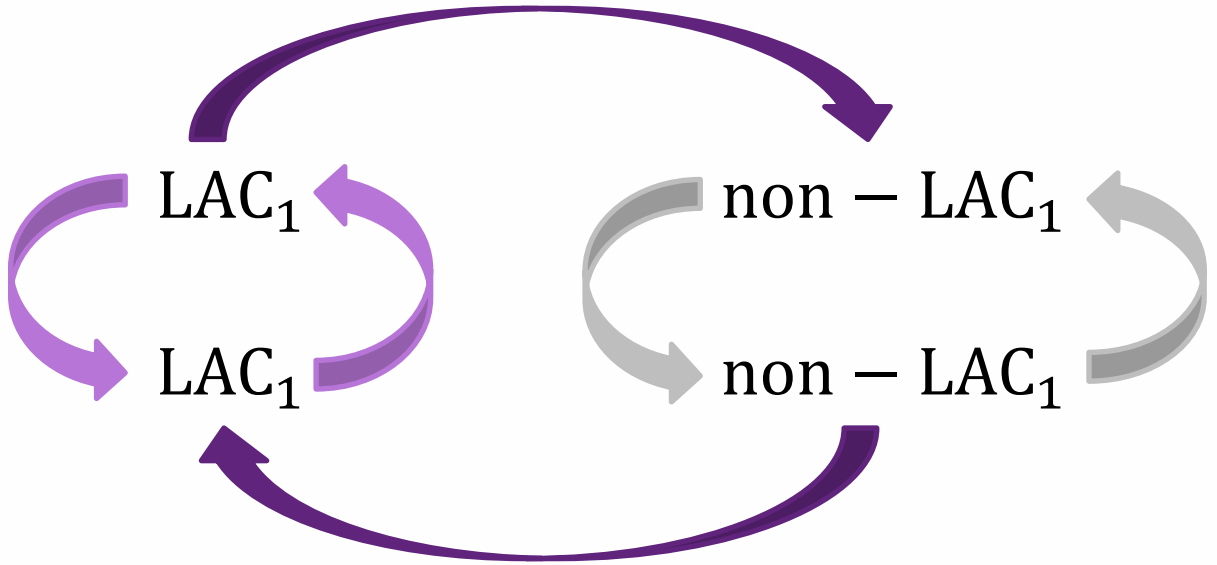
▶ Back

ESI decreases trade flows in primary commodities

	Merchandise	Primary Commodities
Export similarity index	0.170	-0.857**
	(0.143)	(0.381)

Back

Benchmarking LAC's trade flows



\+ LAC trade flows (treatment)

Intra-regional LAC trade flows (treatment')

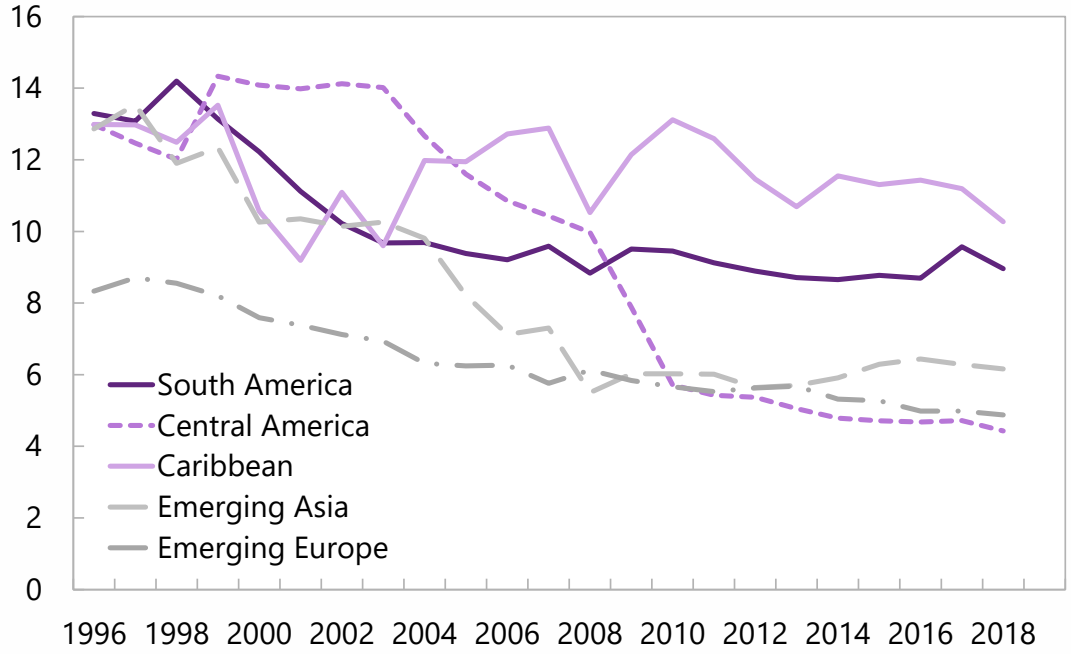
Non-LAC trade flows (control/benchmark)

Back

Import tariffs in South America and the Caribbean did not fall alongside peer regions

Broad reduction in MFN tariffs in early 2000s, but progress stopped in late 2000s for SA and the CAR.

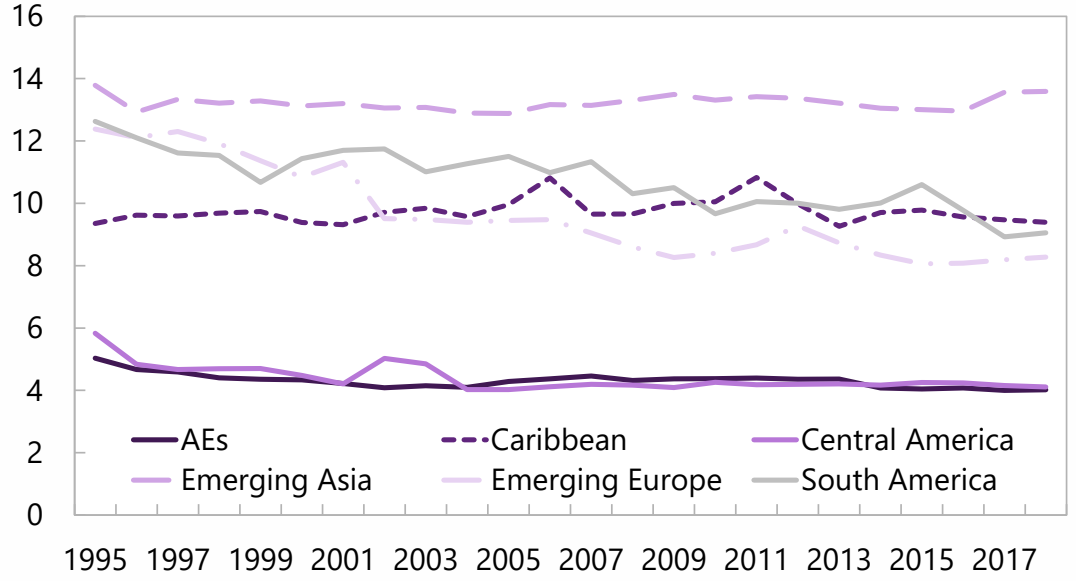
Most-Favoured Nation Tariffs Across Regions
(Weighted by imports, percent)



Sources: TRAINS, ITPD-E and IMF staff calculations.

Not much gains in reducing non-tariff trade barriers in SA and the CAR.

Non-tariff Trade Barriers by Region
(Average MATR, weighted by good imports)



Sources: Estefania-Flores et al. (2022). Notes: MATR = Measure of Aggregate Trade Restrictions, an empirical measure of how restrictive official government policy is towards the international flow of goods and services, developed by IMF authors.

Back ► Bilateral tariffs ► Unweighted avg.

Trade policy + Infrastructure indicators

	Merchandise			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)
FTA dummy	0.593***	0.590***	0.610***	0.684***	0.667***	0.688***
	(0.0893)	(0.0913)	(0.0881)	(0.0961)	(0.100)	(0.0958)
log (MATR)	-0.432***	-0.303*	-0.475***	-0.540***	-0.450***	-0.602***
	(0.140)	(0.159)	(0.133)	(0.149)	(0.172)	(0.142)
Average MFN, importer	-0.0329**	-0.0308*	-0.0374**	-0.0379**	-0.0382*	-0.0439**
	(0.0166)	(0.0180)	(0.0180)	(0.0174)	(0.0199)	(0.0192)
Inf. LPI, exporter	2.137***		3.380***	4.215***		4.071***
	(0.586)		(1.057)	(0.737)		(1.306)
Inf. LPI, importer	1.747***		2.436***	1.171**		2.174**
	(0.468)		(0.888)	(0.490)		(0.924)
Customs LPI, exporter		1.203***	-1.293*		3.203***	0.145
		(0.397)	(0.686)		(0.485)	(0.820)
Customs LPI, importer		1.298***	-0.753		0.811**	-1.068
		(0.382)	(0.701)		(0.408)	(0.717)

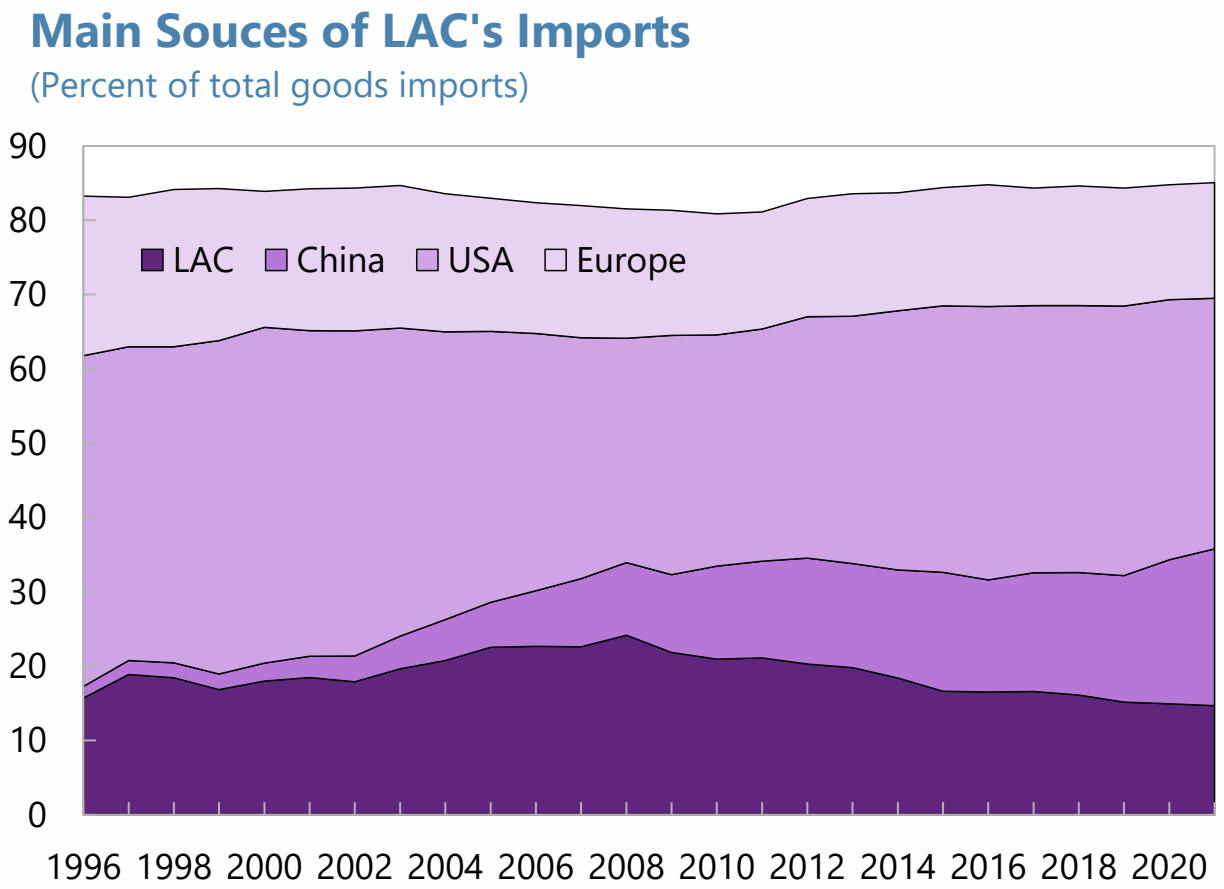
Back

Trade policy

	Merchandise	Manuf	Prim Commodities
FTA dummy	0.646***	0.742***	0.257
	(0.0960)	(0.105)	(0.171)
log (MATR)	-0.263	-0.378**	0.247
	(0.160)	(0.181)	(0.208)
Average MFN, importer	-0.0515**	-0.0542**	-0.0375
	(0.0201)	(0.0223)	(0.0240)

Back

LAC accounts for over 10 percent of total imports of goods



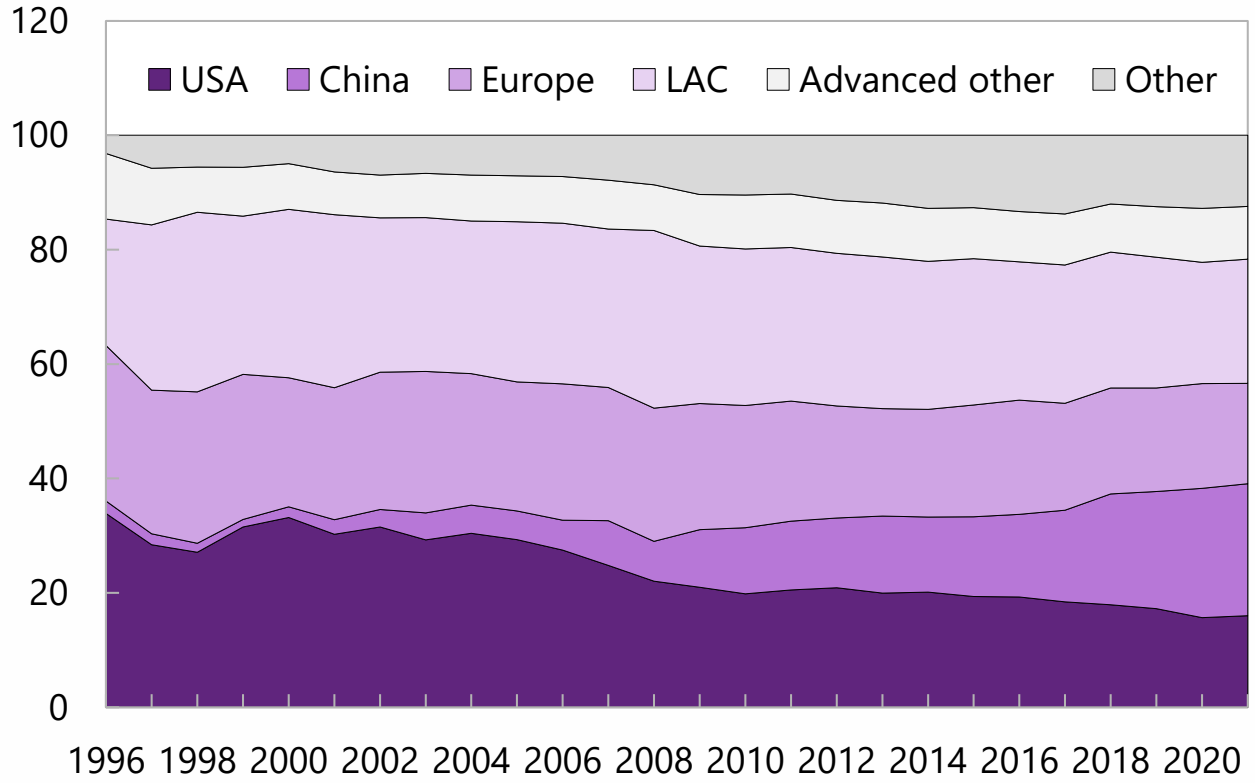
Sources: BACI and IMF staff calculations.

Back

Composition of exports across destinations

Composition of LAC's Exports Across Destinations

(Excluding Mexico, percent)



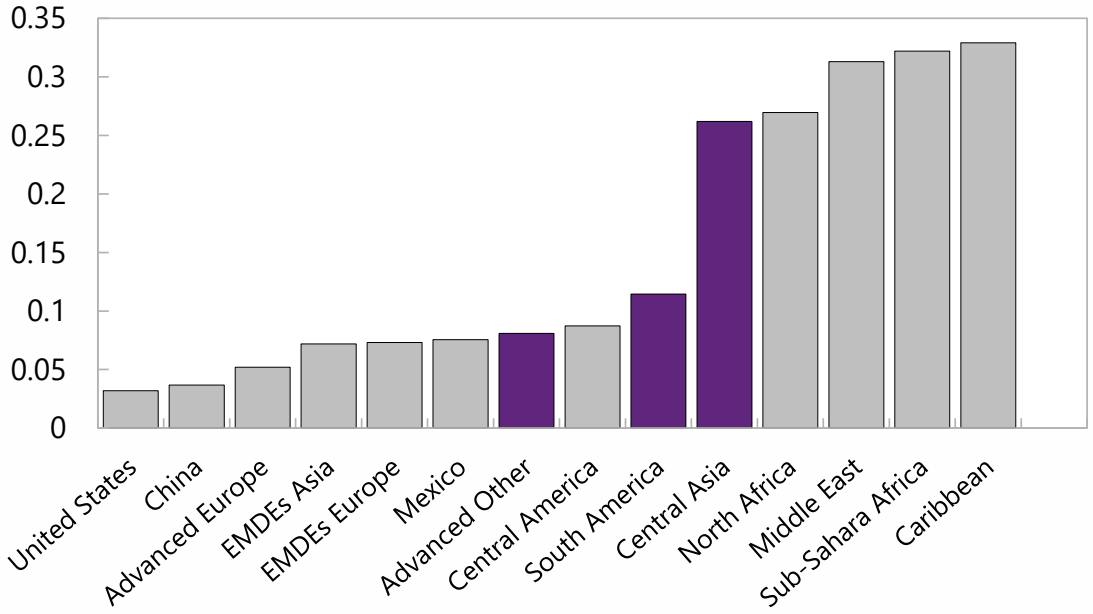
Sources: BACI and IMF staff calculations.

Back

Trade concentration: alternative measures and the role of China

Goods Export Concentration, 2021

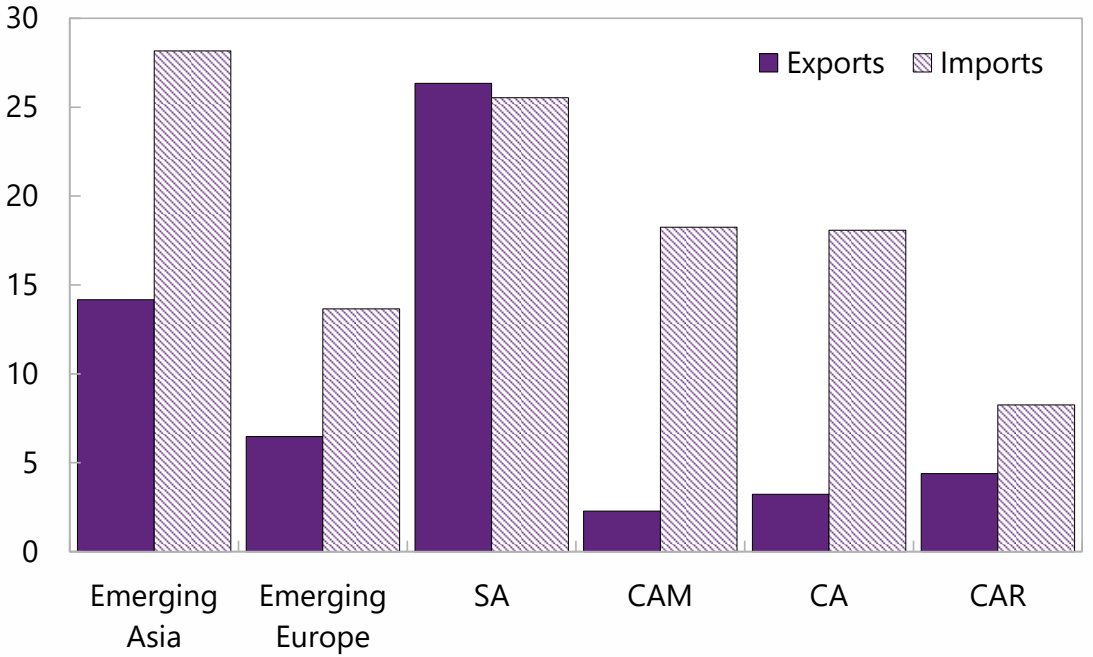
(Export-weighted average across countries)



Sources: BACI and IMF staff calculations.

China's Participation on Exports and Imports

(Percent)



Sources: BACI and IMF staff calculations.

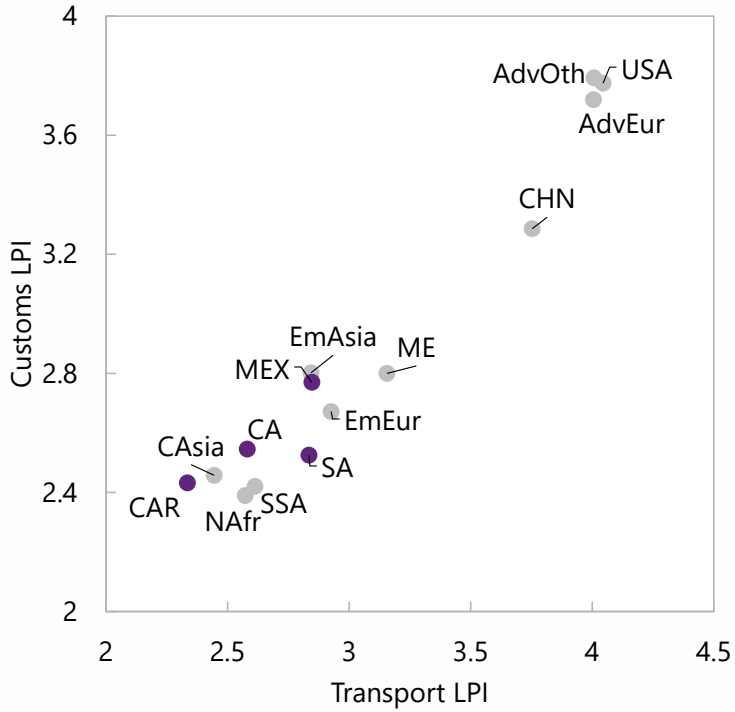
Back

LAC's trade potential: trade and output gains from infrastructure improvements

- What are the trade and output gains from closing the infrastructure gaps in the region? ▶
- Bhattacharya and Pienknagura (2023) gravity model results embedded into general equilibrium trade model ▶
  - Infrastructure affects international trade costs
  - Countries reoptimize their production and trade structure after changes in fundamentals
- Counterfactual analysis: close the infrastructure gap between LAC and AEs by 10, 20 and 50 percent. ▶

Logistics Performance Index, 2018

(Transport and Customs LPI, GDP weighted)



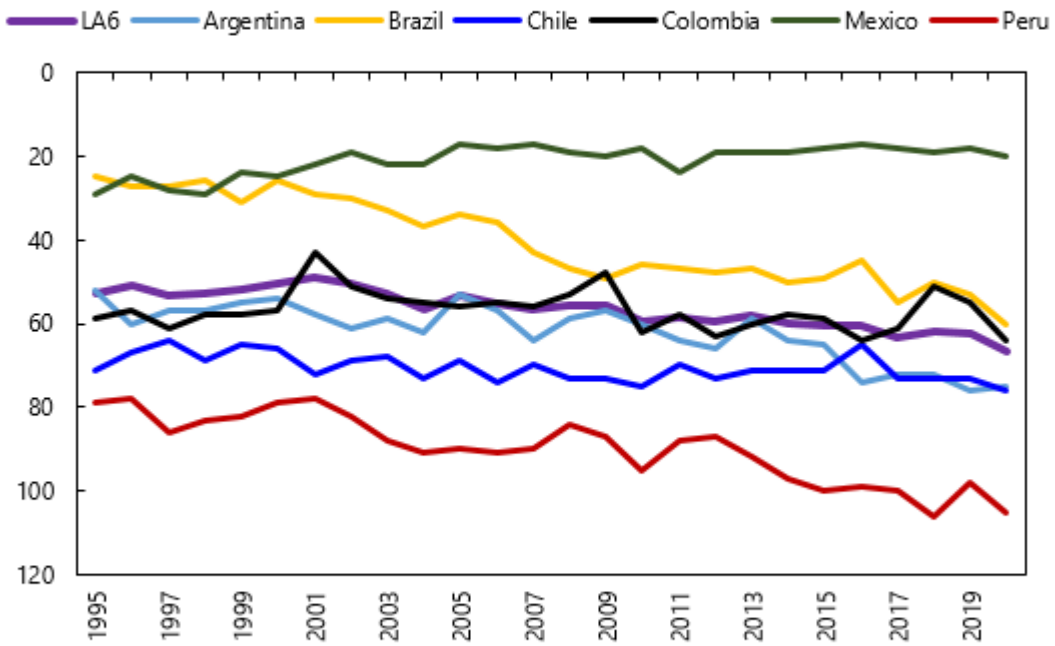
Sources: IMF staff calculations. SA=South America; CAM= Central America and Mexico; CA=Central America; CAR= Caribbean; NAfr=North Africa; CAsia=Central Asia; SSA=Sub-Saharan Africa; EmAsia=Emerging Asia; EmEur=Emerging Europe; ME=Middle East; AdvEur=Advanced Europe; AdvOth= Advanced Other

Back

LAC has lost ground in exports' complexity rankings

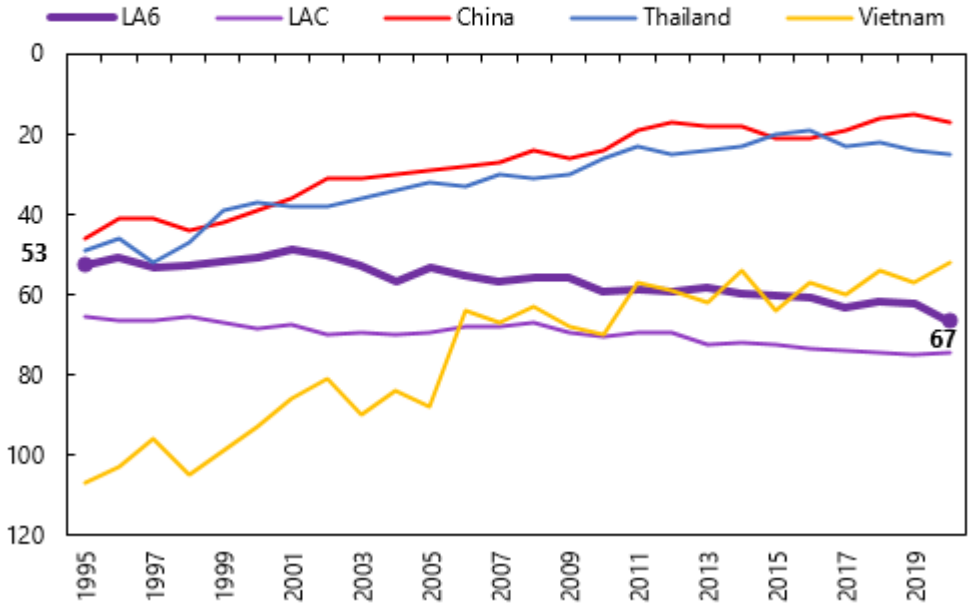
Complexity Ranking

(Rank: 1–133, where 1 is the highest)



Complexity Ranking

(Rank: 1–133, where 1 is the highest)



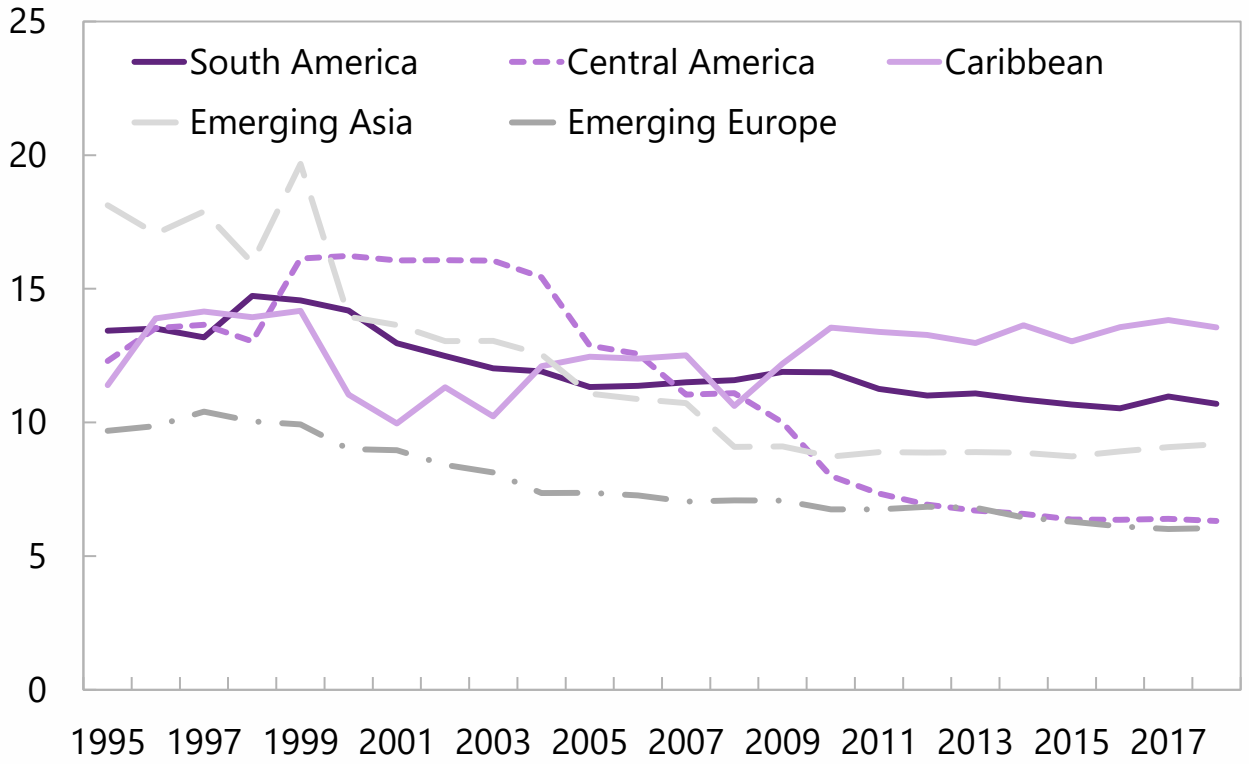
Sources: Atlas of Complexity and IMF staff calculations.
Note: LAC is simple average. LAC = Latin America and the Caribbean.

Back

MFN tariffs (simple average)

MFN Tariffs Across Regions

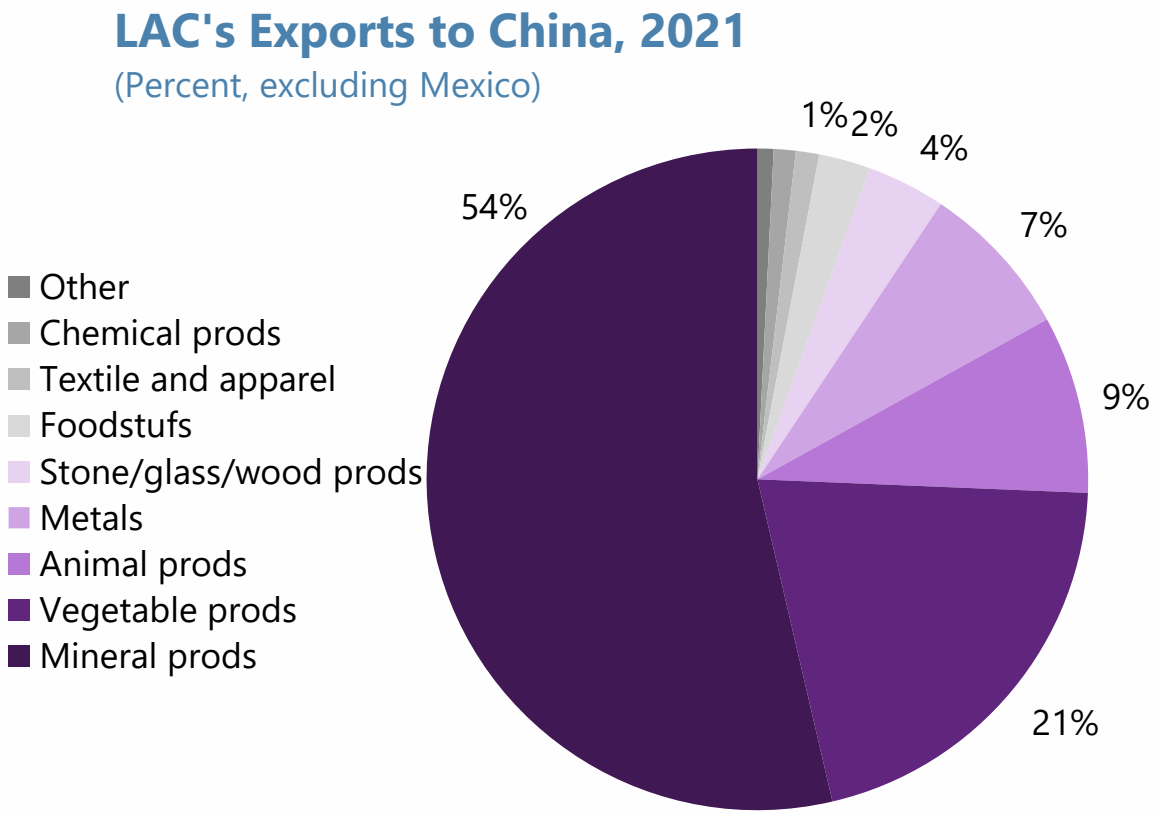
(Simple average, percent)



Sources: TRAINS and IMF staff calculations.

Back

91 percent of LAC's exports to China are commodity-related goods



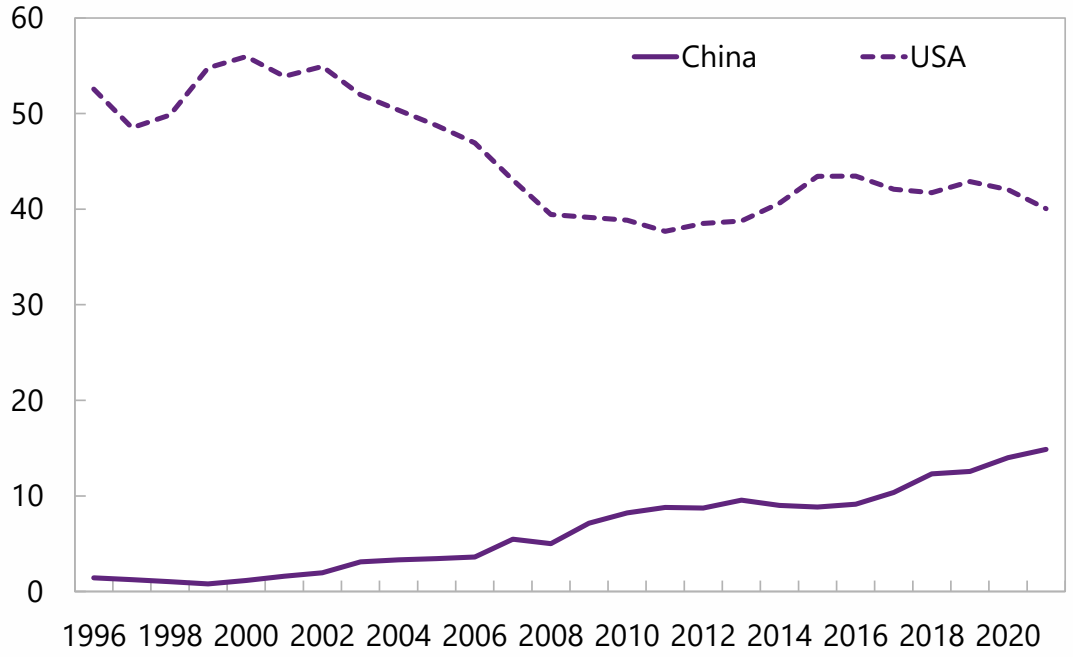
Sources: BACI and IMF staff calculations.

Back

LAC's exports to China and the USA over time

China and the USA as the Main Consumers of LAC's Exports

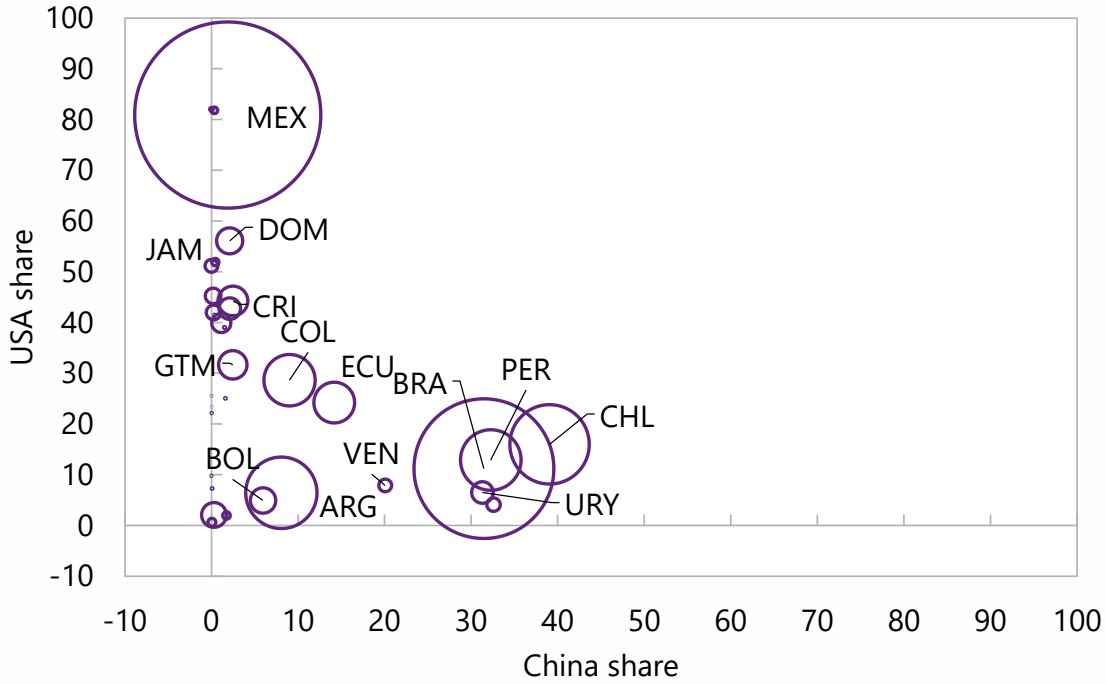
(Percent of total goods exports)



Sources: BACI and IMF staff calculations.

LAC's Trade with China and the USA, 2021

(Percent of total exports, including goods and services)



Sources: IMF DOTS and IMF staff calculations.

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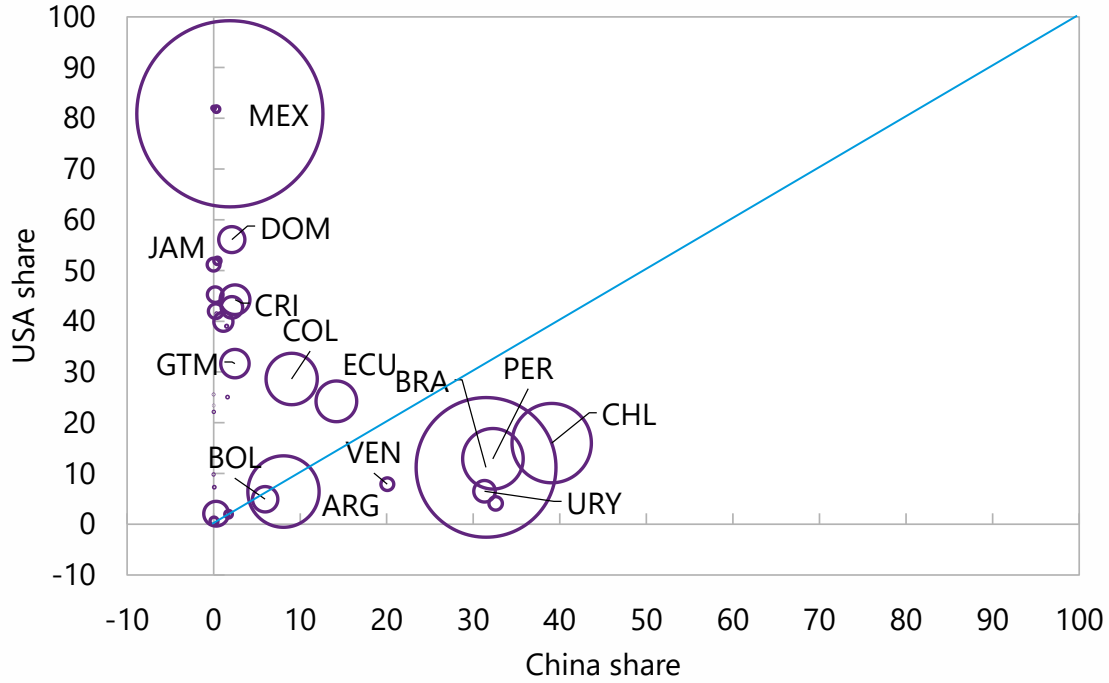
Two Measures of Proximity: Trade and UNGA votes

LAC's Trade with China and the USA, 2021

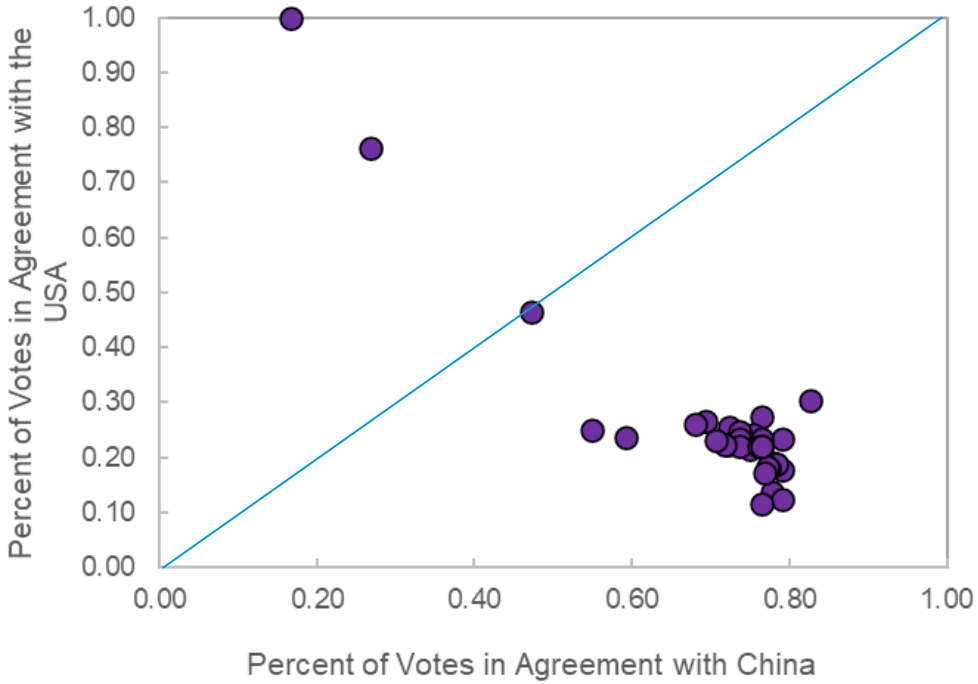
(Percent of total exports, including goods and services)



Sources: IMF DOTS and IMF staff calculations.

Votes at the UN General Assembly

(Agreement on resolutions votes, 1946-)



Source: Voeten (2013) and IMF Staff calculations

Back

WB's Logistic Performance Index

- The LPI is a tool to measure and compare the logistics performance across countries and over time

- Based on a survey conducted among global freight forwarders and experts with in-depth knowledge of countries' logistics operations

- Experts asked to evaluate (1=very low; 5=very high) country-specific quality of logistics along 6 dimensions:
  1. **Efficiency of customs and border management clearance**
  2. **Quality of trade transport infrastructure**
  3. Ease to arrange competitively priced shipments
  4. Competence and quality of logistics services
  5. Ability to track and trace consignments
  6. Timely delivery of shipments.

Back

LPI and government policy

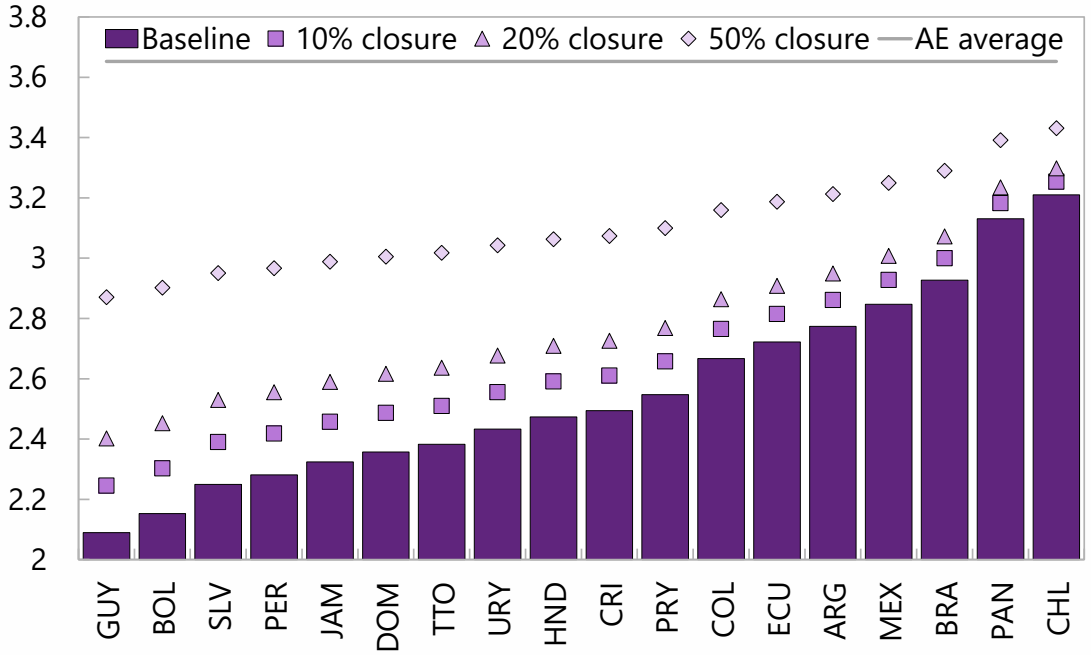
- **Trade Facilitation:** Streamline and simplify customs procedures, reduce bureaucratic red tape, and enhance transparency in trade processes.
- **Trade Digitalization:** Automate procedures and digitize documentation in customs, adopt electronic data interchange systems, and implement risk-based customs controls to expedite clearance processes while maintaining security (Cambodia, East Africa's Norther Corridor).
- **Infrastructure Development:** Investing in the quantity, quality, and the integration of different transport modes, including roads, railways, ports, airports, and logistics facilities. Improving transport-related technologies such as digital tracking systems for cargo (India).
- **Logistics Sector:** Developing a sector with efficient freight forwarding, warehousing, and providers. Encouraging competition, fostering PPPs and regulations that ensure quality services.
- **Institutional Capacity:** Provide training programs to customs officials and transportation personnel to enhance their skills and knowledge. This includes training in modern customs practices, risk assessment, logistics management, and the use of advanced technologies.

Back (conclusion) Back

Closing the infrastructure gap between LAC and AEs

Transportation Infrastructure Counterfactuals

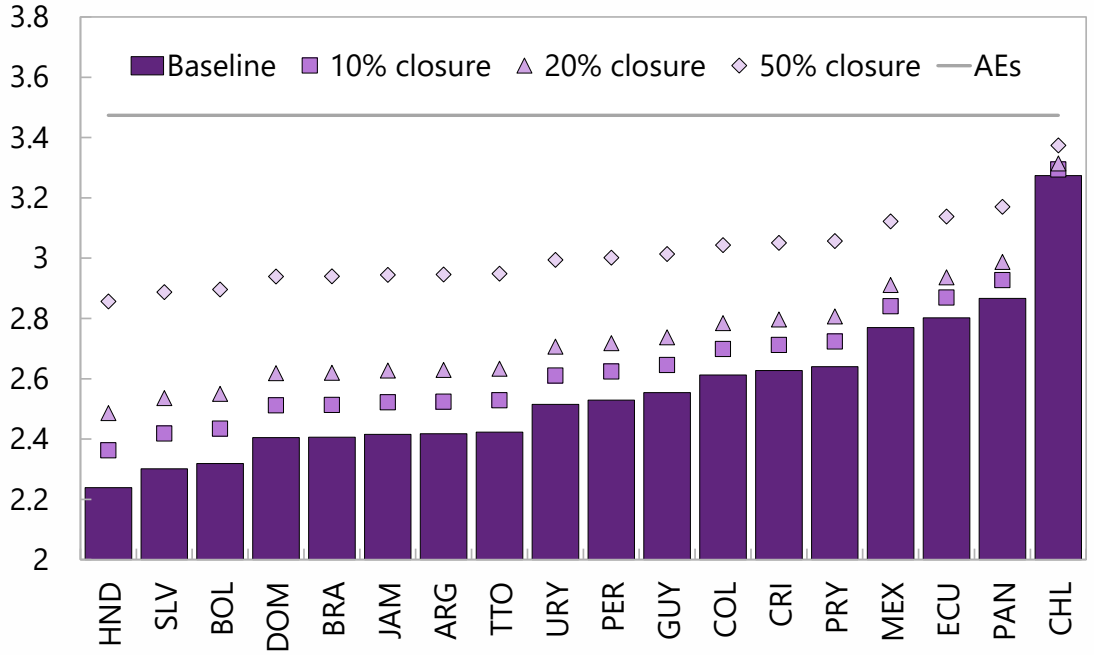
(Transportantion LPI, 2018)



Sources: WB LPI and IMF staff calculations.

Customs Infrastructure Counterfactuals

(Customs LPI, 2018)



Sources: WB LPI and IMF staff calculations.

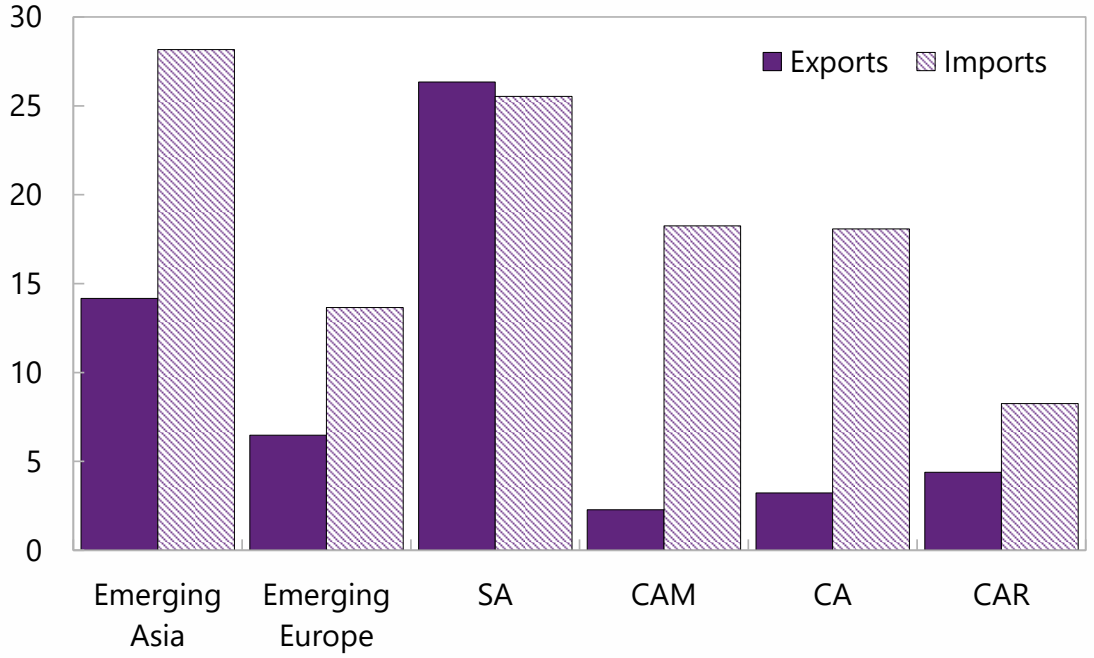
Back

The Presence and Substitutability of China's Exports to LAC

China dominates LAC's imports, accounting for 25 percent of South America's imports.

China's Participation on Exports and Imports

(Percent)

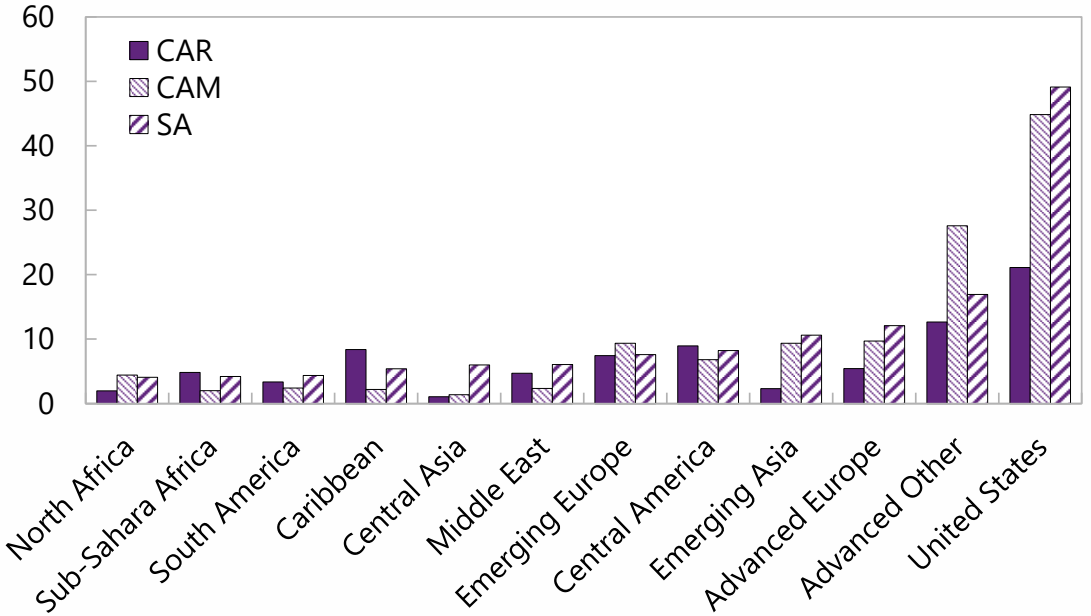


Sources: BACI and IMF staff calculations.

There is low similarity between exports into LAC from other sources and China.

Export Similarity Index to China

(Exports into LAC subregions, similarity relative to China)



Sources: BACI and IMF staff calculations. $ESI = 100 \times \frac{\sum_p s_{p,i} \cdot s_{p,CHN}}{\sqrt{\sum_p s_{p,i}^2}\sqrt{\sum_p s_{p,CHN}^2}}$

Back

Only 9.5 percent of harmful trade interventions imposed on LAC in 2022 were import tariffs

Type of intervention	Frequency	Examples
Public procurement localisation	32.39	Govt extends local content requirements to firms majority owned by the local govt
Import tariff	9.5	Govt sets import criterion values for electric accumulators
Export tax	8.8	Govt increases the export criterion values of raisins destined to certain LA countries
Financial grant	7.35	Govt announces Wine Sector Support Program
Local content requirement	6.3	Govt amends the 2022 edition of the National Fertilizers Programme
Tax or social insurance relief	3.62	Modifications to the tax incentive regime to manufacture capital goods
Local content incentive	3.18	Local dev. bank provides loan to an undisclosed agricultural undertaking
Production subsidy	2.94	Scheme to support energy and trade-intensive firms in context of war in Ukraine
State loan	2.59	New credit line to support beef and livestock producers
In-kind grant	1.49	Certain subsidies and public proc adv for electrolyzers, fuel cells, and platinum
Public procurement	1.49	Certain subsidies and public proc advs for critical materials in large-capacity batteries
Loan guarantee	1.4	Govt provides financial support to SOE oil firm to avoid shortages of fuel
Special safeguard	1.12	Modify triggers to activate the special safeguards on certain fruits and vegetables
Financial assist. in foreign mkt	1.05	Loan deal to support local firm's subsidiary in foreign country
Local supply req. for exp.	1.05	20% local market obligation introduced to exporters of crude palm oil

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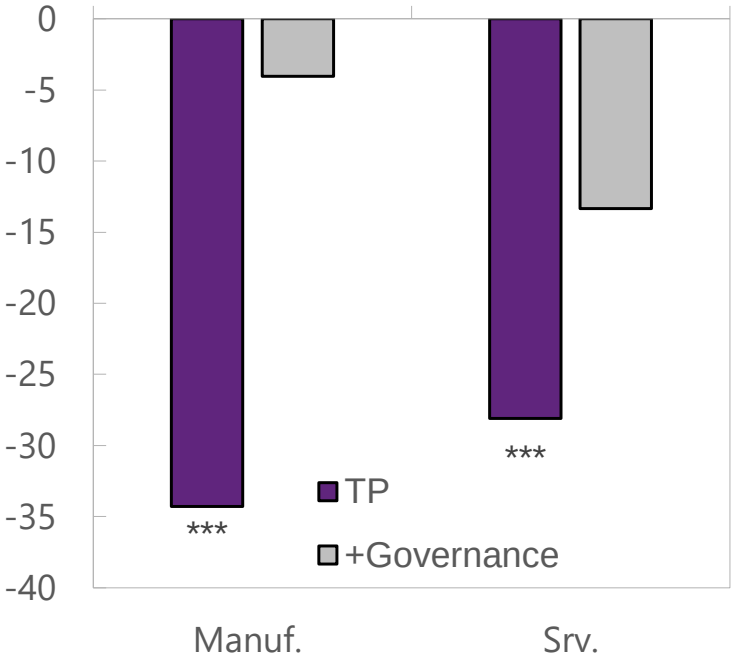
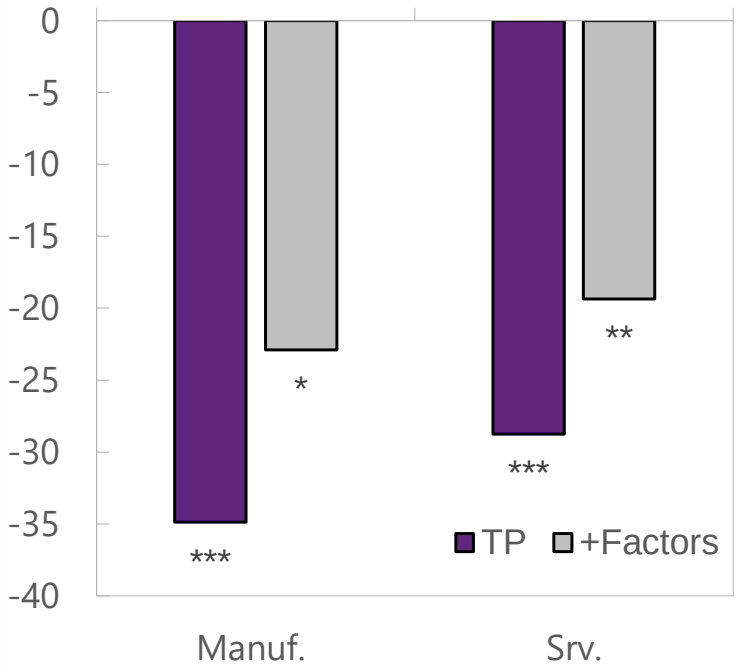
South America Trade, Governance and Factors of Production

South America and Governance



South America and Factors of Production

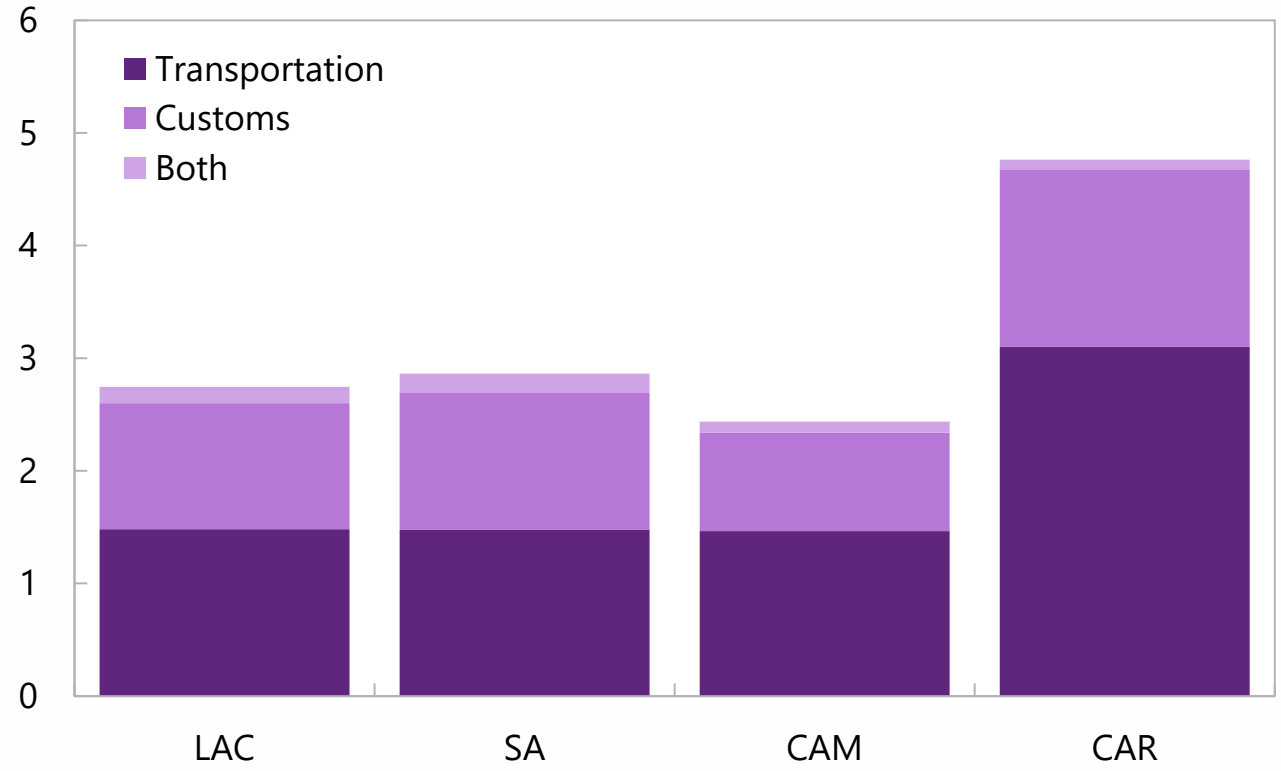


Back

Both margins contribute substantially to output gains and complementarities exist, but are mild

Contributions of Transportation and Cutoms

(Percent increase in output relative to baseline; 20 percent catch-up scenario)



Sources: IMF staff calculations.

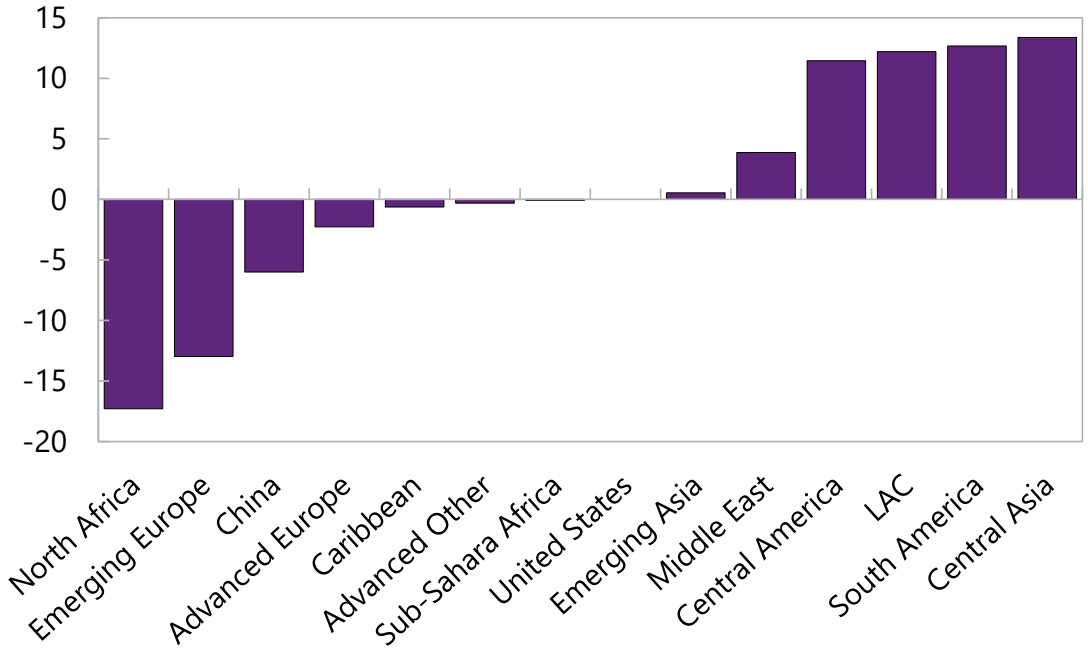
Back

LAC's infrastructure rank decreased between 2010 and 2018

Between 2010 and 2018, LAC's transport infrastructure rank fell 10 positions, while Emerging Euro saw improvements in transport infrastructure.

Change in Relative Ranking Across Regions

(Rank position change between 2010 and 2018, trade weighted)

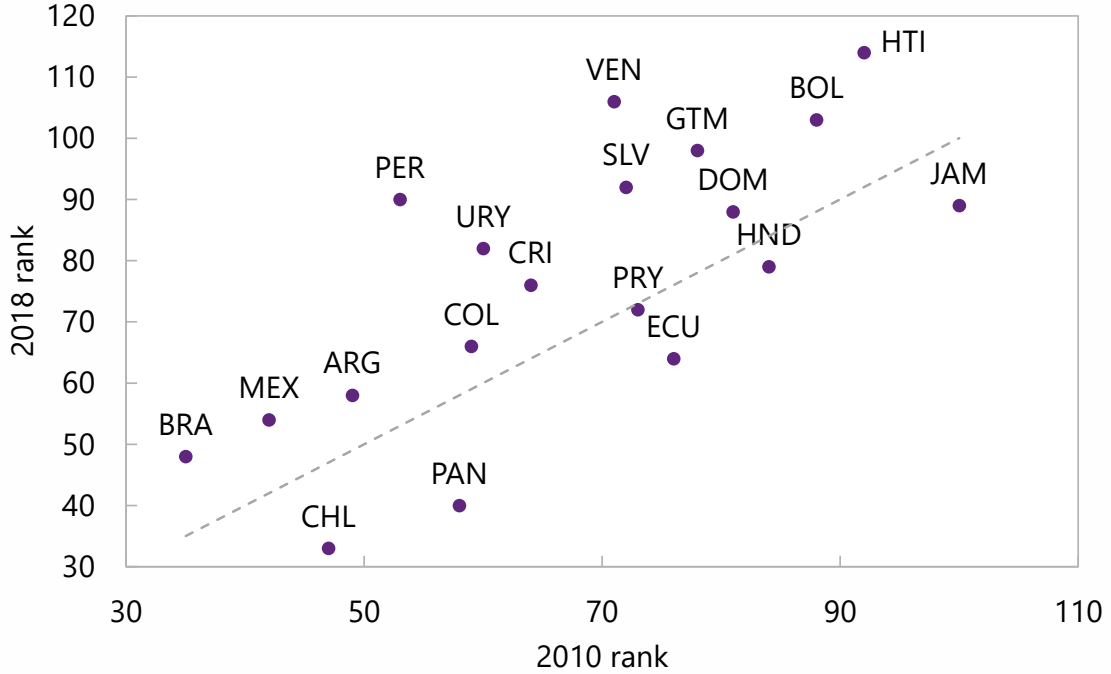


Sources: LPI and IMF staff calculations.

Countries like CHL, PAN and ECU experienced relative transport infrastructure improvements.

Transport LPI Rank, 2010 vs. 2018

(Rank, relative to 120 countries)



Sources: WB LPI and IMF staff calculations.

Back

Decomposing the impact of trade policy in gravity models

The Armington trade model **+ infrastructure**:

- Each country produces a differentiated good with labor (fixed endowment) as only input
- Goods are imperfect substitutes (CES demand)
  - Love for varieties -> trade!
- Iceberg trade costs to ship goods between two countries
  - Extension: **infrastructure decreases trade costs**!
- Equilibrium: total production equals total exports for all countries in the world

Full Endowment GE:

Conditional GE:

Direct (PE):

$$X_{ij} = \frac{Y_i E_j}{Y}\left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma} \quad (2\text{-}1)$$

$$\Pi_i^{1-\sigma} = \sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} \frac{E_j}{Y} \quad (2\text{-}2)$$

$$P_j^{1-\sigma} = \sum_i \left(\frac{t_{ij}}{\Pi_i}\right)^{1-\sigma} \frac{Y_i}{Y} \quad (2\text{-}3)$$

$$p_i = \left(\frac{Y_i}{Y}\right)^{\frac{1}{1-\sigma}} \frac{1}{\alpha_i \Pi_i} \quad (2\text{-}4)$$

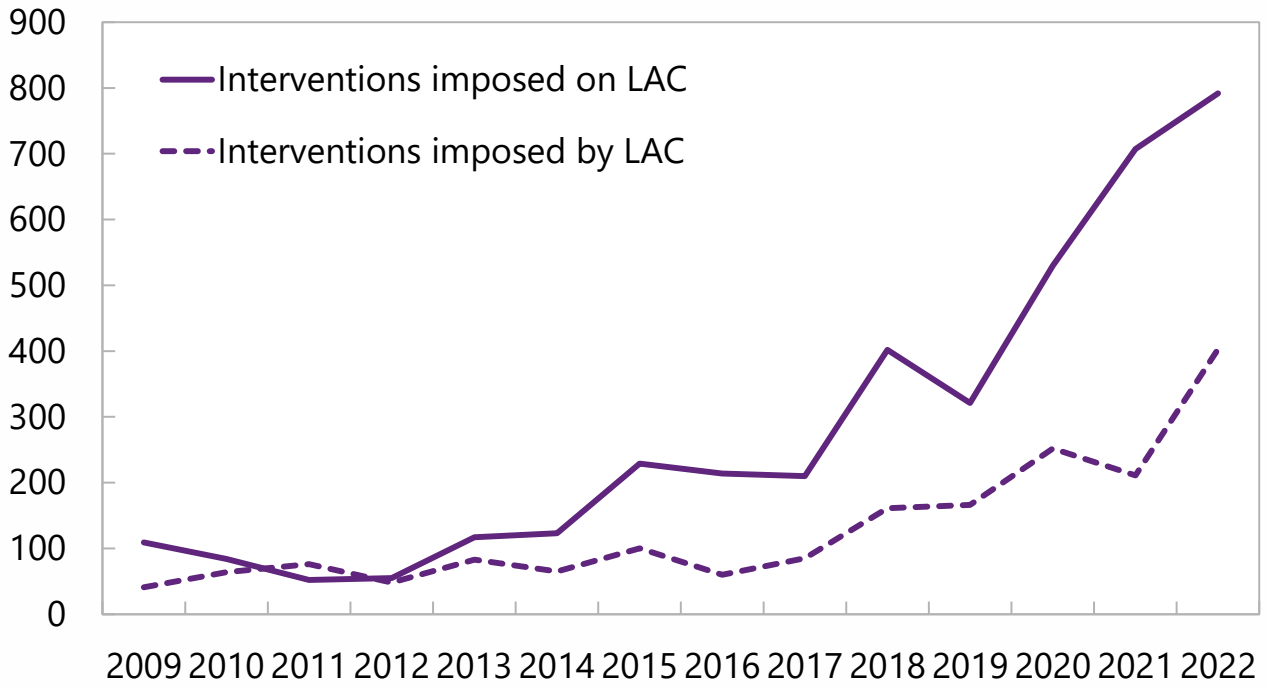
$$E_i = \varphi_i Y_i = \varphi_i p_i Q_i \quad (2\text{-}5)$$

Back

Early signs of global fragmentation in LAC

New Harmful Trade Interventions

(Number)



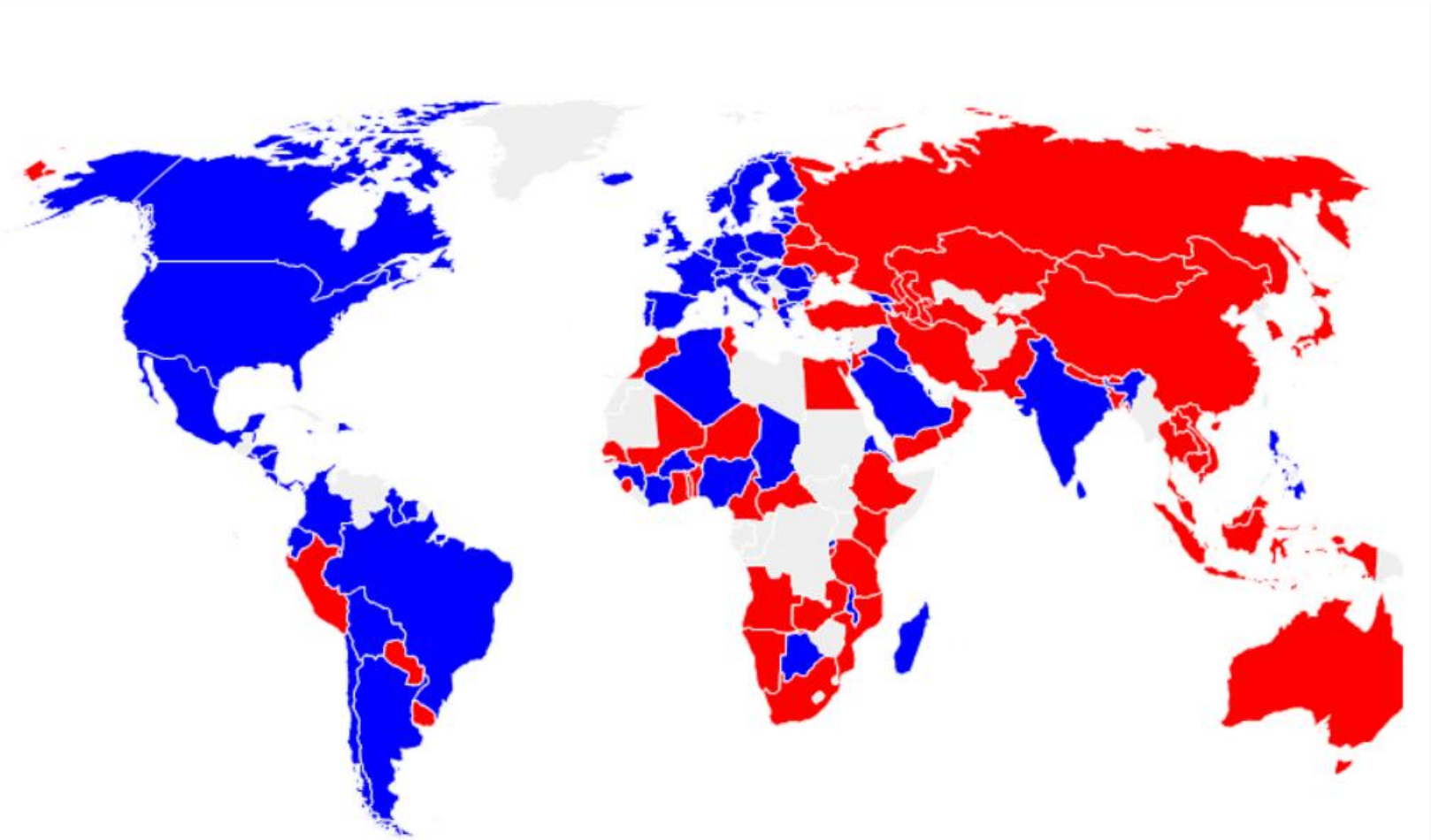
Sources: Global Trade Alert (2022). Notes: Data adjusted for reporting lag as of Dec 31st. Interventions represent the harmful policy instrument, following GTA's classification. Example: the announcement of a new production subsidy to steel producers.

► Interventions details Back

Fragmentation in a Dynamic Trade Model

- Multi-country (N=40) model with capital accumulation (Ravikumar et al. 2019)
- 3 sectors: Consumption, Investment (*both Non Traded*), Intermediates (*Traded*)
- Continuum of varieties, assembled in a composite $M_{it} = \left[\int q_{it}(v)^{1-1/\eta}\right]^{\eta/\eta-1}$
  - Intermediates: $Y_{mit}(v) = z_{mi}\ (v)\ [K_{mit}(v)^{\alpha} L_{mit}(v)^{1-\alpha}]^{\upsilon_{mi}} M_{mit}(v)^{1-\upsilon_{mi}}$
  - Consumption: $Y_{cit} = A_{ci}\left[K_{cit}{}^{\alpha} L_{cit}{}^{1-\alpha}\right]^{\upsilon_{ci}} M_{cit}{}^{1-\upsilon_{ci}}$
  - Investment: $Y_{xit} = z_{xi}\left[K_{xit}{}^{\alpha} L_{xit}{}^{1-\alpha}\right]^{\upsilon_{xi}} M_{xit}{}^{1-\upsilon_{xi}}$
  - Investment goods **more trade intensive** than consumption good: $1-\upsilon_{xi} > 1-\upsilon_{ci}$
- Severe Fragmentation scenarios modelled as shocks to the bilateral trade cost matrix
- Back

Trading Blocks in the Severe Fragmentation Scenario



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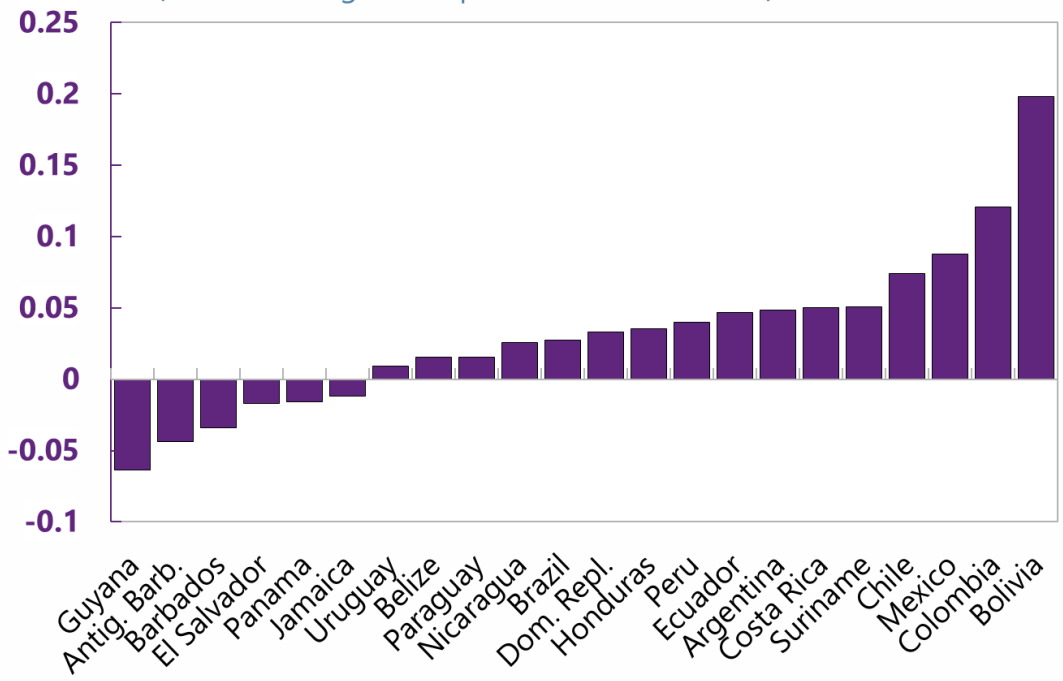
Country-by-Country impact of Fragmentation

The Impact of Strategic Decoupling on LAC

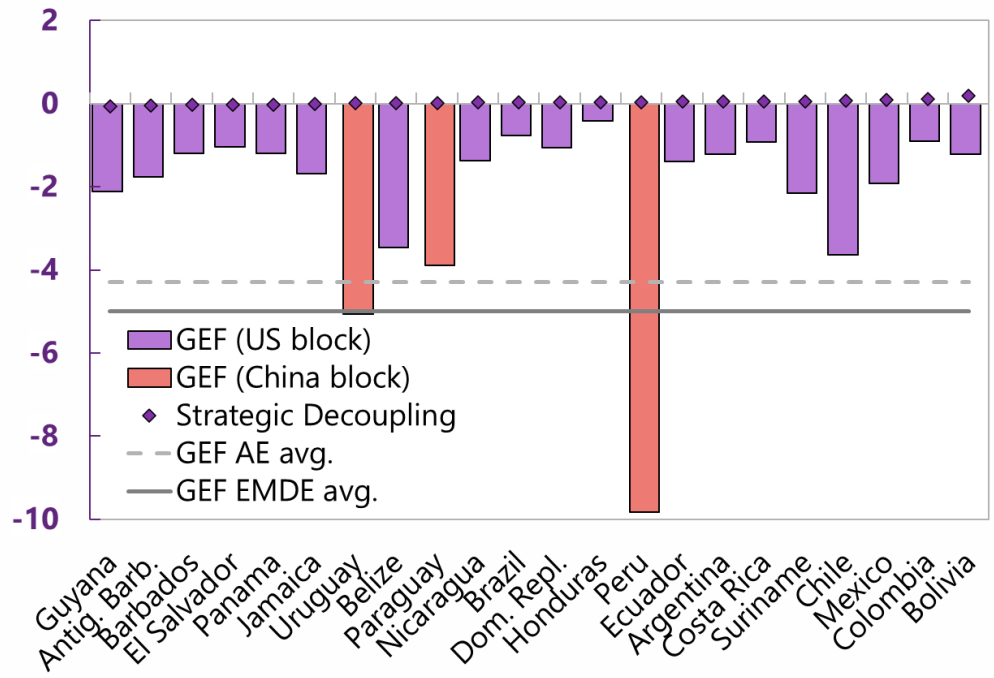
(Percent change in output relative to baseline)



Sources: Bolhuis et al. (2023).

The Impact of Different Fragmentation Scenarios on LAC

(Percent change in output relative to baseline)



Sources: Bolhuis et al. (2023).

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Details on Output impact of fragmentation

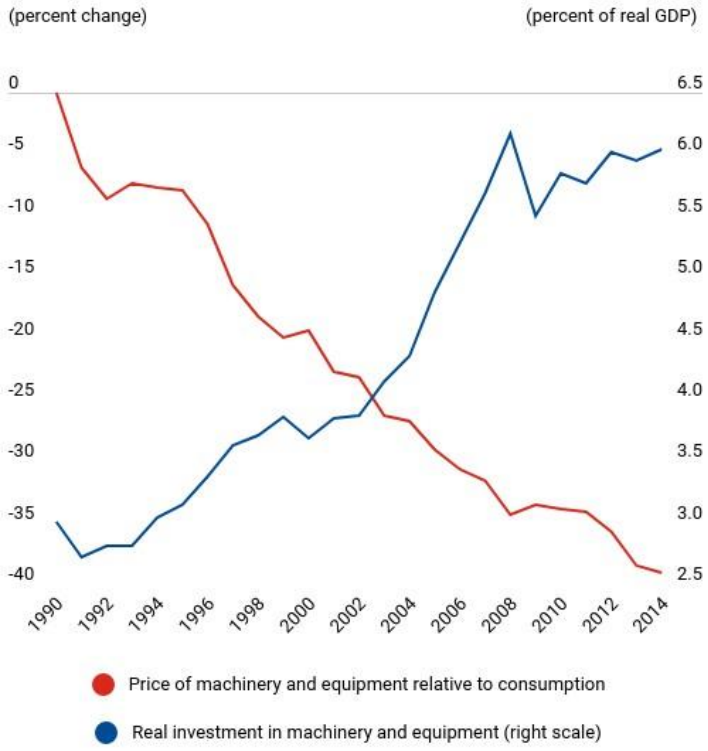
- Impact on output, up to a first order can be expressed:

$$\frac{1}{\overline{\theta_k}}\overline{\ln\left(1-\pi^k_{n,other}\right)}+\frac{\alpha_n(1-\mu_n)}{1-\alpha_n}\frac{1}{\overline{\theta_k}}\overline{\ln\left(1-\pi^k_{n,other}\right)}+\frac{\alpha_n\mu_n}{1-\alpha_n}\frac{1}{\overline{\theta_j}}\overline{\ln\left(1-\pi^j_{n,other}\right)}$$

- Where the first component is the **direct effect on the price of final goods**
  - The *lower* the trade elasticities (θ_k), and the *higher* the expenditure share on intermediate inputs from the other bloc ($\pi^k_{n,other}$), *the larger the losses*
- The next two terms capture amplification through the input-output linkages, for both commodities and other intermediate goods

Real Investment and the price of machinery and equipment

Closely linked
The rise in real investment in emerging markets and developing economies coincided with large drops in the relative price of machinery and equipment.



Sources: Penn World Table 9.0 and IMF staff calculations.

Table 3.2 Real Investment Rate and the Relative Price of Machinery and Equipment

Dependent Variable: Log Real Investment-to-GDP Ratio	Cross-Country Regressions			Sectoral Regressions	
	All	Post-1990	EMDEs		
	(1)	(2)	(3)	(4)	(5)
Log Relative Price	–0.377***	–0.292*	–0.491***	–0.326***	–0.528***
	(0.116)	(0.171)	(0.161)	(0.078)	(0.068)
Number of Observations	658	553	457	971	971
Number of Countries	127	127	93	18	18
R^2	0.41	0.36	0.38	0.94	0.93
First Stage F-Statistic	118.80	81.81	64.04	644.60	728.80

Source: IMF staff calculations.
Note: The dependent variable is log real machinery and equipment investment-to-GDP ratio. Regressions are estimated with data averaged over nonoverlapping five-year windows using instrumental variable regressions, where the main independent variable—log price of machinery and equipment relative to consumption—is instrumented with its lagged value. All cross-country panel regressions in columns (1)–(3) control for country and period fixed effects, and a set of other determinants of investment-to-GDP ratios. Sectoral regression in column (4) is estimated with country-period and country-sector fixed effects, and in column (5) with period and country-sector fixed effects, where period refers to the nonoverlapping five-year windows. Standard errors clustered at the country level are in parentheses. See Online Annexes 3.6 and 3.7 for details. EMDEs = emerging market and developing economies.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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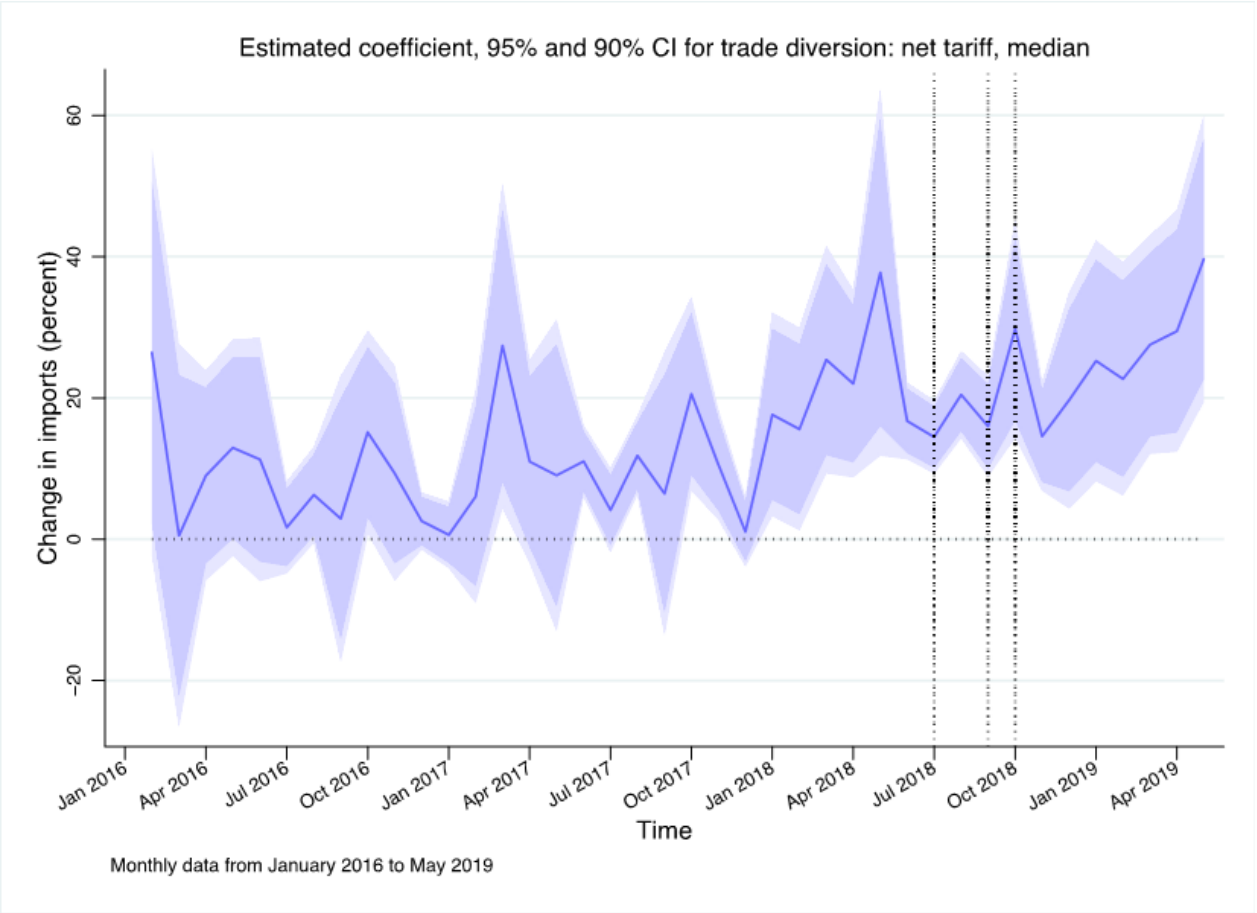
Trade Diversion Effects for Mexico after 2018 trade tensions

Overall positive trade diversion after the 2018 US-China trade tensions

- **A 1 percentage point increase in net tariff change on Chinese products led to a 1.1 percent increase Mexican exports** in corresponding industries.
- Direct tariffs play the largest role, but downstream tariffs also have an impact
- Evidence of some anticipatory effects
- Important to account for input-output linkages

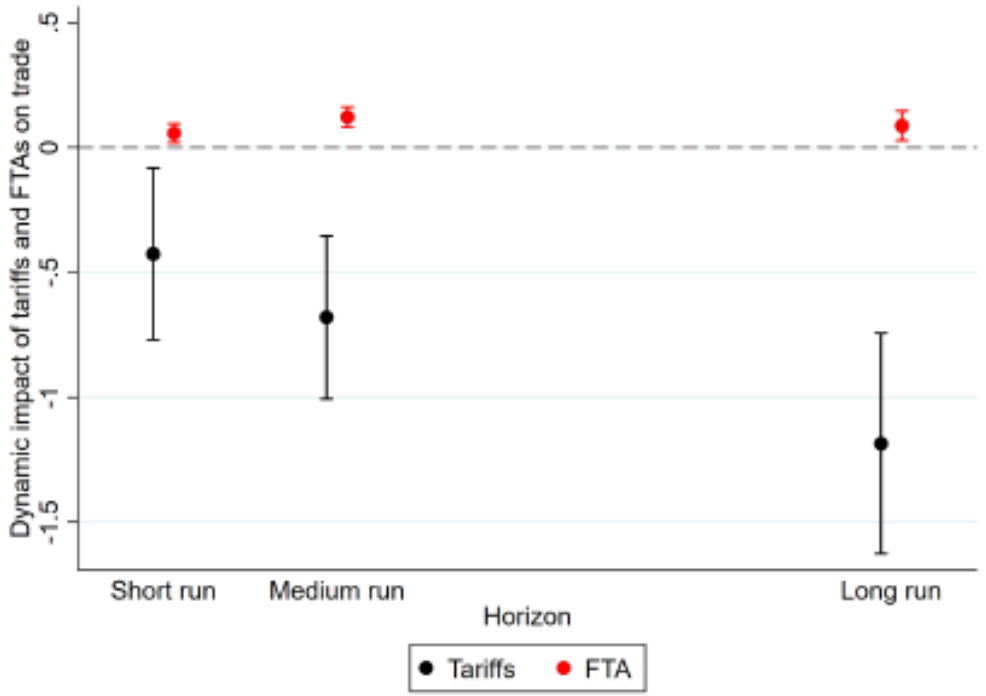
Back



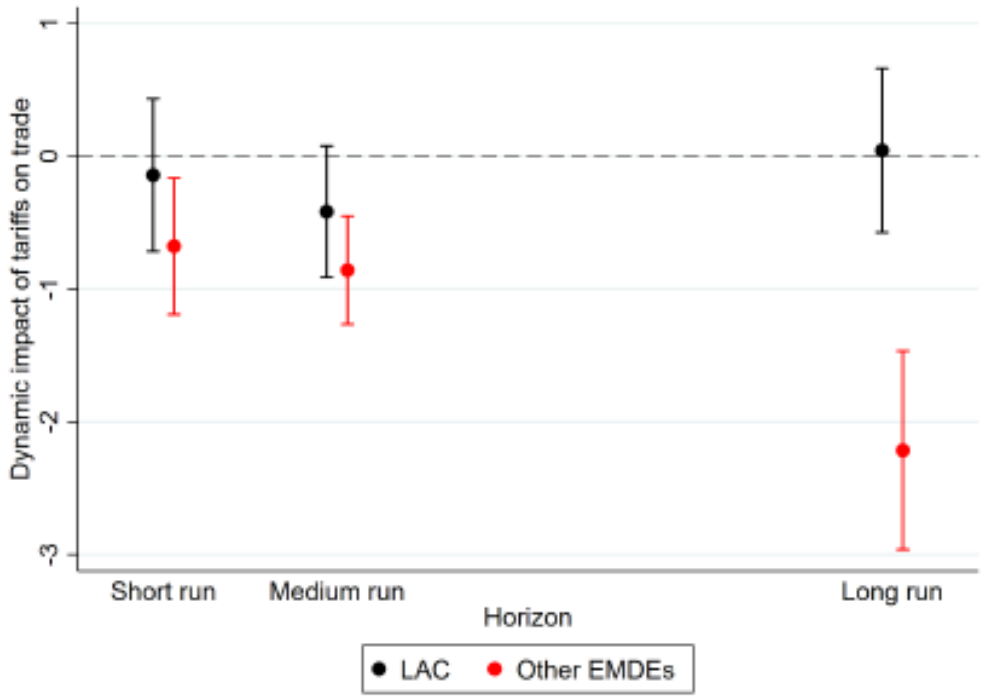
Sources: IMF staff calculations. INEGI, WIOD, UN Comtrade.

Notes: Estimated coefficients (solid line) and 90 percent confidence intervals (dashed lines) in each month. The coefficient measures the average difference in the US (log) import values, between industries that are more exposed to tariff increase during the US-China trade tensions and industries that are less affected by the tensions. Vertical lines indicate the first three rounds of tariff imposing by the US.

LAC trade is less responsive to tariffs than are other EMDEs



1. Dynamic trade elasticities

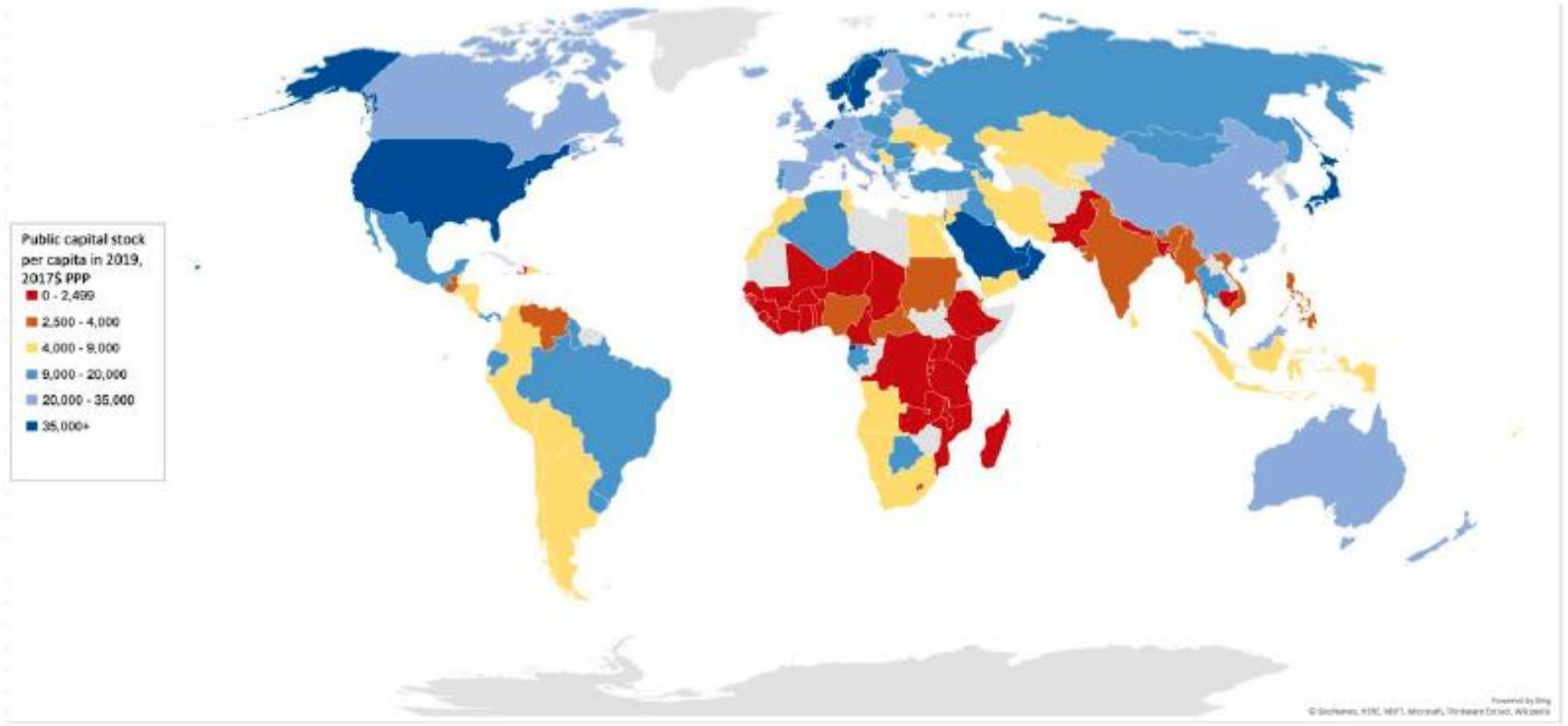


2. LAC versus other EMDEs

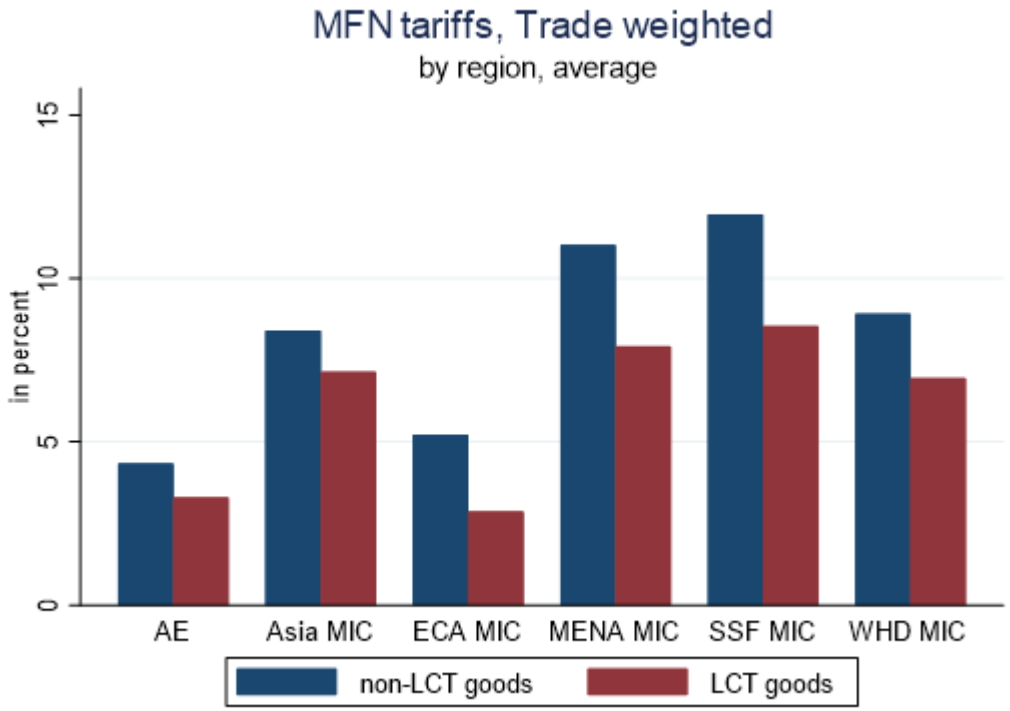
Annex: Climate Transition and Trade Opportunities for LAC

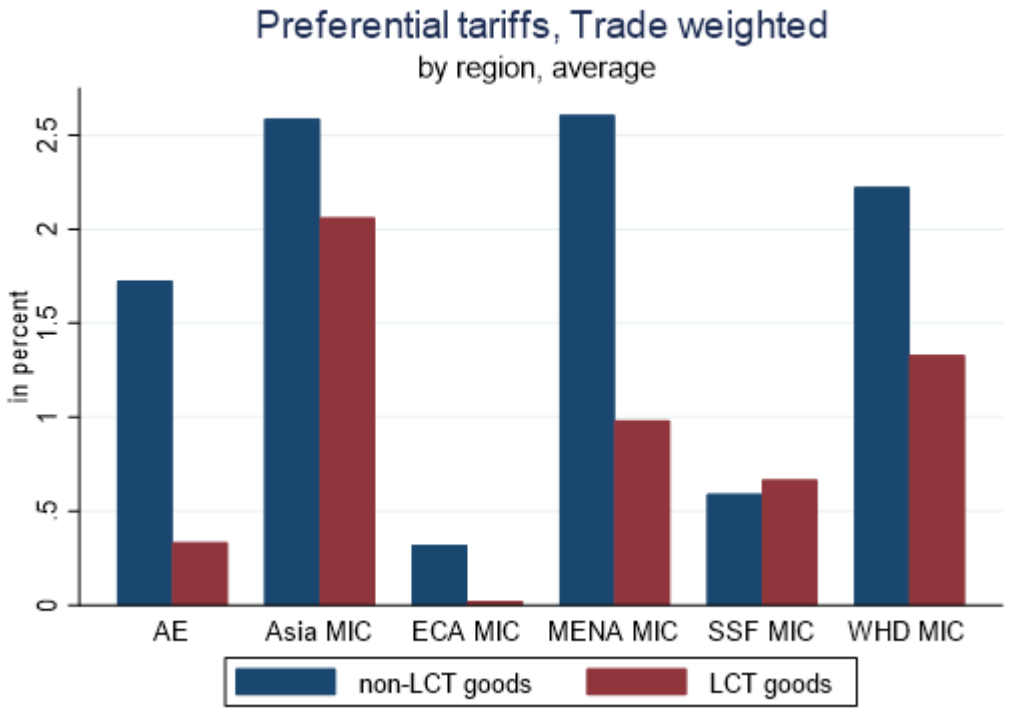
LAC lags behind in terms of public capital

Figure 1. Public Capital Stock per Capita, 2019



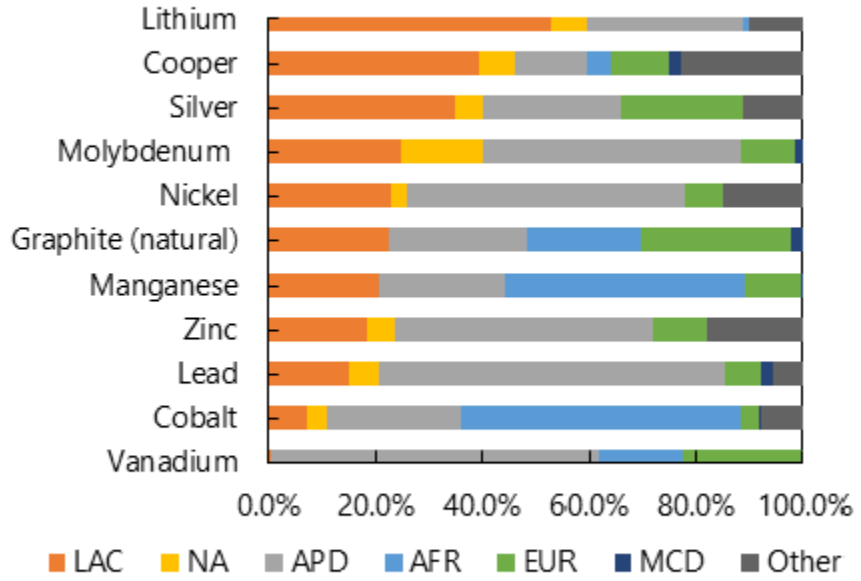
LAC tariff policy is favorable to imports of Low-Carbon Technologies





LAC has a natural comparative advantage in green commodities and can play an important role in the global climate transition

Figure 13. Reserves of "green" commodities by region
(Percent of total reserves, by metal)



Sources: United States Geological Survey (USGS) Mineral Commodity Summaries Report 2021; and IMF staff calculations.

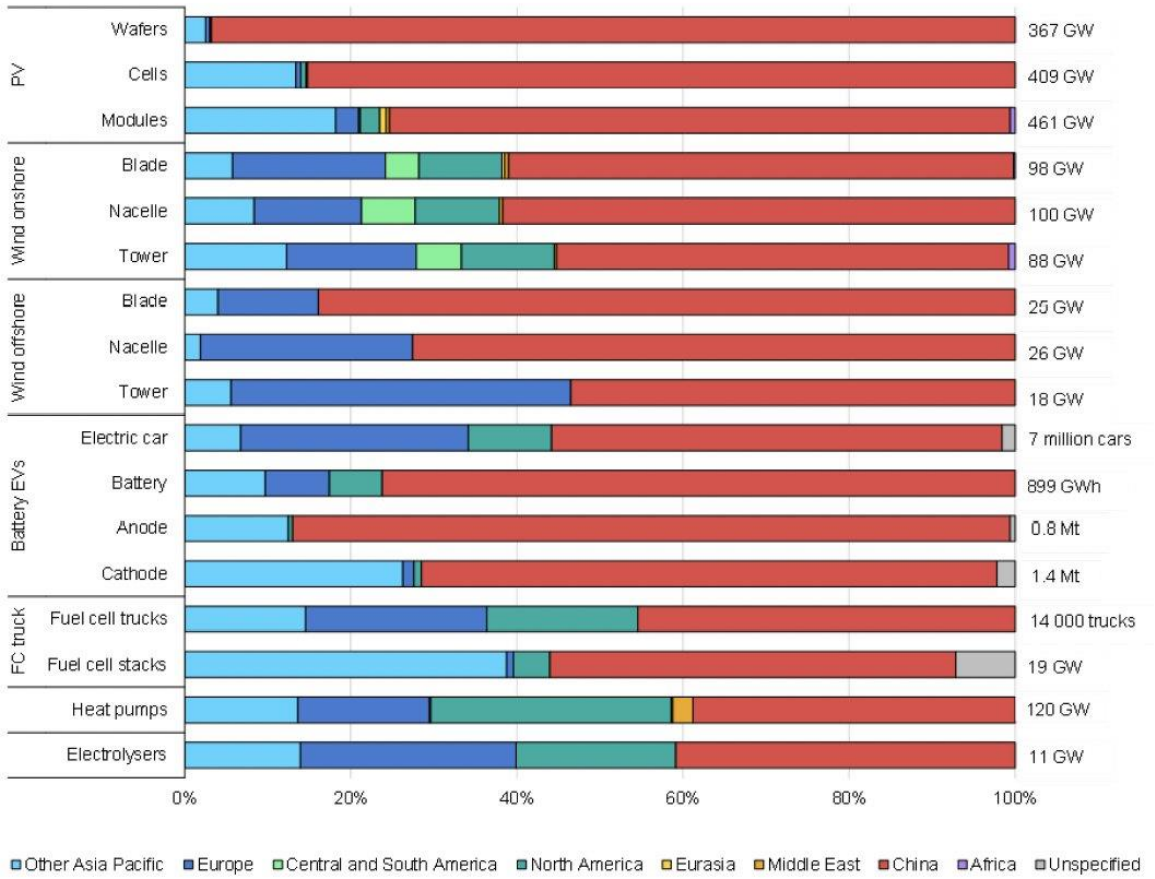
Table 2. Exports of "Green" Commodities
(Annual average during 2016–19)

Exports of	Percent of GDP	Percent of Exports
Copper		
Chile	6.160	21.829
Peru	5.087	21.206
Brazil	0.120	0.915
Mexico	0.161	0.420
Argentina	0.096	0.689
Dominican Republic	0.063	0.267
Colombia	0.015	0.096
Ecuador	0.024	0.106
Bolivia	0.055	0.219
Nickel		
Guatemala	0.064	0.350
Brazil	0.000	0.004
Lithium		
Chile	0.034	0.122
Cobalt		
Brazil	0.000	0.001

Sources: UN Comtrade; and IMF staff calculations.
Note: Based on some levels of exports of the commodity, Colombia shows potential for lithium and nickel; Ecuador for cobalt and lithium; and Brazil and Panama for lithium.

China's dominance in Green Technologies

Figure 2.7 Regional shares of manufacturing capacity for selected mass-manufactured clean energy technologies and components, 2021



IEA. CC BY 4.0.

Notes: FC = fuel cell. Heat pumps capacity refers to thermal output.

Sources: IEA analysis based on InfoLink (2022); BNEF (2022); BNEF (2021b); Benchmark Mineral Intelligence (2022); GRV (2022); UN (2022a); Wood Mackenzie (2022).

Around 90% of mass-manufacturing capacity for several key clean energy technologies is concentrated in China and the Asia Pacific region.