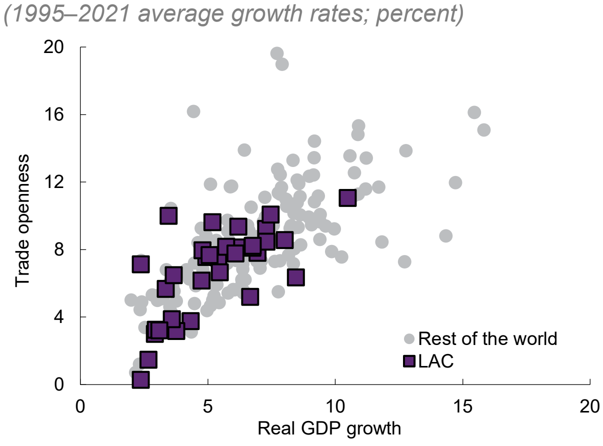
Trade Integration and Implications of Global Fragmentation for Latin America and the Caribbean[1] (Background Paper 2)

The chapter documents the experience of Latin America and the Caribbean (LAC) with trade integration, studies the potential for greater integration, and analyzes the emerging risks from global fragmentation. Despite progress in decreasing trade barriers, LAC's degree of trade integration remains low, especially within the region. Intra-regional trade is between 40 percent (for goods) and 50 percent (for services) lower than in regions with similar economic and geographic characteristics. Obstacles derived from poor infrastructure, and inadequate governance, among other deficiencies, have played an important role in limiting trade within and outside the region and point to sizable potential gains from lifting them. Closing half of the existing infrastructure gap between the region and advanced economies would lift exports by 30 percent. Amid deepening global trade tensions, LAC is well placed to withstand a mild trade fragmentation scenario, in which trade barriers are erected only among large economies. In contrast, LAC's output losses could be sizable in more extreme scenarios, whereby the global economy splinters into competing economic blocs and LAC loses access to important markets. A strategy aimed at boosting trade, including regional trade, and putting in place policies that make LAC an attractive investment destination could pay a double dividend of boosting trade and growth in the region while mitigating the risks from global fragmentation.

1. Introduction

Trade could be an important engine for economic growth in LAC. There is ample evidence that international trade is instrumental to boosting growth (Figure 1), narrowing income gaps, reducing poverty, and improving living standards, in particular in emerging and developing economies (EMDEs).[2] Moreover, integration into global value chains facilitates technological transfer and brings countries closer to the frontier of innovation (Acemoglu et al., 2015; Melitz and Redding, 2021; Perla et al., 2021; Cai et al., 2022).

Figure 1. Growth versus Trade Openness in the Long Run
(1995–2021 average growth rates; percent)



Sources: IMF, Balance of Payments Statistics database; and IMF staff calculations.
Note: Trade openness measured as exports plus imports of goods and services in percent of GDP. LAC = Latin America and the Caribbean.

At the same time, the evolving global trade landscape could pose new opportunities, although also important challenges for LAC. The energy transition is expected to change the patterns of trade globally. While the region's fossil fuels exporters may be negatively impacted by the transition toward renewable sources of energy, countries endowed with large reserves of critical minerals could benefit substantially from expanding trade opportunities. On the other hand, geopolitical tensions, exacerbated by Russia's invasion of Ukraine, have resulted in an acceleration of harmful trade interventions and rising risks a broader fragmentation of

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[2] See Frankel and Romer (1999), Dollar and Kraay (2002, 2004), Bhagwati and Srinivasan (2002), Feyrer (2019), Goldberg and Pavcnik (2016), and Bustos (2011).

international trade—i.e., a split of the global economy into a few economic blocs—that could have important implications for LAC.

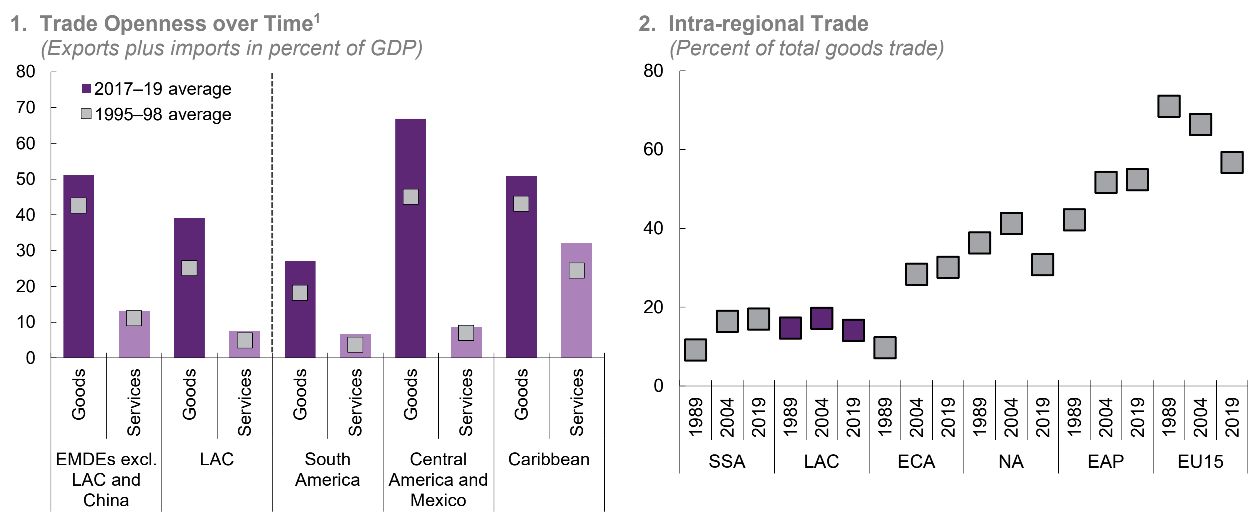
This chapter takes stock of the evolution of trade in LAC and sheds light on how the region could tap its trade potential in the changing global landscape. Specifically, the chapter addresses the following questions: (i) How have the structure of LAC's trade and its degree of regional and global integration changed over time? (ii) What are the main obstacles to LAC's trade (with the rest of the world and within the region)? (iii) How important are the potential gains from greater trade integration? And (iv) How would global fragmentation affect the region, given its trade characteristics?

2. Evolution and Composition of LAC's Trade

LAC's degree of trade integration lags that of many other regions. The region's exports are concentrated in a few industries (mostly primary commodities), with limited integration into global value chains, and with strong ties to the US, Europe and, more recently, China. At the same time, the region relies heavily on imports of investment goods, of which China playing an increasingly dominant role as a main source of machinery products.

LAC's trade integration lags that of many other regions, **pointing to substantial untapped potential.** Despite some progress in increasing trade integration—LAC's trade in goods and services with the rest of the world increased from about 30 percent of GDP in 1995 to 47 percent in 2019—the region remains behind other Emerging Markets and Developing Economies (Figure 2, panel 1).[3] This is especially noticeable for South America. LAC's low degree of integration is also visible in terms of intra-regional trade, which stands at a modest 14 percent of total goods trade, significantly below that of Europe and Central Asia and East Asia and the Pacific, and comparable to Sub-Saharan Africa (Figure 2, panel 2).

Figure 2. The Evolution of LAC's Trade Integration



Sources: IMF, Balance of Payments Statistics database; IMF, Direction of Trade Statistics; and IMF staff calculations.
Note: EMDEs excl LAC and China = Emerging and Developing Asia and Europe excluding China. EAP = East Asia and Pacific; ECA = European and Central Asia; EU15 = European Union 15 extended; LAC = Latin America and the Caribbean; NA = North America; SSA = Sub-Saharan Africa.
[1]Includes intra-regional trade.

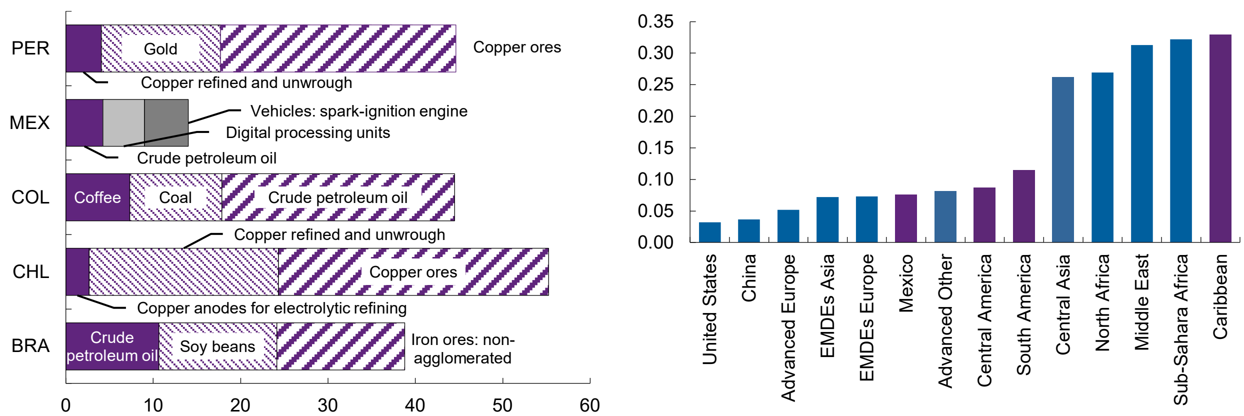
[3] The terms "trade integration" or "trade openness" are used interchangeably to refer to a country's share of GDP traded internationally.

Primary commodities account for the bulk of LAC's goods exports. Except for Mexico, the top export products of the largest economies of the region are primary commodities, consistently accounting for over 40 percent of merchandise exports (Figure 3, panel 1). The region's goods exports remain concentrated more broadly (Figure 3, panel 2). The Caribbean's exports are the most concentrated, reflecting a high dependence on agricultural products. South America's exports are more concentrated than Asian and European EMDEs, although less than those of Africa and Central Asia. Export concentration in Central America and Mexico is in line with other EMDEs reflecting more diversified manufacturing base.

Figure 3. LAC's Goods Exports Across Products and Industries

1. **Top 3 Export Products in LA5, 2021**
(Percent of goods exports)

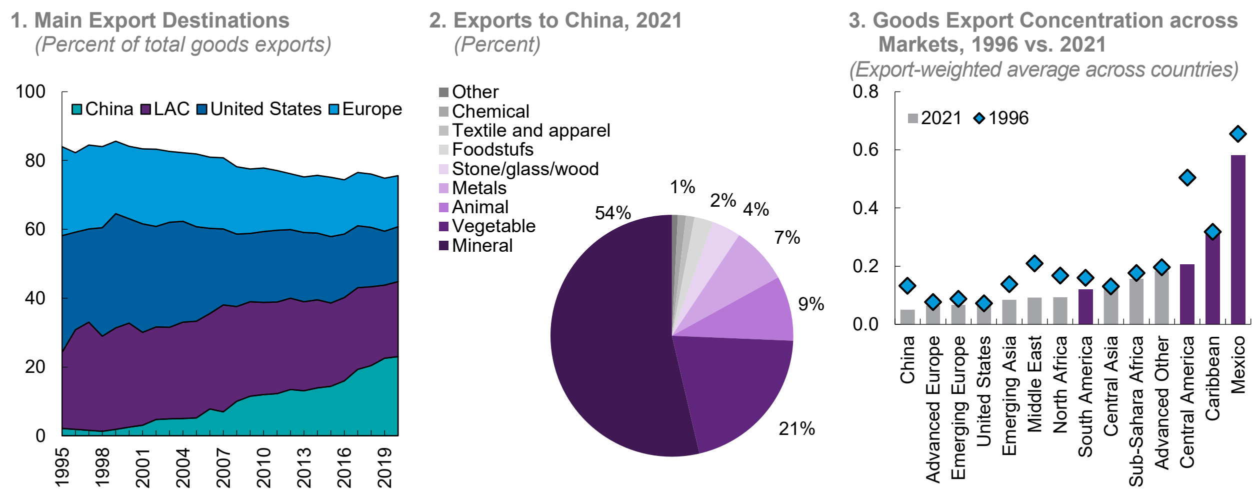
2. **Goods Export Concentration across Products, 2021**
(Export-weighted average across countries)



Sources: Base pour l'Analyse du Commerce International (BACI); and IMF staff calculations.
Note: LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru). Advanced Europe = Advanced Economies in Europe. Advanced Other = Advanced Economies excluding Europe and the US. Export concentration measured as the Herfindahl–Hirschman Index (HHI) at the HS-3 product codes. For each country, the index is calculated as the sum of the squares of export shares of each product.

Besides intra-regional trade, the US and China are the largest export destinations for LAC's goods. Over the last 25 years, China's share of LAC's goods exports (excluding Mexico) increased tenfold, from near zero in 1996 to over a fifth in 2021, while the combined share of advanced Europe and the US was reduced in half over the same time period, from 60 to about 30 percent (Figure 4, panel 1). By 2018, China became the main consumer of LAC's products, excluding Mexico—with exports to China heavily concentrated in mineral (about half of exports), vegetable (20 percent), and animal (10 percent) primary products (Figure 4, panel 2). The share of intra-regional exports has remained steady at about ¼ of total goods exports during 1996-2021. More broadly, despite improvements in market share diversification over time, Central America, the Caribbean, and Mexico's exports remain more concentrated across destinations than most other regions in the world, partly due to their strong trade ties with the US (Figure 4, panel 3).

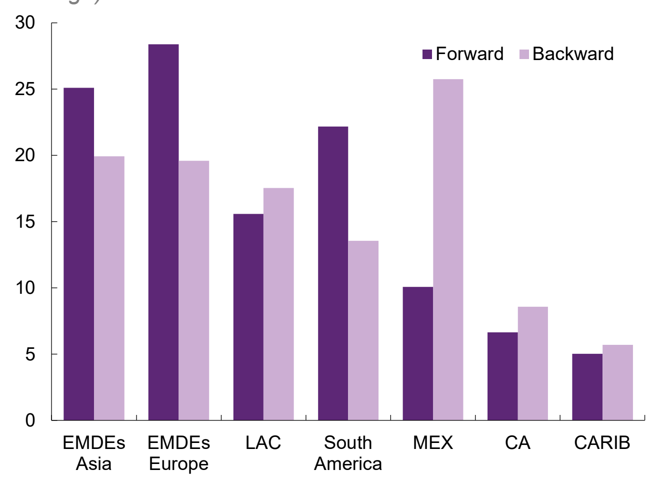
Figure 4. Geographical Composition of LAC's Goods Exports and the Role of China



Sources : Base pour l'Analyse du Commerce International (BACI) ; and IMF staff calculations.
Note: The figure reports exports of LAC excluding Mexico. The growing role of China as a destination for LAC's products is also present when including Mexico in the analysis. Advanced Europe = Advanced Economies in Europe. Advanced Other = Advanced Economies excluding Europe and the US. Export concentration measured as the HHI across export destinations. For each country, the index is calculated as the sum of the squares of export shares of each export destination.

LAC's integration into global value chains (GVC) remains limited. Both the region's average backward participation (i.e., the use of imported inputs in LAC's exports) and forward participation (i.e., the use of LAC's exports as inputs in other countries' exports) stand below other Asian and European EMDEs (Figure 5). Within LAC, however, there is some heterogeneity: (i) South America, where several countries are commodity exporters, have levels of forward participation in line with other EMDEs, although lower levels of backward participation;[4] (ii) Mexico stands out for its high backward participation in manufacturing (reflecting the high import content of its exports) but low forward participation (reflecting that much of its manufactures are exported to the US as final destination); (iii) Central America and the Caribbean are regions with little GVC integration on both dimensions.

Figure 5. LAC's Integration in Global Value Chains
(Percent of gross exports of goods and services; 2015-18 average)



Sources: UNCTAD-Eora Global Supply Chain database and World Bank's World Development Indicators; and IMF staff calculations.
Note: 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. CA = Central America; CARIB = Caribbean; EMDEs = emerging markets and developing economies; GVC = global value chains; LAC = Latin America and the Caribbean; MEX = Mexico.

The region's merchandise imports are concentrated in capital goods, with China playing an increasingly major role as a provider of these goods. Capital goods (in the form of machinery, electrical, and transportation products) account for over 1/3 of the region's imports of goods (Figure 6, panel 1), with China becoming a main source of these products over time (Figure 6, panel 2). Accompanying the growing role of China, the share of imports from the US has decreased from around 50 percent in 1996 to nearly 30 percent in 2021. As of 2021, LAC's machinery imports from China represent 8 times Germany's total machinery exports and 14 times Japan's total machinery exports. Besides being a large supplier of

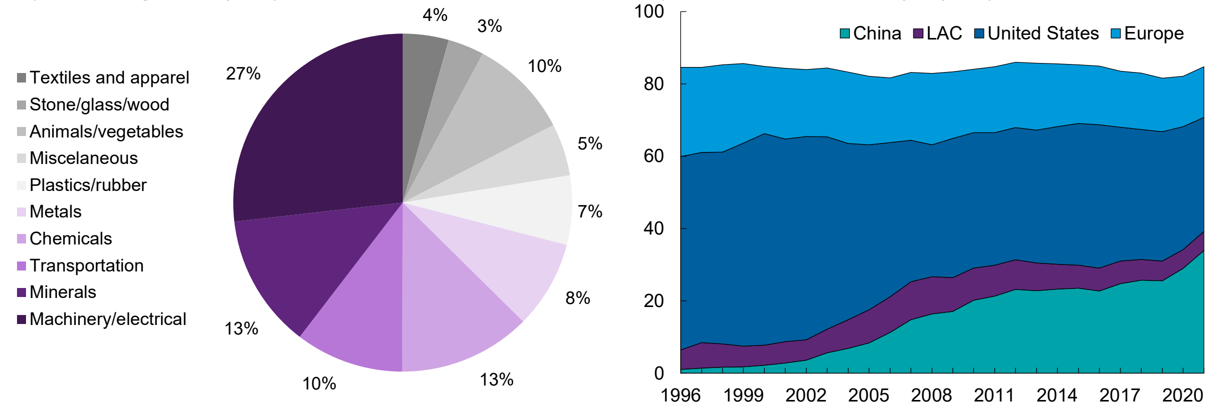
[4] Commodity exporters tend to have larger forward participation, as their production is less dependent on imported inputs and they export primary goods that enter as inputs in other countries' exports (e.g., Chile exports raw copper to China, who refines it and then exports copper-based products).

LAC, China exports to the region products that cannot be easily replaced by products from other origins, as the product composition of imports from China is very dissimilar to the composition of imports from other countries except the US.[5]

Figure 6. The Industrial and Geographical Composition of LAC's Goods Imports

1. Imports Across Industries, 2021
(Percent of goods imports)

2. Main Sources of Machinery Imports
(Percent of total machinery imports)



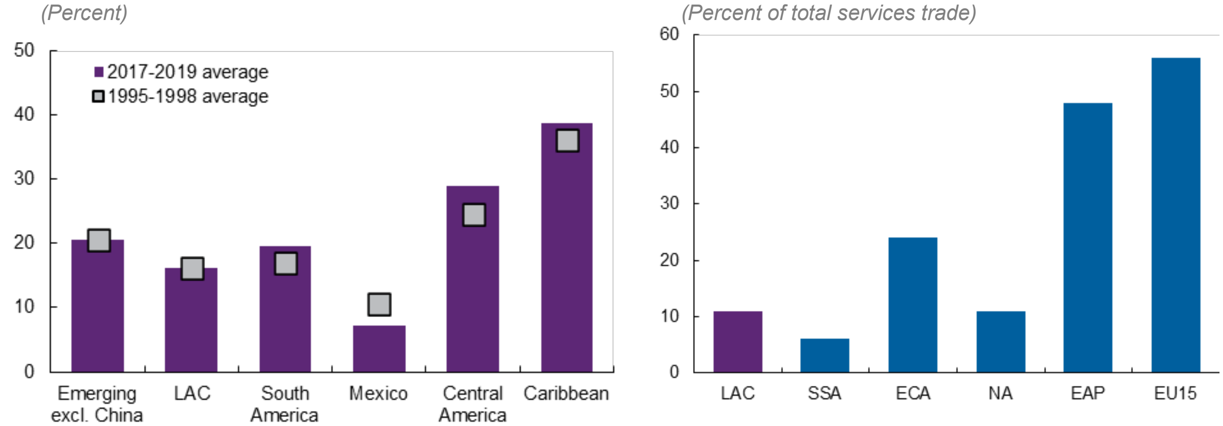
Sources: Base pour l'Analyse du Commerce International (BACI); and IMF staff calculations.
Note: LAC = Latin America and the Caribbean.

LAC could further boost trade in services, especially in South and Central America. At the global level, the share of services to total trade has been rising and reaching close to a quarter of world trade in 2019 (WTO, 2020). Meanwhile, in LAC, services only account for about 15 percent of total trade, a share that has stayed constant since the 1990s (Figure 7, panel 1). This share rises to about 40 percent in the Caribbean, where tourism-related travel and transportation account for the bulk of services exports and imports respectively. The region's largest economies and top exporters of commercial services, Brazil and Mexico, only stand at the 35th and 36th global ranks for the global value of services exported (WTO, 2023). Most services exports from LAC are destined to North America, and intra-LAC trade in services is lower than in relevant peers' groups, with only about 11 percent of services exports directed to other LAC countries, compared to about half in European or in East Asian peer regions (Figure 7, panel 2).

Figure 7. LAC's Trade in Services

1. Share of Services in Total Trade[1]
(Percent)

2. Intraregional Trade in Services
(Percent of total services trade)



Sources: IMF, Balance of Payments Statistics database; IMF, Direction of Trade Statistics database; WTO-OECD Balanced Trade in Services BaTIS, and IMF staff calculations.
Note: CA = Central America; EAP = East Asia and Pacific; ECA = European and Central Asia; EU15 = European Union 15 extended; LAC = Latin America and the Caribbean; NA = North America; SSA = Sub-Saharan Africa.
[1]Includes intraregional trade.

[5] LAC's imports from origins other than the US have a low Spearman correlation index to imports from China. This index captures the correlation of export shares across products of different origins: $Spearman_i = 100 \times \frac{\sum_p s_{i,p} \times s_{CHN,p}}{\sqrt{\sum_p s_{i,p}^2} \times \sqrt{\sum_p s_{CHN,p}^2}}$ where $s_{i,p}$ denotes the share of LAC's imports of product p from country i such that $\sum_p s_{i,p} = 1$. An index of 100 indicates that LAC's imports from country i have the same product structure than LAC's imports from China.

3. Obstacles to LAC's Trade

This section studies more formally the extent of LAC's under-trading, key obstacles to trade, and the potential gains from greater trade integration. Despite progress in lowering trade barriers over the last three decades, LAC continues to trade considerably less than other countries with similar economic and geographic characteristics. The region's trade underperformance is particularly evident at the intra-regional level and in the manufacturing sector. This is partly explained by low levels of infrastructure, although poor governance and human capital are also behind the observed under-trading, especially in South America. The potential gains from improving infrastructure in the region are sizable.

Trade policy, human capital, governance, and infrastructure are key factors shaping LAC's trade performance, but the relative importance of each factor varies by country. Arena et al. (2023), Fernandez-Corugedo et al. (2022) and Rosales Torres et al. (2023) have shown that trade policy, as well as structural policies related to human capital, governance, and infrastructure, are important drivers of trade volumes and diversification in Colombia, Guatemala, and Trinidad and Tobago, respectively. Given the heterogeneous impact of different policies across countries, in what follows the chapter provides a broad assessment of the main obstacles to trade in LAC as a whole, in LAC's subregions, and across sectors.

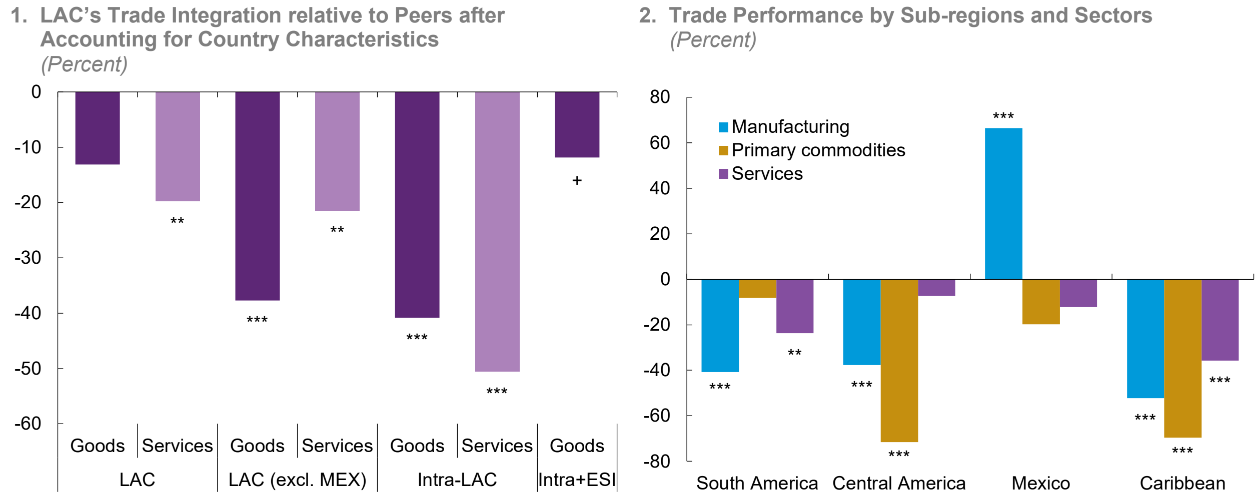
LAC's trade integration, especially within the region, is low, given its economic and geographic characteristics. After accounting for key macroeconomic characteristics in a gravity trade model, LAC's trade is estimated to be about 13 percent lower for goods and 20 percent lower for services than comparable trade flows outside of LAC (Figure 8, panel 1).[6] Excluding Mexico—which has a high degree of integration in merchandise trade, mostly due to its close relationship with the US—the region's underperformance in goods trade reaches 38 percent. A similar analysis focusing on trade within LAC countries indicates that intra-regional trade is 41 percent lower in goods and 50 percent lower in services than non-LAC trade flows, indicating that intra-regional trade is low in comparison to both trade *outside* the region and trade *between LAC and non-LAC* countries. This may partly reflect similarity in comparative advantage (e.g., in production of commodities) as indicated by the lower estimated degree of under-trading controlling for the similarity of export baskets. It is important to stress, however, that while a comparative advantage in certain products is largely given in the short term, it can change over time.

There is substantial heterogeneity across subregions and subsectors in the degree of under-trading. A similar analysis assessing the degree of trade underperformance by subregions and subsectors, given their economic and geographic characteristics, reveals that (Figure 8, panel 2): (i) South America significantly under-trades both in manufacturing and in services; (ii) Central America under-trades in manufacturing and primary commodities; (iii) there is no evidence that Mexico under-trades; and (iv) the Caribbean under-trades in all sectors.[7] Importantly, these results should be interpreted with caution as they may reflect natural comparative advantages of countries in each region, since the model does not control for endowments of natural resources.

[6] This analysis is based on Bhattacharya and Pienknagura (2023), who benchmark LAC's trade performance relative to non-LAC countries using a gravity model. Bilateral trade flows are regressed on baseline gravity controls (e.g., GDP, population, distance, common language, contiguity) and regional dummies. Throughout this section, "LAC trade" refers to trade flows that have LAC countries as either their source or destination. "Non-LAC" trade are trade flows that occur completely outside of LAC. "Intra-regional LAC trade" are trade flows that have LAC countries as both their source and destination. The regional dummies capture conditional mean differences between LAC (or subregions) and non-LAC trade flows. See Annex 2 for more details.

[7] Due to the Caribbean's geographical proximity to three large economies (the US, Mexico, and Brazil), the empirical model predicts even larger services trade flows for the region than what is observed in the data.

Figure 8. Assessing LAC's Trade Performance



Source: Bhattacharya and Pienknagura (2023).
Note: Percent difference in each region's trade flows relative to non-LAC trade flows, conditional on population, GDP, distance, border, common language, and landlocked. Export similarity index (ESI) is the Spearman index for goods trade at the product level. ***p<1%, **p<5%, *p<10%, +p<20%. LAC = Latin America and the Caribbean.

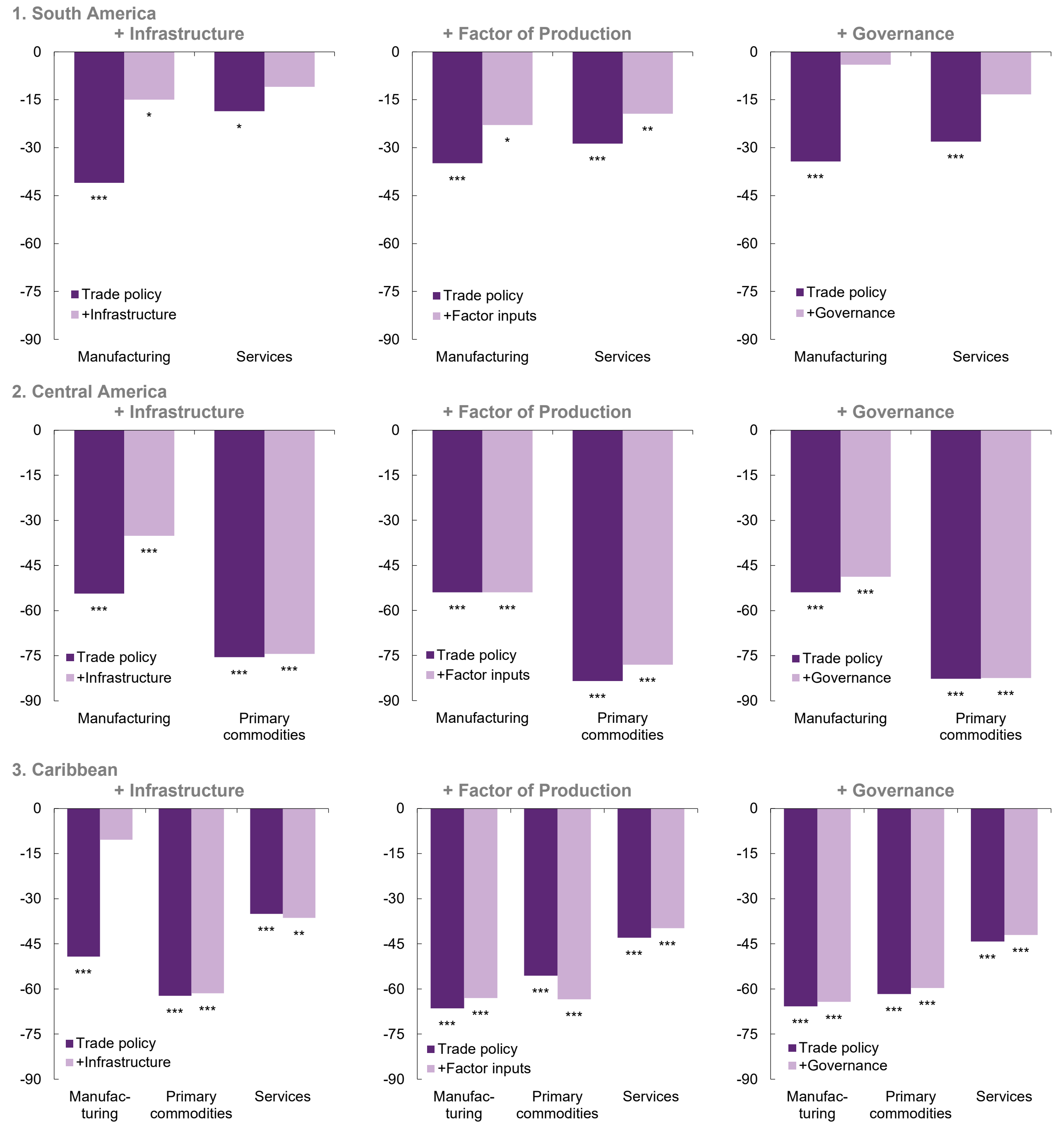
The standard gravity model is augmented to study which policy variables explain LAC's poor trade performance. Specifically, we explore: (i) trade policy variables (e.g., tariff/non-tariff barriers and regional trade agreements); (ii) infrastructure (transport- and customs-related); (iii) quality of factors of production (e.g., the quality of education and access to electricity); and (iv) quality of governance (e.g., levels of corruption and political instability).[8] To assess whether each policy variable can explain the region's under-trading, estimates of the degree of trade under-performance from specifications with and without the policy controls are compared.[9]

Infrastructure gaps explain a sizable part of LAC's trade underperformance. The augmented gravity estimates uncover three key findings (Figure 9). First, LAC's under-trading is not explained by differences in trade policy between LAC and non-LAC countries, even though reducing policy-related trade barriers significantly increases trade. For instance, being part of a trade agreement increases manufacturing trade by around 90 percent (Annex Table 2.1) but, conditional on trade policy, South America still under-trades non-LAC countries by 40 percent (see Box 3 for a discussion on LAC's trade policy). Second, controlling for infrastructure significantly reduces the extent of South America's under-trading in all sectors, as well as that of Central America's and the Caribbean's under-trading in manufacturing. This indicates that infrastructure gaps can explain an important part of LAC's poor trade performance. Third, low quality of governance and factors of production are important obstacles to trade in South America. Specifically, when controlling for the quality of governance, there is no evidence that the region under-trades, and controlling for factors of production reduces South America's manufacturing under-trading from 40 to 20 percent (see Box 1 for a discussion on Mercosur's trade performance). These findings highlight that transversal policies like infrastructure, governance, and human capital are important barriers to LAC's trade integration.

[8] Transport infrastructure and customs efficiency are measured by their respective World Bank's International Logistics Performance Indices. Access to factors of production is measured as the share of firms in the World Bank's Enterprise Survey (WBES) reporting access to finance and electricity as major obstacles, whereas the quality of factors of production is captured by the human capital index from the Penn World. Quality of governance is proxied by the share of firms in the WBES reporting corruption, political instability and crime, theft, and violence as major obstacles. See Annex 1 for a full description of the data and variables used in this chapter.

[9] To avoid collinearity issues across controls, policy variables are added to the specification one at a time.

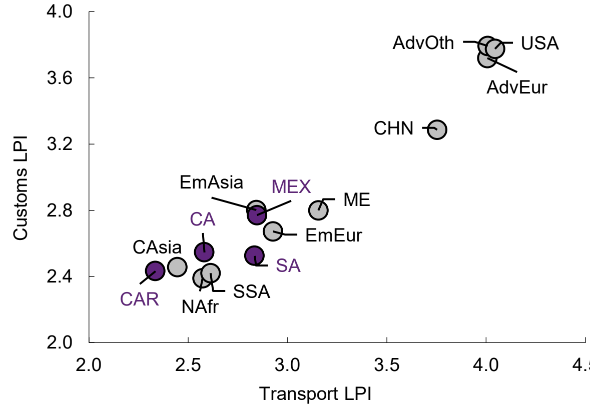
Figure 9. Trade Gaps for Different Regions and Model Specifications
(Percent, controlling for specific factors)



Source: Bhattacharya and Pienknagura (2023).
Note: Percent difference in each region's trade flows relative to non-LAC trade flows, conditional on population, GDP, distance, border, common language, and landlocked. Each row analyzes each subregion in LAC (South America, Central America, and the Caribbean). Each column includes, in addition to trade policy variables, control variables related to infrastructure, factor of production, and governance. ***p<1%, **p<5%, *p<10%.

Closing the infrastructure gaps would generate substantial gains from trade. The concept of infrastructure encompasses physical infrastructure as well as customs infrastructure. Countries with a low Transport Logistics Performance Index (LPI)–which measures, for example, the quantity and quality of physical infrastructure–tend to have low Customs LPI—which measures, among other things, processing times for customs clearance (Figure 10). Aside from Mexico, there are sizeable infrastructure gaps between LAC and other EMDEs and AEs. To assess the potential trade gains from improving both dimensions of infrastructure in the region, the gravity model in Bhattacharya and Pienknagura (2023) is embedded into a general equilibrium trade model along the lines of Anderson and van Wincoop (2003). In the model, infrastructure facilitates trade by reducing trade costs (see Annex 3 for a full description of the model). Closing the infrastructure gap in both transport and customs efficiency areas between LAC and AEs by 10, 20, and 50 percent would increase LAC's exports between 5, 11, and 30 percent, respectively (Figure 11, panel 1). As a consequence, LAC's output would increase by 1½, 2½, and 7 percent, respectively (Figure 11, panel 2). Both dimensions of infrastructure contribute to the gains from trade. For example, when closing the gap by 20 percent, LAC's output increases by 2.8 percent, with transportation infrastructure responsible for 1.5 percentage points (pp), customs efficiency for 1.1 pp, and 0.2 pp due to the interaction between the two types of infrastructure (i.e., transport infrastructure gains are larger when there is better customs efficiency). Output gains are heterogeneous across countries, ranging from 1½ to 6 percent, depending on the extent of the initial infrastructure gaps.

Figure 10. Logistics Performance Index
(Transport and customs Logistics Performance Index)

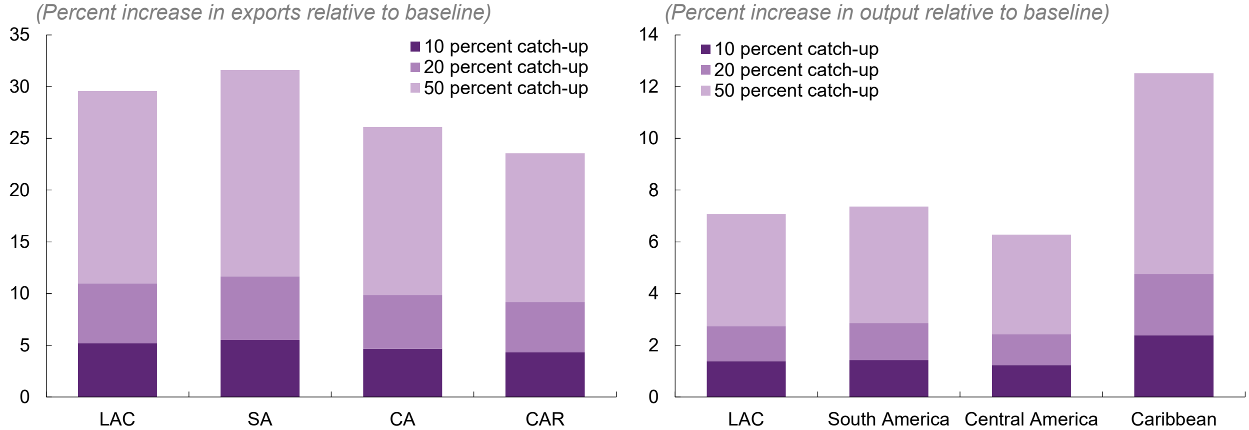


Source: IMF staff calculations.
Note: Aggregates are GDP-weighted. LPI = Logistics Performance Index; AdvEur = Advanced Europe; AdvOth = Advanced Other; CA = Central America; CAR = Caribbean; CAsia = Central Asia; EmAsia = Emerging and Developing Asia; EmEur = Emerging and Developing Europe; LPI = Logistics Performance Index; ME = Middle East; NAfr = North Africa; SA = South America; SSA = Sub-Saharan Africa.

Figure 11. Infrastructure Improvements and the Gains from Trade in LAC

1. **Export Gains from Closing Infrastructure Gaps Between LAC and AEs**
(Percent increase in exports relative to baseline)

2. **Output Gains from Closing Infrastructure Gaps Between LAC and AEs**
(Percent increase in output relative to baseline)



Source: IMF staff calculations.
Note: CA = Central America including Mexico; CAR = Caribbean; LAC = Latin America and the Caribbean; SA = South America.

A wide range of policy actions could help close infrastructure gaps. The World Bank's Logistics Performance Index (LPI), used to capture infrastructure in the analysis, points to several policies that could help improve infrastructure and boost trade in LAC, including:[10] (i) streamlining, automating, and digitizing customs procedures, reducing bureaucratic red tape, and enhancing transparency in trade processes; (ii) investing in the quantity, the

[10] The World Bank's Logistics Performance Index (LPI) is a tool to assess the logistics performance across countries based on a survey among experts with in-depth logistics knowledge. For country-specific interventions, please refer to previous LPI reports at: https://lpi.worldbank.org/report

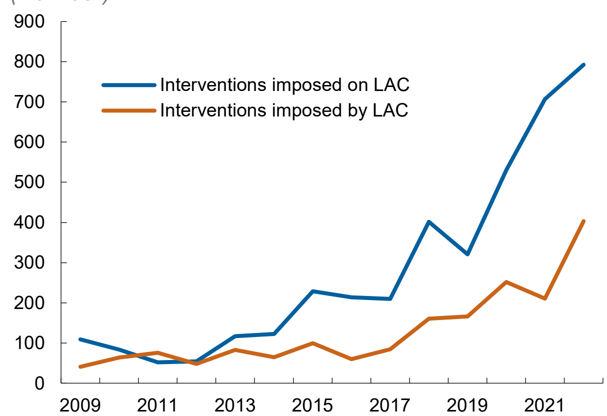
quality, and the integration of different transport modes, and improving transport-related technologies such as digital tracking systems; (iii) developing a logistics sector with efficient freight forwarding, warehousing, and providers by encouraging competition and fostering Public-Private Partnerships (PPPs); and (iv) training customs and transportation personnel to enhance their skills. One important caveat is that large infrastructure improvements may imply potentially large costs. Implementing these policies would require a case-by-case analysis of key bottlenecks that need to be prioritized, while observing fiscal policy constraints and creating an environment conducive of private investment.

4. Global Trade Fragmentation: Implications for LAC

Deepening geopolitical tensions threaten to reverse a secular decline in trade barriers, increasing the risks of global fragmentation—a split of global trade and finance into economic blocs. LAC is well placed to withstand a mild scenario, with some countries benefitting from trade diversion of manufacturing goods or commodities. However, LAC would face substantial losses in more extreme scenarios, with the impact depending on the ultimate configuration of trading blocs and individual countries' characteristics. Strengthening global and regional trade ties wherever possible could help limit the potential impact of global fragmentation while preserving the gains of trade openness.

Risks of global fragmentation have risen in recent years. A surge of harmful trade interventions, including discriminatory production subsidies and anti-dumping measures, threatens to culminate in a broader policy-driven reversal of global economic integration. LAC has already faced over 800 interventions imposed by other countries but also played its part by increasing interventions imposed on other countries (Figure 12). Going forward, there is a risk that the rising trend of trade restrictions could culminate into a broader division of countries into economic blocs, with trade and finance ties reshaping along the bloc lines, a process referred to as geoeconomic fragmentation. Given the recent tensions, these blocs are likely to center around the US-EU and China-Russia. There are multiple possibilities, however, of how other countries would align with these two blocs. For example, countries could align based on geopolitical views or based on trade or financial ties.

Figure 12. New Harmful Trade Interventions
(Number)



Source: Global Trade Alert (2022).
Note: Data adjusted for reporting lag as of December 31st. Interventions include production subsidies, sanitary and phytosanitary measures, technical barriers to trade, capital control measures, tariff-rate quotas, local content measures, subsidies, government procurement restrictions. LAC = Latin America and the Caribbean.

Global fragmentation could reverse gains from globalization and affect LAC through several channels. Fragmentation could disrupt both trade and financial linkages, reducing flows between blocs and re-routing them between countries in the same blocs.[11] For the world economy, including LAC, these developments could lower GDP growth, as these restrictions will likely impair capital and labor allocations and reduce technological diffusion, leading to lower productivity growth. Fragmentation could also increase barriers to migration, with potential risks to remittances flows, of which many LAC countries are large beneficiaries. Fragmentation could also harm international cooperation on public goods such as climate change, pandemic preparedness, international taxation, as well as AML/CFT, with negative implications for LAC.

[11] For instance, China provides development finance for infrastructure and energy projects in the region. See China-Latin America Finance Databases - The Dialogue for a list of projects.

However, a changing trade landscape could also provide opportunities for LAC, in particular in the manufacturing and commodities sector. In response to fragmentation prospects, companies could choose to relocate parts of their supply chain operations to countries where trade disruption risks are lower or look for alternative import sources for key commodities. While few countries in the region currently possess a competitive manufacturing base, Mexico could become a potential beneficiary of trade diversion and grow its manufacturing sector. In fact, evidence suggests that Mexico is already benefitting from trade diversion since the onset of trade tensions between the US and China in 2018 (see Box 2).[12] For other countries, there could be selective opportunities to expand in some manufacturing sectors. LAC's fossil fuel, mineral, and agricultural producers could also benefit from a reorientation of demand as well as temporarily higher commodity prices (Figure 3, panel 1).[13] While commodity markets are prone to shocks that could be amplified by geoeconomic fragmentation,[14] LAC's vast resources of the minerals critical for green technologies and decarbonization, such as lithium, silver, and copper, make it a central player courted by advanced economies seeking to secure supplies of critical minerals.[15] With the appropriate policy frameworks, these resources could attract substantial investments.

The likely impact of fragmentation on LAC will depend on the degree of fragmentation. To provide a quantitative assessment, the chapter explores two kinds of illustrative scenarios—a mild scenario and two more extreme fragmentation scenarios—in a simple trade model. A mild fragmentation scenario entails full suspension of trade between Russia and US-EU while trade between China and US-EU remains open, except for high-tech sectors. Trade among other countries remains unchanged (Figure 13, panel 1).[16] In this scenario, LAC manages to maintain economic ties with the two blocs. In the more extreme fragmentation scenarios, in contrast, all trade between the US-EU and China-Russia blocs come to a halt, and other countries are forced to trade exclusively with one another within a bloc. In this scenario, countries face the stark alternative to join either US-EU or China-Russia blocs and suspend trade with the other bloc (Figure 13, panel 2). For the purpose of our analysis, we formulate two hypothetical extreme fragmentation scenarios. In one scenario, countries are assigned to either bloc based on the strength of their trade relationship with the bloc members (most LAC countries would join the US-EU bloc), and in the other scenario countries are assigned to blocs based on their geopolitical proximity.[17] We evaluate the impact of these three fragmentation scenarios in an input-output trade model, which focuses on the static misallocation costs due to trade frictions. In this model, we abstract from other channels such as financial flows.

[12] See Fajgelbaum et al. (2022) for a survey of the economic impacts of the US-China trade war. In 2023Q1, Mexico has supplanted China as the United States' main trading partner. US Census. See also Cigna et al. (2022) for a product-level analysis of trade diversion to third countries after the US-China trade wars.

[13] Latin America is expected to expand its oil production until 2028, with the largest additions coming from Brazil's pre-salts and Guyana' offshore fields IEA (2023)

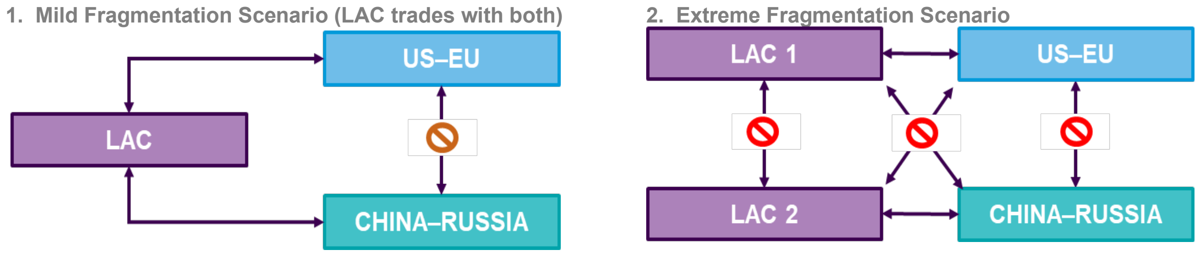
[14] Commodities, which account for a large share of LAC's trade, are already showing signs of fragmentation (October 2023 WEO). The oil and natural gas markets are among those markets where signs of fragmentation have been the most salient, with large reallocation of export destinations and price spikes that have spurred bouts of inflation. Substantial uncertainty regarding medium-term forecasts of lithium demand and mining needs stems from the risk of technological breakthrough in battery production or recycling possibilities (Vazquez 2023, Riofrancos et al 2023)

[15] For instance, the EU and Chile signed in July 2023 a memorandum of understanding to establish a partnership on sustainable raw materials value chains.

[16] Following Cerdeiro et. al. (2021), high-tech sectors are defined using the classification in OECD (2011), which is based on sectoral R&D intensities. This methodology highlights two high-tech sectors: electronics and machinery, and transport equipment.

[17] Following Bolhuis et al. (2023) countries are assigned to blocs based on their share of bilateral trade in goods and services in 2019. Countries join the bloc of whichever pair, USA and Europe on the one hand, or China and Russia on the other hand, account for the largest trade share. In the other extreme scenario geopolitical proximity is measured by distance between countries' voting patterns at the United Nations General Assembly, see Bailey et al (2017).

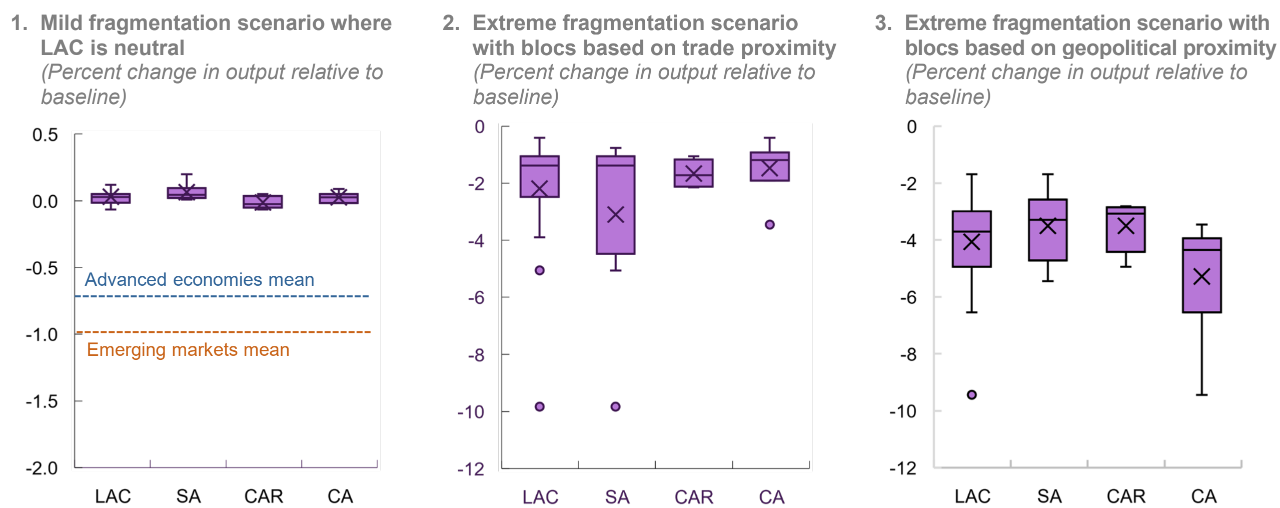
Figure 13. Fragmentation Scenarios



Source: IMF staff calculations.
Note: Arrows between country blocs represent trade linkages. The interdiction sign denotes trade restrictions. In panel 1, LAC continues to trade with all countries while trade is suspended between the US and the EU, on the hand, and Russia (all sectors) and China (high-tech sectors only). In panel 2, there is complete cessation of trade between different group of countries. LAC countries are assigned to trade blocs based on their relative trade proximity with either bloc, as measured by trade share.

LAC would weather a mild fragmentation scenario well. In fact, in a mild fragmentation scenario, changes to LAC's output would be near zero and marginally positive on average (Figure 14, panel 1). From that perspective, LAC would be better placed than advanced or other emerging economies, which are estimated to lose on average ½ to 1 percent of output, relative to a world where there is no fragmentation. LAC's trade structure provides two mitigating factors explaining LAC's resilience in this scenario. First, due to its export similarity with commodities exported by Russia (Figure 3) LAC—South American's fossil fuel and agricultural exporters in particular—can benefit from trade diversion and temporary higher prices. Second, the silver lining of LAC's limited integration into GVCs (Figure 5) is that severing trade between EU-US and China in the high-tech has little impact on the region's trade flows and the rest of the region's trade remains essentially unaffected in this scenario.

Figure 14. Possible Impact of Global Fragmentation on LAC under several scenarios



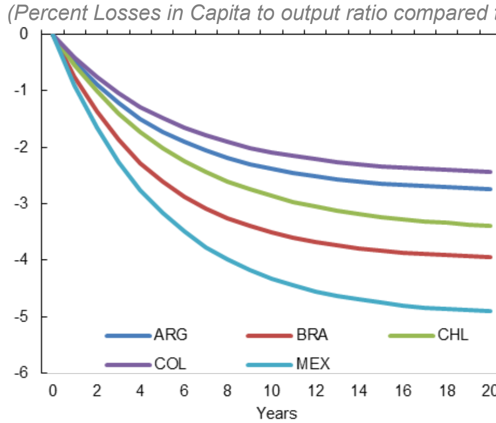
Source: IMF staff calculations.
Note: In all panels, the horizontal lines in the bars represent the median, for the countries in the group, the cross the average, the bars the interquartile range, the whiskers the min and max, except for outliers (dots) lying outside 1.5 times the interquartile range 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.

More extreme fragmentation scenarios could result in more sizeable output losses for LAC, although still below those for advanced or emerging economies. In more severe fragmentation scenarios, LAC's permanent output losses would average from 2 to 4 percent – still less than those in AEs and other EMEs (Figure 14, panels 2 and 3). Larger output losses in these scenarios result from the stark assumption that trade between countries in opposing blocs is completely cut off. Moreover, these losses would depend on individual country characteristics. Two features of LAC economies make them particularly vulnerable . First, given that both US and China account for large shares of LAC's trade (Figure 4, panel 1), alignment with either bloc would necessarily imply disrupting trade with a major partner, resulting in substantial losses, to the extent that these trade flows are not smoothly reallocated. This extreme global fragmentation could also result in LAC countries being separated from neighboring countries and joining opposing blocs, generating additional losses. The costs would be largest for countries that end up separated from their neighbors (Figure 14, panel 2). Losses are higher when blocs are formed based on geopolitical ties (Figure 14, panel 3), as these ties do not necessarily align with current trade relationships between countries.

Fragmentation could also weigh down on capital investment in the region. LAC's rate of gross fixed capital formation has persistently lagged behind peers and the region still faces sizeable investment needs (Section 2). While globalization delivered a steep decline in the prices of capital goods, boosting real investment and productivity in most EMDEs (IMF 2019), fragmentation threatens to reverse this trend. LAC could be particularly exposed given its reliance on machinery and equipment imported from China (Figure 4, panel 2), with few readily available and cost-competitive alternative sources. To estimate how these headwinds could hamper investment, we simulate, in a simple dynamic multi-country trade model with capital accumulation (see Annex 5), the extreme fragmentation scenario splitting the world into the two blocs described above. The analysis suggests that investment rates in LAC's largest economies could drop by 2 to 5 percent, hitting particularly Mexico and Brazil (Figure 15)—countries with more capital-intensive industries—with the capital intensity in these economies gradually faltering compared to a baseline with no fragmentation. This suggests a substantial impact of fragmentation on investment, which can amplify output losses due to extreme fragmentation by about 40 percent, compared to a simulation of the same extreme fragmentation scenario when the investment channel is shutdown. Additionally, evidence suggests that investment, and FDI in particular, can also be negatively affected by the policy uncertainty associated to fragmentation risks (IMF 2023).

Figure 15. Impact of Fragmentation on Capital Intensity in LA5 countries over time

(Percent Losses in Capita to output ratio compared to baseline)



Source: EORA, BACI, and IMF staff calculation
Note: Evolution of capital-to-output ratio over time after trade is fragmented into blocs. Percentage losses relative to the capital-to-output in the baseline equilibrium with no fragmentation. See Annex 5 for details of the model.

Strengthening trade integration and policy coordination among LAC countries would help limit the impact of fragmentation. From a global standpoint, a first-best scenario is to avoid fragmentation. However, with rising risks of global fragmentation, LAC countries may need to focus on a strategy that pursues greater integration while mitigating the potential costs from global fragmentation. Deepening intra-regional trade integration and fostering regional coordination would go in this direction, helping to boost trade and increase opportunities for diversification to minimize the risks from global fragmentation. While nonalignment with either bloc can help limit the risk of a costly intra-regional division into opposite blocs and place the region in a stronger footing in trade negotiation vis-à-vis large economies (Bolhuis, et al., 2024), it can also generate policy uncertainty that may deter FDI (IMF 2023). Ensuring a strong WTO could also help maintain openness and predictability.

5. Summary and Policy Implications

LAC's degree of trade integration lags that of many other regions. The region's trade basket has remained concentrated in a few industries, with China recently becoming a key trading partner on par with the US and Europe. LAC's trade, especially intra-regional, is low in comparison to peers, once economic and geographic factors are considered. Poor infrastructure and, in some cases, low quality of governance and human capital have contributed to LAC's low degree of trade integration and point to the potential for substantial gains from improving transport- and customs-related infrastructure. At the same time, LAC's intra-regional trade in services is limited. Technological innovation has increased the tradability of different types of services (telecommunications, education, and health), which now can be digitally delivered, offering LAC countries opportunities to further trade integration without large and costly upfront investments.

In a context of deepening global trade tensions, the region is well placed to withstand mild scenarios of global fragmentation and could benefit from trade diversion, but could be more significantly impacted in extreme scenarios, in which global trade splits into competing blocs. Strengthening trade integration, including within the region, could be key to reaping the benefits of greater trade openness while mitigating the risks of global fragmentation. Reducing trade barriers, including non-tariff barriers, closing infrastructure gaps, and putting in place policies that make LAC an attractive investment destination could boost trade and growth in the region. Multilateral cooperation and trade policy coordination, including within LAC, could help reduce cross-border spillovers and trade policy uncertainty, as well as identify and mitigate unintended consequences of trade policy actions.

Box 1. Mercosur's Trade Performance

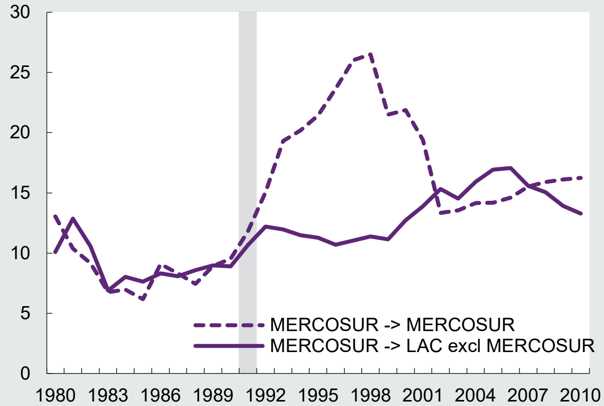
Established in 1991, Mercosur successfully improved trade and output of its member countries. These gains were short lived, however, and nowadays member countries underperform peer regions given their economic and geographic characteristics. Gravity estimates suggest that the under-performance is due to little integration between Mercosur and the rest of LAC. Infrastructure, governance, and the quality of factor inputs are important obstacles to the bloc's trade integration.

Mercosur—a trade bloc mainly consisting of Argentina, Brazil, Paraguay, and Uruguay—was established in 1991, with the aim of promoting trade integration and economic cooperation among its member countries. Upon implementation, member countries agreed to gradually reduce most of their bilateral tariffs to zero, to establish a common external tariff framework and to become a customs union by 1995.

Upon implementation, trade flows between member countries outpaced trade flows between Mercosur and non-Mercosur countries (Box Figure 1.1), consistent with gravity-model estimates in the literature[1]—pointing towards sizable output and welfare gains from the trade agreement (Campos and Timini, 2022). However, these trade gains appear to have been short-lived, as the extent of trade among Mercosur countries converged back to the level of trade between Mercosur and the rest of LAC by the mid-2000s.

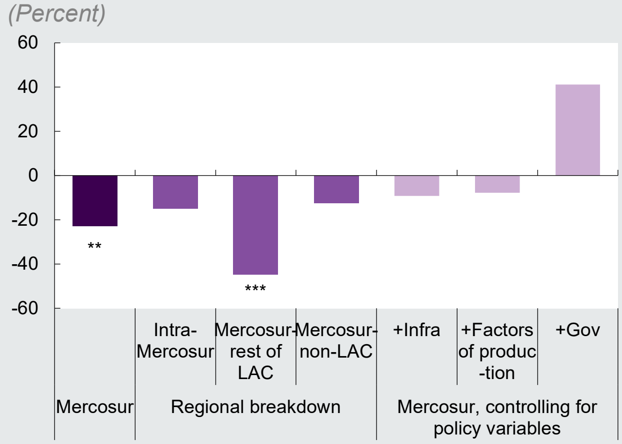
Implementing the gravity framework of Bhattacharya and Pienknagura (2023) to assess the degree of trade integration of Mercosur points to three key findings (Box Figure 1.2). First, Mercosur under-trades by about 25 percent relative to its benchmark. Second, there is strong under-performance in trade flows between Mercosur and the rest of LAC, and not so much within Mercosur or between Mercosur and non-LAC countries. Third, policy variables related to transport infrastructure, customs efficiency, and the quality of factors of production and governance explain the bloc's current trade performance.

Box Figure 1.1. Exports from Mercosur to Mercosur and to rest of LAC
(Percent share of goods trade)



Sources: IMF, Direction of Trade Statistics database; and IMF staff calculations.
Note: LAC = Latin America and the Caribbean; Mercosur = Mercado Común del Sur (ARG, BRA, PRY, URY).

Box Figure 1.2. MERCOSUR's Goods Trade Performance
(Percent)



Source: IMF staff calculations.
Note: Percent difference in trade flows in Mercosur versus non-LAC regions, conditional on population, GDP, distance, border, common language, landlocked, MFN (most-favored nation) tariffs, trade agreements, and non-tariff barriers. ***p<1%, **p<5%, *p<10%. LAC = Latin America and the Caribbean; MERCOSUR = Mercado Común del Sur (ARG, BRA, PRY, URY).

Prepared by Rafael Machado Parente and Flavien Moreau.

[1] See Baier et al. (2007), Kohl (2014), Baier et al. (2019), El Dahrawy Sánchez-Albornoz and Timini (2021), and Campos and Timini (2022).

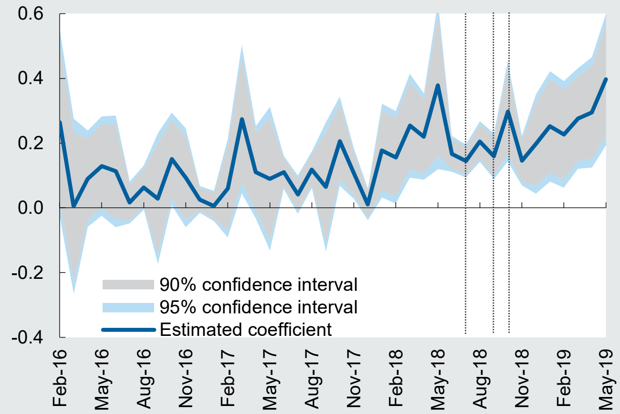
Box 2. Global Tensions and Trade Diversion Effects for Mexico—Insights from Granular Production and Trade Data

Using industry-level data, this analysis finds overall positive trade diversion effects on Mexico's exports to the US during 2018 US-China trade tensions. The magnitude of the trade diversion across industries does not depend on Mexico's industry-level trade exposure to the US, but rather on the US tariff changes on Chinese goods, the decrease in imports by the US from China, product substitutability with Chinese products, and (weakly) on Mexico's GVC integrations.

International trade theory predicts that trade agreements can lead to "trade creation" but also "trade diversion". Similarly, following trade tensions (e.g., increase in tariffs between two countries), trade could divert towards a third country. This study explores whether Mexico's exports to the US experienced a trade diversion effect when the latter-imposed tariffs on China in 2018.

The study builds a unique industry-level dataset that combines Mexico's nationally sourced input-output data (INEGI) with cross-country sources (WIOD, UN Comtrade). The INEGI dataset is used as the base with variables of other datasets aggregated or disaggregated into these industries. This allows to quantify channels through which input-output linkage may play a role during global tensions. Compared to cross-country sources, the constructed database accounts for higher supply linkages across a larger number of industries (258 industries versus cross-country coverage of 56 industries in WIOD).

Box Figure 2.1. Change in Imports after a One-Standard Deviation Change in Net Tariff
(Percent)



Sources: INEGI; UN Comtrade; WIOD; and IMF staff calculations.
Notes: This figure plots the estimated coefficients (solid line) and 90 percent confidence intervals (dashed lines) in each month. The coefficient in each month measures the average difference in the US (log) import values in this month between industries that are more exposed to tariff increase during the US-China trade tensions and industries that are less affected by the tensions. The coefficient is estimated by a difference-in-differences method; hence, we control for the average differences in the US import values between the treated and the control groups in January 2016. We consider industries to be more exposed to the US-China trade tensions when the increase in the sum of output and downstream net upstream tariff imposed by the US on Chinese products is larger than the median of industry-level tariff change. Vertical lines indicate the first three rounds of tariff imposing by the US.

The trade diversion effect on Mexico's exports to the US is estimated from the first three rounds of US tariffs on China imposed on July 6th, August 23rd, and September 24th of 2018 (Bown 2021). Following Cigna et al. (2020), a difference-in-differences method is used to exploit the variation of tariff exposure across industries. This entails comparing Mexican exports to the US of industries in which a higher US import tariff was imposed on Chinese products with that of those less affected, before and after the introduction of tariffs. The regressions control for lagged terms of dependent variables, industry- and month- fixed effects.

The results point to an overall positive effect on Mexico's exports, with a one-standard deviation increase (5.8 percentage points) in net tariff change (sum of output plus downstream minus upstream tariffs) on Chinese products increasing Mexican exports to the US by 6.4 percent. To shed further light and to further corroborate the first set of results, an alternative flexible specification is used to compute the coefficient for each month. As is often present during trade agreements and other policy interventions (Hannan 2016, Abadie et al. 2010), we find positive and statistically significant trade diversion effect earlier than the formal policy implementation dates due to the anticipation effect (Box Figure 2.1).

Prepared by Mengqi Wang (University of Wisconsin-Madison) and Swarnali Ahmed Hannan (WHD), based on their forthcoming IMF Working Paper "Trade Diversion Effects from Global Trade Tensions—Higher than We Think".
[1] Upstream tariff is the weighted average of tariffs faced by the upstream industries, and it affects one industry through input supply channel. Downstream tariff is the weighted average of tariffs exposed by the downstream industries, and it affects one industry through input demand channel.

Box 2. *(continued)*

Delving deeper, tariffs directly applied to the exported goods are found to play an important role, with some evidence on a positive impact through downstream tariffs as well. Finally, the industry-level trade diversion effect does not vary according to Mexico's trade exposure to the U.S., but rather according to the size of the changes of U.S. tariffs on Chinese products, the decrease in U.S. imports from China, and the degree of substitutability of Mexico's products vis-à-vis China (see text table). There is some weak evidence that higher global value chain (GVC) integrated industries benefitted more. The findings are in line with those of Freund et al. (2023) who, using cross-country analysis, show that China's decline in U.S. exports was concentrated in tariffed goods and Mexico was one of the biggest winners. The authors also find some evidence of nearshoring to Mexico.

Overall, the results suggest that differential short-term impact across countries and industries are important to bear in mind in the current discussion of the risk of policy-driven geoeconomic fragmentation.

Box Table 2.1. Industry-Specific Trade Diversion Effect

Industry characteristics	Correlation coefficient	p-value
Change in U.S. imports from China	-0.7181	0.0000
Net tariff change	0.2500	0.0196
Output tariff change	0.2742	0.0102
Export share to the U.S. in 2017	0.0149	0.8716
Imported input value share in production in 2016	0.0655	0.2956
Export share in sales in 2016	0.0624	0.3182
Product substitutability (σ)	0.2320	0.0002

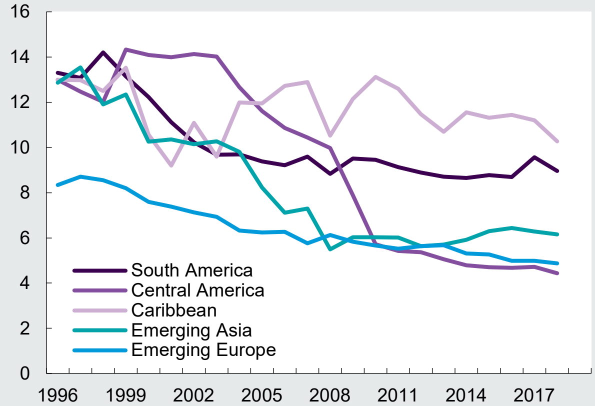
Note: This table reports the correlation coefficient and corresponding p-values between industry-level estimated export growth from Mexico to the U.S., $\widehat{\beta_j}$, and industry-level characteristics. $\widehat{\beta_j}$ is estimated to be the industry-level average increase in monthly export value to the U.S. after the trade tensions. It is estimated using monthly time-series data during 2016/01-2019/05, with specification $Y_{j,t} = \alpha_j + \beta_j Post_t + \rho_j Y_{j,t-1} + \gamma_j X_{j,t} + \varepsilon_{j,t}$. In this specification, where $Y_{j,t}$ is the U.S. imports from Mexico (in logarithms) in sector j in month t, $Post_{j,t}$ is the time dummy which equals to 1 after tariffs increased. Control variables $X_{j,t}$ include GDP growth rate of the U.S. and Mexico, CPI growth rate (inflation rate) of two countries, and exchange rate of peso against dollars. We also control for lagged imports. We correlate the estimated export growth at industry level with several industry-level characteristics listed in the first column. Change in U.S. imports from China is measured by the industry-level estimated export growth from China to the U.S., $\widehat{\beta_{j,CHN}}$, using the above specification but with data on China. Net tariff change and output tariff change are the size of changes in net and total tariffs at industry-level, measuring the exposure to the U.S.-China tariff changes. Export share to the U.S. in 2017 is the industry-level share of aggregate Mexican export value to the U.S. in 2017, measuring the relative exposure to the U.S. market. Imported input value share in production in 2016 is the share of imported input in total production cost. Export share in sales in 2016 is the share of export value in total production value. Both measure the industry-level GVC integration and are constructed from the input-output table obtained from INEGI in the year of 2016, before the trade tensions. Product substitutability (σ) at industry level comes from Broda and Weinstein (2006). The estimated product substitutability measures the substitution between varieties from different countries, for example, shoes from Mexico and China.

Box 3. The Evolution of LAC's Tariff and Non-tariff Trade Barriers

LAC has made substantial progress in reducing import tariffs over time, despite heterogeneity across subregions and trading partners. In order to continue promoting trade and integration, LAC will need to complement the broad decline in barriers to trade with deeper commitments that go beyond tariffs and address climate concerns.

Trade tariffs and free-trade agreements have been a major focus of trade policy historically. In line with other regions, LAC has significatively reduced its import tariffs since 1973, with more than 300 trade agreements involving LAC countries ratified. While tariffs have broadly declined in LAC, a divergence has opened across LAC's subregions. In South America and in the Caribbean, the reduction in Most Favored Nation (MFN) import tariffs has stalled since the late 2000s. In contrast, MFN tariffs in Central America fell by up to 8 percentage points on average, reaching levels similar to those observed in other emerging markets (Box Figure 3.1).

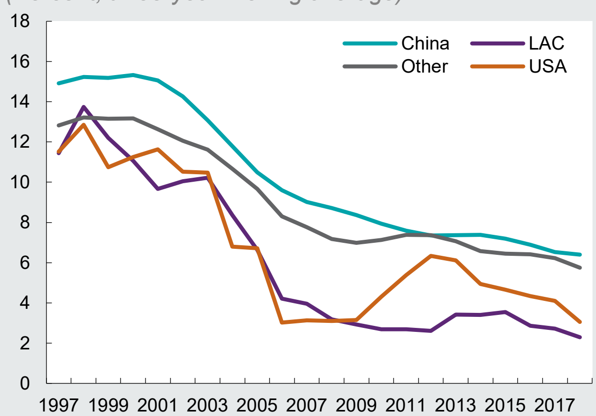
Box Figure 3.1. Most-Favored Nation Tariffs
(Weighted by imports; percent)



Sources: International Trade and Production Database for Estimation; UNCTAD Trade Analysis Information System; and IMF staff calculations.

Not all trading partners are subject to the same import tariffs. Regional trade agreements like Mercosur, NAFTA-USMCA and the Andean Community have played an important role in simplifying regional trade policies and lowering tariffs applied to neighboring countries. At the same time, the effective import tariffs that LAC imposed on China and other trade partners have remained around 6–8 percent. (Box Figure 3.2). Free trade agreements have also helped shield countries from certain temporary import tariff increases.[1]

Box Figure 3.2. LAC's Effective Import Tariffs by Trade Partner
(Percent; three-year moving average)



Sources: International Trade and Production Database for Estimation; UNCTAD Trade Analysis Information System; and IMF staff calculations.
Note: Effectively applied tariff is the lowest available tariff rate for each country pair. Preferential tariffs are used for trade flows in a regional trade agreement. LAC = Latin America and the Caribbean.

Looking ahead, the broad decline in LAC's barriers to trade faces a number of challenges that go beyond tariffs. First, "Non-tariff Trade Barriers" (NTBs) have stayed stubbornly high in most of LAC's subregions, except for Central America where they are on par with advanced economies (Box Figure 3.3). NTBs particularly affect sectors such as Agriculture, where they often take the form of sanitary and phytosanitary restrictions, or services, where various regulatory hurdles prevent foreign firms from effectively accessing domestic markets. Importantly, a group of Andean countries —Ecuador, Chile, Colombia, and Peru—have successfully reduced trade barriers in services between 2008 and 2016.[2] In order to further promote trade and global value chain integration, LAC countries could also pursue deep commitments in areas that go beyond tariffs such as trade facilitation and regulatory cooperation (Rocha and Ruta, 2022).

Prepared by Rafael Machado Parente and Flavien Moreau.

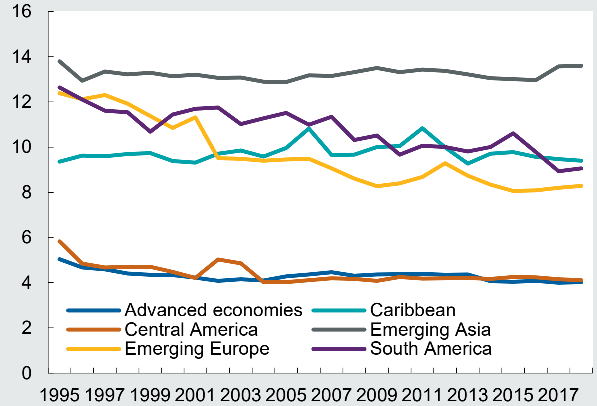
[1] For instance in August 2023 Mexico raised import tariffs on steel and 392 products from countries. The raise only affected countries with which Mexico had no trade agreement DOF - Diario Oficial de la Federación.

[2] See the "Services Trade Restrictiveness Index" by Brochert et al (2020)

Box 3. *(continued)*

Another challenge arises from the increasing integration of climate concerns into trade policy. For instance, the EU-Mercosur trade agreement, 20 years in the making, has not been ratified, with additional climate conditions proposed by the EU, including related to deforestation. Moreover, LAC's exports could be affected by policies such as the EU's Carbon Border Adjustment Mechanism (CBAM), which could impose additional charges on imports entering the EU based on their carbon content, including the carbon emitted during the goods' production. Thanks in large part to hydropower, which accounts for 45 percent of total electricity supply, LAC is the region with the highest share of renewables in its electricity generation. Ensuring that LAC maintains a high share of renewables would help limit carbon emitted in supply chains and mitigate the impact of Border carbon adjustments on LAC's products.

Box Figure 3.3. Non-tariff Trade Barriers by Region
(Average MATR; weighted by goods imports)



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

[3] An important justification for the CBAM is to limit 'carbon leakages', that is, the transfer of production to regions with lower taxation of carbon emissions, and greenhouse gases emissions more generally.

Annex 1. Data for Sections 2 and 3

Section 2

We use trade data from: (i) the IMF's Balance of Payments (BoP) database, with information on the total trade of goods and services across countries; (ii) the IMF's Direction of Trade Statistics (DOTS), which has information on bilateral merchandise trade flows across all IMF member states starting in 1946; (iii) the CEPII's Base pour l'Analyse du Commerce International (BACI) data (Gaulier and Zignago, 2010) on bilateral merchandise trade flows for 200 countries at the Harmonized System 6-digit level; and (iv) the UNCTAD-Eora Global Value Chain (GVC) database, with information on key GVC indicators for 189 countries from 1990 to 2018.

Section 3

Data for merchandise, manufacturing and non-manufacturing trade flows are from CEPII's Gravity database (see Conte, Cotterlaz, and Mayer, 2022). Data on bilateral trade in services are from the WTO-OECD Balanced Trade in Services (BaTIS) database. Trade flows are reported at the country pair and averaged over the 2012 to 2019 period. We also use data on each country's economic, geographical, and cultural characteristics from CEPII's Gravity database. These gravity variables are countries' GDP and population, their bilateral distance, and dummies for common language, land border and whether a country is landlocked. Data on bilateral trade agreements are from CEPII's Gravity database, data on importer's trade weighted merchandise MFN tariff are from the World Bank's World Development Indicators, and data on non-tariff trade barriers are from Estefania-Flores et al. (2022). Data on infrastructure, logistics and customs come the World Bank's logistics performance index (LPI), which presents information on: 1) the efficiency of customs and border management clearance, 2) the quality of trade transport infrastructure. Data on the quality and access to key factors of production are from World Bank Enterprise Survey (WBES) and from the Penn World Tables (PWT), revision 10.1. From the latter we use an index of human capital based on a country's average years of schooling. From the former we use data on the share of firms that report access to finance and access to electricity as obstacles for firm performance. Governance variables come from WBES on the share of firms reporting corruption, political instability, and crime, theft, and violence as major obstacles, respectively.

Annex 2. Estimating LAC's Trade Performance

To benchmark LAC's performance, we estimate an extended gravity model. Given the prevalence of zero trade flows and concerns about heteroskedasticity, we estimate our model using the Poisson pseudo-maximum likelihood (PPML) estimator proposed by Santos Silva and Tenreyro (2006). More precisely, we estimate the following model:

$$X_{i,j}^{s} = exp\{\alpha_0 + \alpha_1 \ln(GDP_i) + \alpha_2 \ln(GDP_j) + \alpha_3 \ln(POP_i) + \alpha_4 \ln(POP_j) + \alpha_5 \ln(d_{ij}) + \alpha_6 w_{ij} + \alpha_7 TP_{ij} + \alpha_8 Z_i + \alpha_9 Z_j + +\beta LAC\} + \varepsilon_{ij} \qquad (1)$$

Where $X_{i,j}^{s}$ is the average trade flow over the period 2015-2019 between country i and country j in product family $s \in$ {goods, services, manufacturing goods, and primary commodities}, GDP is average GDP in each country, POP is population, d is the bilateral distance between the country pair, w is a set of bilateral and country-specific variables including a common language dummy, a common land border dummy, and a landlocked dummy for both exporter and importer, and TP is a vector of trade policy variables. The vectors Z_i and Z_j are either proxies of infrastructure (transport and customs) for both the exporter and importer, respectively, proxies of the quality and availability of factors of production, or proxies of governance. Finally, LAC can be either a dummy that takes value one if the exporter or importer are in LAC, or a vector of four dummies that take value one if the exporter or importer are in either South America, Central America, the Caribbean or Mexico.

Our main objective is to study the economic and statistical significance of β. This coefficient captures the conditional mean differences between LAC (or subregions) and the average non-LAC country. With that aim, we conduct a sequential estimation of (1), where we first force α_7, α_8 and α_9 to be equal to zero (a stripped gravity estimation), then we add the effects of policy variables (forcing only α_8 and α_9 to be equal to zero) and then we proceed to estimate the full augmented model by including each cluster of variables at a time. Annex Table 2.1 depicts the gravity regressions when controlling for trade policy variables (forcing α_8 and α_9 to be zero). See Bhattacharya and Pienknagura (2023) for a complete list of the regression tables.

Annex Table 2.1. Gravity Model Regressions with Trade Policy Variables

	Goods		Manufacturing		Primary Commodities		Services	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Regional trade agreement	0.662***	0.0975	0.756***	0.106	0.286	0.176	0.0474	0.0846
Non-tariff index	-0.292*	0.175	-0.412**	0.202	0.186	0.204	-0.0413	0.107
Most-favored nation tariffs $_j$	-0.0393**	0.0199	-0.0410*	0.0220	-0.0348	0.0276	-0.0320*	0.0174
South America	-0.413***	0.0950	-0.513***	0.0955	-0.0494	0.229	-0.207*	0.108
Central America	-0.808***	0.127	-0.707***	0.131	-1.304***	0.240	-0.0892	0.0931
Caribbean	-0.718***	0.145	-0.671***	0.139	-1.148***	0.251	-0.402***	0.155
Mexico	0.00828	0.228	0.0258	0.257	-0.251	0.357	-0.196	0.233
$LGDP_i$	0.765***	0.0365	0.800***	0.0422	0.601***	0.0447	1.047***	0.0353
$LGDP_j$	0.638***	0.0566	0.632***	0.0644	0.645***	0.0838	1.001***	0.0546
$LPOP_i$	0.0280	0.0474	0.0591	0.0527	-0.0949*	0.0519	-0.368***	0.0419
$LPOP_j$	0.0808	0.0618	0.0836	0.0698	0.0939	0.0909	-0.306***	0.0570
LDISTANCE	-0.348***	0.0638	-0.357***	0.0687	-0.322***	0.0739	-0.582***	0.0420
LANG	0.278***	0.102	0.275**	0.114	0.243*	0.140	0.835***	0.0818
BORDER	0.832***	0.127	0.777***	0.138	1.053***	0.191	-0.0354	0.118
$LANDLL_i$	-0.0967	0.104	0.0816	0.117	-0.928***	0.161	-0.284**	0.115
$LANDLL_j$	-0.236**	0.0986	-0.167	0.105	-0.751***	0.142	-0.155	0.125
Constant	-11.79***	1.003	-12.74***	1.147	-10.06***	1.741	-22.99***	1.020
Observations	21,010		21,010		21,010		13,687	
R-squared	0.555		0.523		0.281		0.752	

Sources: Bhattacharya and Pienknagura (2023).
Note: Gravity regression coefficients from Equation (1). Non-tariff index is by Estefania-Flores et al. (2022). LANDLL = landlocked; LANG = Language; LDISTANCE = log of distance; LGDP = log of GDP; LPOP = log of population.

Annex 3. Estimating Gains from Trade with Infrastructure Improvement

This Annex details the trade model used to calculate the gains from trade from infrastructure improvements. We allow infrastructure to affect the economy via its effects on trade costs (Donaubauer et al., 2018), expand the data set from Bhattacharya and Pienknagura (2023) by bringing in data on domestic trade flows (Yotov, 2012; Borchert and Yotov, 2017; Bergstrand and others, 2015), and estimate the model following the solution procedure in Larch et al. (2016).

We consider an Armington trade model where infrastructure (together with governance and human capital variables) affects international trade costs. In the model, each country produces a unique variety using labor (in fixed supply) as only input. Consumers have CES preferences over goods from different countries, so these varieties are imperfect substitutes. The CES assumption implies love for varieties and is the motive for trade to exist in equilibrium. We assume there are iceberg trade costs to ship goods across countries. In equilibrium, total world production equals total exports for all countries in the world. The equilibrium equations of the model are:

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

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

$$\mathrm{P}_j^{1-\sigma} = \frac{\Sigma_i \left(\frac{t_{ij}}{\Pi_i}\right)^{1-\sigma} Y_i}{Y}$$

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

$$E_i = \varphi_i Y_i = \varphi_i p_i Q_i$$

Where $\boldsymbol{X_{ij}}$ denotes the trade flows between exporter (or origin) $\boldsymbol{i}$ and importer (or destination) $\boldsymbol{j}$, Y denotes output, E denotes expenditure, $\boldsymbol{t_{ij}}$ represents the trade cost between exporter $\boldsymbol{i}$ to importer $\boldsymbol{j}$, $\boldsymbol{\Pi_i}$ and $\boldsymbol{P_j}$ denote the outward and inward "multilateral resistance" terms, respectively, $\boldsymbol{\sigma}$ is the elasticity of substitution among goods from different countries, $\boldsymbol{\alpha}$ is the CES preference parameter, $\boldsymbol{p_i}$ is the factory-gate price for each good country $\boldsymbol{i}$ produces, $\boldsymbol{Q_i}$ is the fixed endowment supplied by exporters and $\boldsymbol{\varphi}$ represents the trade deficit.

We solved the model following the algorithm delineated in Larch et al. (2016). The first step estimates a partial equilibrium gravity framework, following the first equation, to obtain estimates of the trade costs. Importantly, at this step we allow for infrastructure, the quality of human capital and the quality of governance of countries to affect their bilateral trade costs. We find evidence that infrastructure (measured by the transport and customs LPI) matters the most for boosting trade flows. With the estimated value of trade costs in hand, the next step solves for the remaining of equilibrium equations using an iterative algorithm (see Larch et al., 2016 for more details).

Annex 4. Assessing Geoeconomic Fragmentation

The impact of fragmentation on the GDP in LAC in section 3 is evaluated using a static trade model. The model features several sectors connected through input output linkages both within and between countries. These trade linkages are the main channels through which fragmentation disrupts the world economies. Fragmentation scenarios in the model are simulated by exogenously changing the trade costs.[1] When trade costs change, countries endogenously re-allocate their exports and imports. Because fragmentation raises trade costs, it results in a misallocation of resources as some countries divert trade away from lower-cost producers when the latter are hit by higher trade costs, depressing global welfare.

Concretely, the model in Bolhuis et al (2023) is built along the lines of the canonical Caliendo and Parro (2015) multi-sector trade model. The model can account for heterogeneity in sectoral composition and productivity across sectors and countries. In addition, it distinguishes between two types of good, non-commodities and commodities. Only the former can be consumed as final good while commodities are more upstream in the production process.

At the first order, the impact of fragmentation on real income in country n is a weighted average of the impact in each sector. The latter can be decomposed in three terms. A first term captures the exposure to the other bloc through trade and is proportional to share of expenditure in country n for goods in the other bloc. A second term captures the direct effect of breaking trade linkages on the prices of goods. This price effect is larger for goods and commodities with lower trade elasticities, i.e., that are harder to substitute. Finally, a third term captures indirect, amplification effects through input-output linkages. As a result, ceteris paribus, disruption in commodities markets can have larger effect as shocks propagates downstream to the goods for which these commodities serve as an input.

As a result, countries that are more tightly integrated to global trade and participate in Global Value Chains (GVCs) that span competing bloc are more likely to be severely impacted by fragmentation, as well as countries buying commodities with low trade elasticities produced in the other bloc. Conversely, countries that produce hard-to-substitute commodities benefit the most.

Trade elasticities play a key role in the results and the authors conduct robustness exercises using the range of estimates found in the literature. Finally, it should be stressed that, while the extreme fragmentation scenario relies on the stark assumption of a full partition of trade into two blocs, the model also abstracts from other important channels such as financial linkages, migration, or technological spillovers. Disruption of these additional channels could further compound the cost of fragmentation.

[1] See Bolhuis et al. (2023) for details

Annex 5. Dynamic Gains from Trade and Capital Accumulation

To assess the contribution of the investment channel to fragmentation costs, we move beyond static gains and capture formally the dynamic gains and losses from arising from trade frictions, we consider a dynamic trade model with capital accumulation along the lines of Ravikumar et al. (2019). We model various fragmentation scenarios as distortions to the bilateral trade costs as in the previous fragmentation exercise.

The basic structure is the multi-country trade model of Eaton and Kortum (2002) embedded in a neoclassical growth model with capital accumulation as in Alvarez (2017). There are three sectors: consumption, investment, and intermediates. A continuum of varieties is traded and assembled in a composite good $M_{it} = \left[\int q_{it}(v)^{1-1/\eta}\right]^{\eta/\eta-1}$. In each sector, the production function is Cobb-Douglas, with country and sector specific productivity shifters. In particular, each sector combines capital (K), labor (L), and the composite good M with Cobb-Douglas production functions, respectively,

$$Y_{mit}(v) = z_{mi}\ (v)\ [K_{mit}(v)^{\alpha} L_{mit}(v)^{1-\alpha}]^{v_{mi}} M_{mit}(v)^{1-v_{mi}}$$

for intermediate goods,

$$Y_{cit} = z_{ci}\left[K_{cit}{}^{\alpha} L_{cit}{}^{1-\alpha}\right]^{v_{ci}} M_{cit}{}^{1-v_{ci}}$$

for consumption goods, and

$$Y_{xit} = z_{xi}\left[K_{xit}{}^{\alpha} L_{xit}{}^{1-\alpha}\right]^{v_{xi}} M_{xit}{}^{1-v_{xi}}$$

for investment goods. Productivities (z) differ across countries and sectors. A key feature of trade data is that investment goods are more trade intensive than consumption good. When estimating the model, this results in $1 - v_{xi} > 1 - v_{ci}$. As a result, investment goods are more sensitive to trade fragmentation, which explains the potency of the dynamic channel. In equilibrium, the investment rate of a given country respond negatively to increases in trade costs.

The model is calibrated using the latest available input-output trade data from EORA and the Penn world table for capital stocks.[1] We include LAC's five largest economies as well as 38 other economies and the rest of the world. As in the previous exercise, we consider fragmentation scenarios, modelled as trade cost shocks to the bilateral trade matrix. In the baseline scenario, countries are assigned to either the US-EU or China bloc depending on which one of the two is their larger trading partner. We then solve the full dynamic transition after trade costs are affected by fragmentation.

[1] Eora Global MRIO (worldmrio.com)

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