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Global and regional value chains in Latin America in times of pandemic

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Global and Regional Value Chains in Latin America in Times of Pandemic

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Abstract*

Global value chains (GVCs) provide countries with opportunities to diversify trade, and boost productivity and growth by specializing in one stage of the production process. However, for the most part, Latin America and the Caribbean participation in GVCs remains low (18 percent) compared to Asia (28 percent) and Europe (34 percent). The COVID-19 pandemic, plus concerns regarding protectionism and the more frequent occurrence of natural disasters, have provided incentives for countries and companies to reassess their positions in global value chains. This crisis has taken a huge toll on trade, but it could also be an opportunity to boost regional integration and value chains within the region. Despite the crisis, some firms have performed well, even in those sectors where global demand has fallen, while others have lost market share. This paper analyzes the performance of individual firms, drawing on the study of rich micro data, to understand their different capacity of trade creation and destruction over the crisis. Results suggest five firm characteristics play a key role in explaining export performance during the pandemic: i) firm size, ii) diversification of export markets, iii) importer status of the firm, iv) distance from foreign suppliers, and v) performance of the firm's suppliers and customers. The results are then used to outline policies fostering firms' participation in global value chains.

JEL codes: F23, F14, L14, L23

Keywords: Global value chains, COVID-19, Production networks, Shock propagation

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1. Introduction

Latin America and the Caribbean (LATAM) is the region of the world that has suffered the most from the Covid-19 pandemic. In 2020, the region registered the largest drop in gross domestic product (-6.3 percent)¹ and experienced the highest rate of excess deaths, reaching 330 people per 100,000 inhabitants.² International trade in goods and services was no exception. In 2020, exports suffered a contraction of 12.5 percent, while imports were reduced by 17.7 percent. The region experienced a 45 percent decrease in its inflows of foreign direct investment (a reduction of \$73 billion), the worst among developed and developing economies. Without a doubt, the pandemic was a severe shock for the region, but even before Covid-19 the most vibrant Latin American economies were already facing structural problems that hindered their insertion into global value chains. While in the last 25 years insertion into supply chains increased by 19 percent globally, LATAM's participation in them grew only 0.1 percent.³

Recent events, such as the trade war between the U.S. and China, and the turbulent negotiations over the US-Mexico-Canada trade agreement (USMCA), replacing the North American Free Trade Agreement (NAFTA), brought to the public view risks associated with drastic trade policy changes in a world in which firms have tightly integrated operations across national borders. More strikingly, the current global COVID-19 pandemic has exposed the risks associated with the interconnected nature of global trade.

Global value chains (GVCs) are intricately interconnected and increasingly geographically partitioned, and as a result, a negative shock in one place can generate disruptions in multiple locations, spreading its effects throughout the production chain. But there are other characteristics of GVCs that also contribute to shocks spreading through the many links in the value chains. First, these complex chains are characterized by high levels of specificity in products and production processes. In many cases the supplier develops and adopts technologies or incurs irreversible capital investments to adapt its products to the needs of a specific client. These specificities bring significant efficiency gains, but they can also open the way to important vulnerabilities, since shocks to one portion of the value chain could wreak havoc throughout the

¹ See the World Development Indicators, World Bank.

² Excess mortality is a term used in epidemiology and public health that refers to the number of deaths from all causes during a crisis above and beyond what we would have expected to see under “normal” conditions. <https://ourworldindata.org/excess-mortality-covid>.

³ See UNCTAD (2020).

supply chain given that finding alternative suppliers or customers entails significant search and financial costs. Moreover, a negative shock originating from one supplier spreads horizontally to other suppliers of the same client (Barrot and Sauvagnat, 2016). Therefore, a firm directly affected by a negative shock not only imposes substantial production losses on its customers, but these losses also extend to its other suppliers, even when they were not directly affected by the initial negative shock.⁴

Second, global chains have multiple levels of suppliers, making it difficult to manage potential vulnerabilities. A company may directly purchase components from hundreds of first-tier suppliers. In turn, each of those providers can rely on hundreds of second-tier providers. Thus, the entire supplier ecosystem associated with a large company can span tens of thousands of producers around the world after the deepest tiers are included. The complexity of these interdependencies makes risks more difficult to recognize and manage.

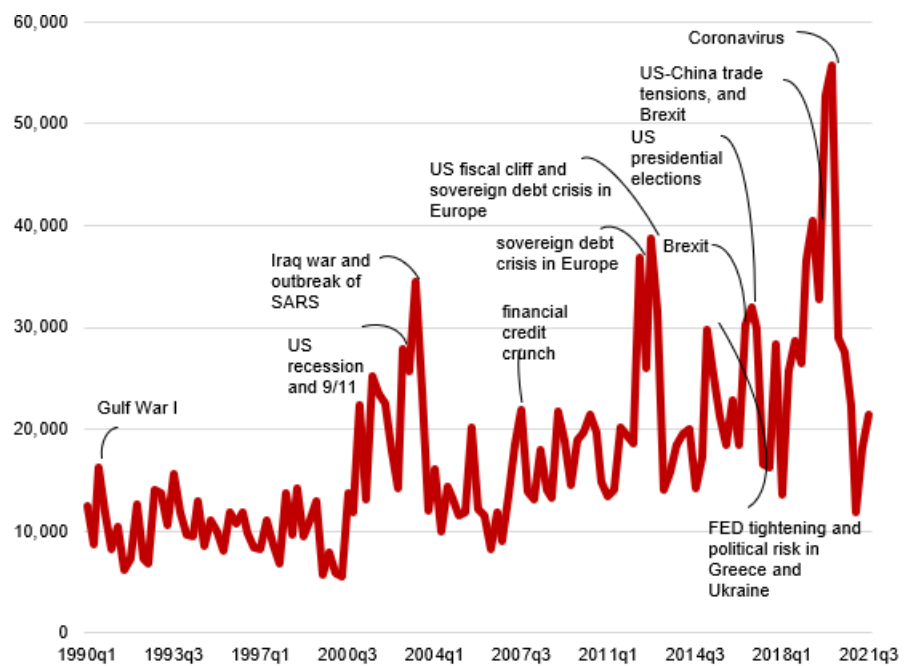
The recent shortage of microprocessors highlights the dense interdependencies of global value chains. On the one hand, the severe restrictions on the mobility of people drove the sales of computers and other devices for teleworking and leisure, while on the other hand, it reduced the demand for automobiles, given that many companies in the industry reacted by cutting their orders. As a result, chipmakers shifted their production lines, and by the time car sales rebounded in the third quarter of 2020, a shortage of chips was already manifesting itself, leaving the auto industry—which tends not to accumulate inventories—with a pinch on its intermediate inputs. Also, the abrupt tariff increases that took place between the United States and China as of February 2018 highlight the magnifying power of the effects of trade policy in a context of the predominance of global value chains. GVCs amplify the effects of tariffs, as they are typically applied to the gross value of a good when it crosses the border, rather than just the “new” value added. Therefore, each border crossing increases the total tariff bill associated with production (Blanchard et al., 2016).

⁴ Although companies reduce production when one of their suppliers is affected, they could very well continue to buy from their other suppliers and even start buying more. Even if the customer reduces purchases from all its suppliers after the interruption of one of its inputs, other suppliers could find alternative buyers for its production. Instead, there are large negative side effects of the initial shock to other providers.

1.1 Firms Operate in a World Where Disruptions Occur Regularly

The shocks to which global value chains are subject to are increasing in frequency and magnitude. Just in last three years the world has experienced the trade dispute between the United States and China, several natural disasters linked to global warming, the Suez Canal traffic jam caused by the stuck ship Ever Given with more than 18,300 containers onboard, and the global-scale pandemic caused by Covid-19. Companies in the automotive, pharmaceutical, aerospace, computer, and electronics industries expect interruptions lasting a month or longer to occur on average every 3.7 years, and that the most severe events will have a significant financial cost (McKinsey, 2020). This higher volatility is captured by the World Uncertainty Index developed by Ahir et al. (2018),⁵ which as the result of US-China trade tensions and Brexit more than doubled (from around 18,000 to more than 40,000); and at the peak of the COVID pandemic it exceeded the value 55,000, more than three times the pre-Brexit values and almost 40 percent of additional uncertainty relative to the values registered during the US-China trade tensions and Brexit episodes (see Figure 1).

Figure 1. World Uncertainty Index (1990Q1 to 2021Q3)



Source: Ahir et al. (2018).

⁵ This index is constructed using the number of times the Economist Intelligence Unit (EIU) reports mention the word uncertainty close to a word related to international trade.

The magnitude of the impact of disruptions to GVCs will depend on their transitory or permanent nature, and on whether these disruptions are predictable or unexpected. In an environment where disruptions to these complex value chains are more frequent, companies are beginning to evaluate strategies that minimize the cost of business interruptions. Reducing the cost of outages and shortening the time to recovery requires firms to analyze their degree of exposure to these shocks and to recognize where their main vulnerabilities lie. In the process of evaluating the costs and benefits associated with different alternatives, some companies will begin to maintain higher levels of inventory; others will respond by adjusting the number and geographic composition of their provider network; or even adjusting their production and distribution plants.⁶

1.2 GVCs in a Post-Pandemic World

Until now the pandemic has not yet induced a dramatic reconfiguration of production networks. After all, today's global value chain structures, defined by where companies place their manufacturing and where they source from, have taken years to form, hundreds of billions of dollars in investments, and long-lasting relationships with suppliers. These decisions are based on economic analysis that includes growth in consumer demand, speed to market, changes in labor and input costs, availability of new technologies, and specialized job skills. Thus, the significant economies of scale associated with modern GVCs could make companies reluctant to dismantle them in the face of severe but temporary shocks (Antràs, 2020).

In this paper, we analyze the performance of individual firms, drawing on the study of rich microdata to understand their export outcomes during the pandemic. A closer look at companies that showed a robust performance during the pandemic, either because their exports increased or because they experienced a lower export decline, could help us understand which of their characteristics—such as, sector of operations, destination regions, export experience, importer status, the extent and longevity of their trade networks, and the recovery's speed of the global demand of their products—explain their relatively positive performance during this shock.

⁶ Recent evidence on the impact of the early closure of China between February and April 2020 shows that the firms that had a greater geographic diversification of intermediate inputs did not experience a smaller drop in their exports relative to the less diversified firms. However, inventory management strategies appear to help companies overcome the adverse supply shock (Lafrogne-Joussier et al., 2022). In addition, some analysis calculates that if companies decided to reorganize their supplier networks, between 16 and 26 percent of total global exports (from \$3 to \$4.5 trillion) could relocate to new destinations in the next five years (McKinsey, 2020).

Understanding the main elements behind exporters' resilience could allow us to outline potential policies to assist firms in the region in their recovery process.

The rest of the document is organized as follows. Section 2 provides a detailed description of the databases used in the analysis. Section 3 examines aggregate-level and firm-level export growth during the crisis. Then, Section 4 explores the U.S. reallocation of imported intermediate inputs across regions. Section 5 explores the margins of trade creation and trade destruction during the Covid-19 pandemic. Finally, Section 6 presents policy recommendations and final considerations.

2. Data

2.1 Overview

In the analysis that follows we use detailed transaction-level custom data, containing information on the international transactions of individual exporters and importers for seven LATAM countries, Mexico, Colombia, Peru, Brazil, Chile, Paraguay, Uruguay, and the United States. Importantly, for a subset of these countries (i.e., Colombia, Mexico, Paraguay and Brazil), we also have information on the identity of their foreign customers (in the export billing of lading, BoL) and foreign suppliers (in the import BoL), allowing us to evaluate the role of a firm's networks in its export performance. Since disruptions of long-term buyer-supplier relationships can have long-lasting effects in firm's performance, we assess whether exporters that were able to preserve their core network of buyers show stronger levels of exports growth during the Covid-19 pandemic.

To investigate the role of value chains, this paper focuses on manufactured intermediate goods.⁷ These exports are likely to be part of GVCs given their significant backward and forward linkages.⁸ At 38 percent of total exports, they represent a significant fraction of the export basket for the countries considered.⁹

⁷ The conclusions are similar when consumption and capital goods (excluding mining and agriculture) are also considered in the analysis.

⁸ Backward linkages correspond to the value added of imported intermediates used in producing goods to be exported. Forward linkages represent the domestic value added of intermediate products that are exported and used in producing trade partner exports. Some countries specialize in upstream natural resource activities, with limited backward linkages but with strong forward linkages. Mining and agriculture are excluded since they do not have significant backward linkages.

⁹ Manufactured intermediate goods are 40 percent of exports in Mexico, 20 percent in Colombia, 32 percent in Peru, 34 percent in Uruguay, and 27 percent in Paraguay.

2.2 Firm-to-Firm Trade Transactions from Bill of Lading Records

Information on international trade transactions are from the shipment-level bill of lading (BoL) compiled and provided by S&P Panjiva for each of the countries in the sample.¹⁰ The original dataset contains over one billion transaction-level records of goods traded across borders since 2007, including information on the date of the transaction, port of landing, name and address of the exporter (shipper) and the importer (consignee), the product description, and Harmonized System (HS) product code,¹¹ as well as value and quantity transacted. Panjiva enhances the dataset by i) providing a unique identifier to each importer (consignee Panjiva ID) and exporter (shipper Panjiva ID) allowing the longitudinal tracking of firms engaged in international trade; and ii) including a unique company identifier variable linking the BoL data to Capital IQ, another S&P Global dataset containing key company's financial information, such as sales, costs of goods sold, and profits.¹²

3. Export Growth in Times of Pandemic

Let us begin by investigating what happened to the countries of the region during the most acute crisis of the pandemic. Using the firm as a central element in global value chains, we propose to investigate what makes possible greater resilience and participation in them. To answer this question, we evaluate the performance of Latin American and Caribbean exporters during the Covid-19 pandemic, focusing on those that have shown a more resilient performance during

¹⁰ A bill of lading in shipping is a record of the traded goods which have been received on board. It is a legal document that establishes an agreement between a shipper and a transportation company for the transportation of goods. The Transportation Company (carrier) issues these records to the shipper. A bill of lading indicates a particular carrier through which the goods have been placed to their final destination and the conditions for transporting the shipment to its final destination. A BoL contains detailed information such as both the shipper's and consignee's name and address, description of the goods, vessel name, transport company name, ports of loading and unloading, weight, and quantity.

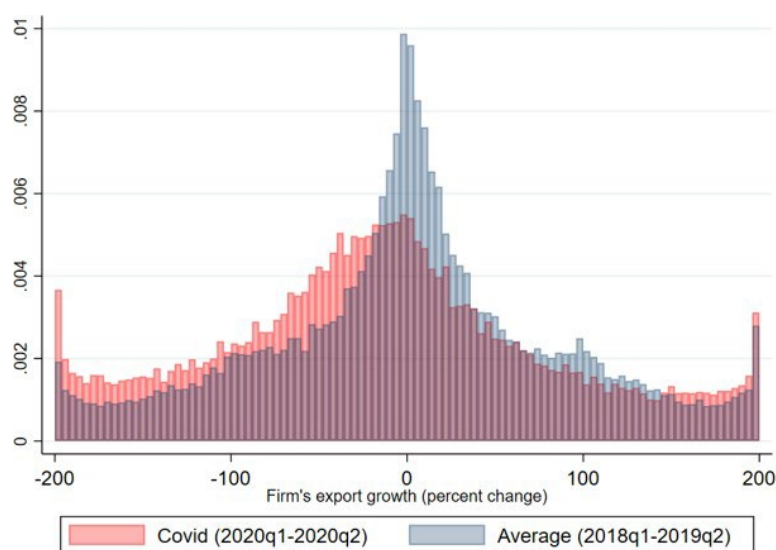
¹¹ Whenever unavailable in the original BoL, Panjiva assigns a Harmonized System (HS) product code to each product description included in the BoL.

¹² Notice that the variables added by Panjiva to those originally included in the U.S. BoL come with some caveats. First, the provided HS product code is at six digits (around 6,000 products), rather than at 10 digits (more than 10,000 products) as the one recorded by the U.S. Census Bureau Customs data. Second, a given transaction can list multiple HS6 codes, but only one shipment weight in kilograms, making impossible to distinguish the weight associated with each HS6. Third, Panjiva uses a text processing algorithm in order to map a given company name and address to a unique numerical ID. Nonetheless, there is a fraction of cases in which the algorithm fails to recognize that two companies are the same legal entity, wrongly assigning different Panjiva ID numbers. We overcome this challenge by refining the procedure, allowing us to assign a temporal consistent ID number to a company that shows up in the data with slightly different spellings in their names and/or addresses. Spelling differences in the address component are resolved by geocoding all the addresses in the BoL dataset. For additional details about the BoL data for the United States, see Flaaen et al. (2021) and Alviarez and Blyde (2021).

crises, whether due to their exports increased or because they experienced a smaller drop (relative to the evolution of global demand). We take a closer look at these companies to understand which of their characteristics—including sector of operations, destination regions, export experience, importer status, extension and longevity of their commercial networks and the speed of recovery of global demand—were the most critical for their performance.

During the Covid-19 pandemic, total exports declined sharply in most countries in the LATAM region and across the majority of sectors and destinations. Figure 2 compares export growth during the first two quarters of 2020 with that in the same quarters of 2019 and 2018, pooling firm level information for six countries in the region: Chile, Colombia, Mexico, Paraguay, Peru, and Uruguay. The left shift is clear: more firms suffered lower export growth, and a greater number posted a decline in exports. The focus is on continuing exporters; therefore, companies that did not export in the first two quarters of 2019 or 2020 were excluded.¹³

Figure 2. Evolution of Firm Exports during Covid-19

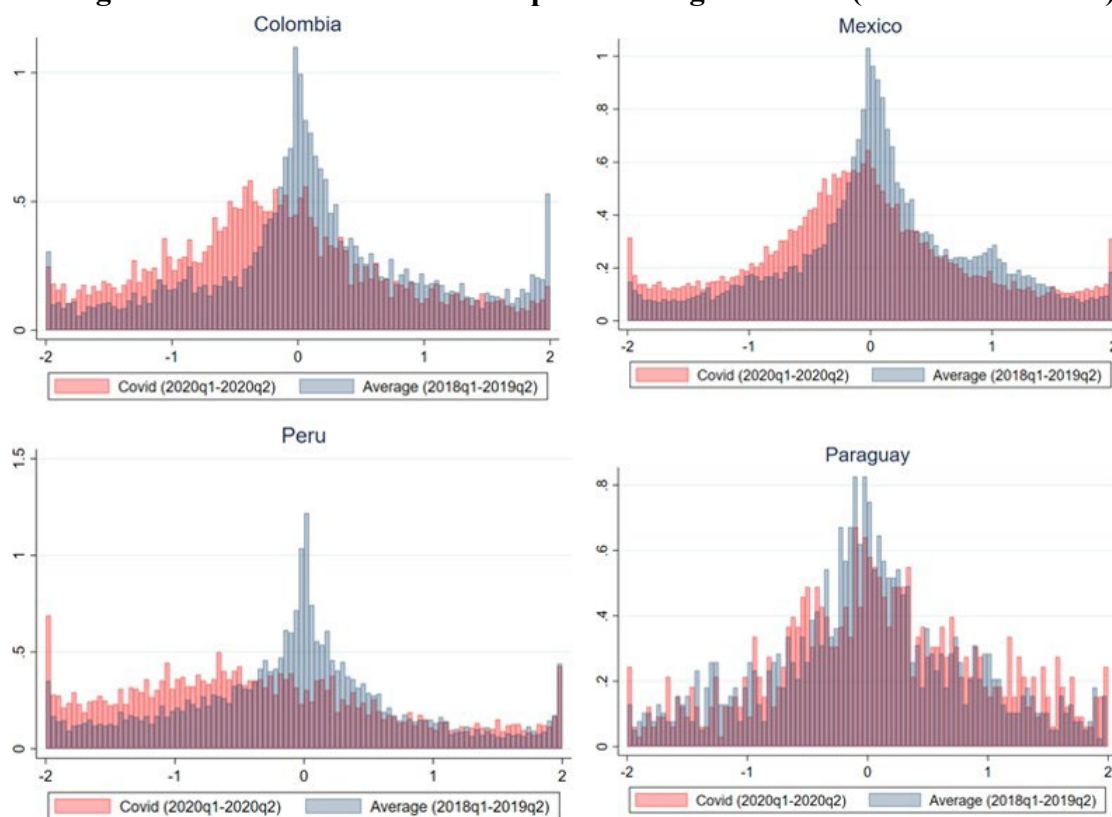


Note: This figure depicts the distribution of firms' export growth before and during Covid-19 (x-axis). Firm-level export growth is calculated using monthly data for the first two quarters of 2020 (red bars), relative to the average during the first two quarters of the period 2018-19 (blue bars), for the countries in the sample: Chile, Colombia, Mexico, Paraguay, Peru, and Uruguay. The figure plots the distribution of growth rates at the firm level. Only firms that exported in 2019 and 2020 are included; growth rates of -200 (exporters that exit) and +200 (exporters that enter) are not depicted in the figure.

¹³ For the list of countries in the sample, 16.4 percent of firms that exported in the first two quarters of 2019, did not export in the same period of 2020 (representing 2.7 percent of exports); only 2.6 percent of firms that exported in 2020 did not export in 2019 (accounting for 0.15 percent of exports). Firms with growth rates of -200 and 200 are excluded from Figure 2 to better appreciate the rest of the distribution.

In 2020, total exports decreased dramatically in most countries in the region, as well as products and export destinations. Figure 3 shows the growth of exports at the firm level in Colombia, Mexico, Paraguay, and Peru, during the first two quarters of 2020 (light blue bars), relative to the average growth of exports, in the same quarters, in 2019 and 2018. Note that the graph only includes firms that continued to export during the pandemic, excluding those that began or stopped exporting during this period. Notice that Paraguay is the only country for which there was no significant left shift of the distribution, compared to the cases of Colombia, Mexico, and Peru, for which the red bars (representing the distribution of export growth during the first two quarters of 2020) are towards the left of the light blue bars (representing the same quarters in 2018 and 2019).¹⁴

Figure 3. Evolution of Firms' Exports during Covid-19 (selected countries)

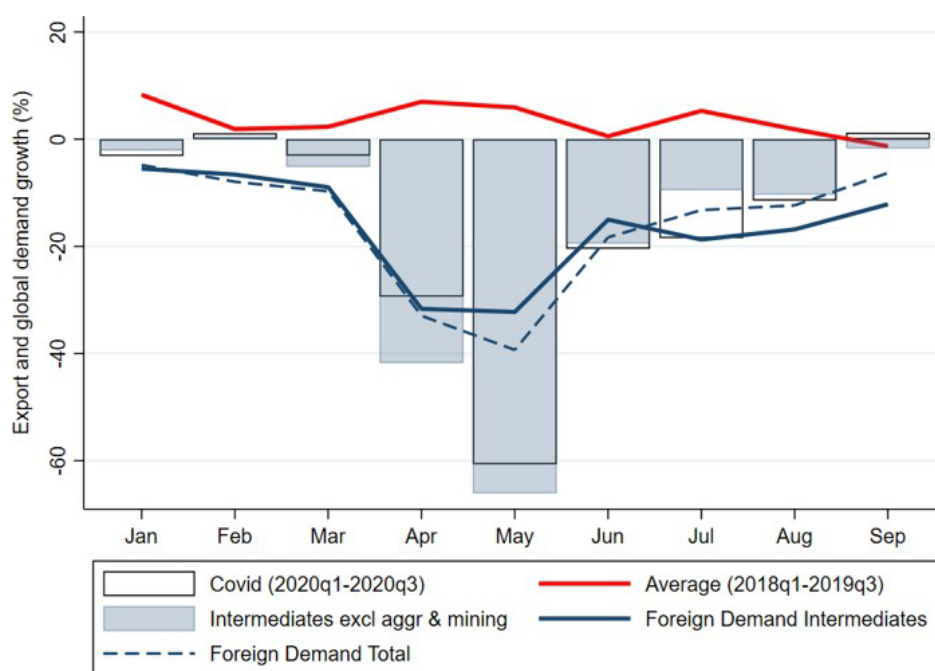


Note: This figure depicts the distribution of firms' export growth before and during Covid-19 (x-axis). Firm level export growth is calculated using monthly data for the first two quarters of 2020 (red bars), relative to the average during the first two quarters of the period 2018-19 (blue bars). The figure plots the distribution of growth rates at the firm level. Only firms that exported in 2019 and 2020 are included; growth rates of -200 (exporters that exit) and +200 (exporters that enter) are not depicted in the figure.

¹⁴ Let us recall that in 2019 the Paraguayan economy was hampered by bad weather and by the adverse situation of its main trading partners. The annual GDP growth rate of Paraguay went from 3.2 percent in 2018 to -0.402 percent in 2019 and -0.566 percent in 2020.

Is the shift of firms' export growth to the left just the consequence of unfavorable world demand during the pandemic, or are there domestic factors explaining such behavior? The answer to this question seems to be both. Exports not only fell, but they did so relative to a measure of global demand: the imports of the same products in other countries across the world (see Figure 4). Total exports plummeted about 60 percent between May 2019 and May 2020, while they grew from May 2018 to 2019. Figure 4 also plots the export performance in intermediate goods (excluding those in mining and agriculture), and global demand, which is constructed as a weighted average of the growth of U.S. and Europe imports of the same goods, with weights corresponding to the relative importance of each product in the region's export basket.¹⁵ For the Latin American countries analyzed, the decline in intermediate goods exported was larger than that of total exports. This suggests that participating in value chains may be riskier than exporting finished goods; still, these exports have recovered since June and have grown faster than global demand for the same products.

Figure 4. Aggregate Export Growth versus Global Demand Growth



Note: The white bars correspond to the growth of total exports and the gray bars correspond to the growth of intermediate inputs excluding those in mining and agriculture, following the Broad Economic Categories (BEC) classification. The red line shows the average export growth from first quarter 2018 to third quarter 2019. The blue solid line shows the growth of foreign demand for intermediates only, whereas the blue dash line shows the growth of foreign total demand.

¹⁵ Each product refers to a category of the Harmonized Commodity Description and Coding System (HS) at the six-digit disaggregation level comprising approximately 5,300 products.

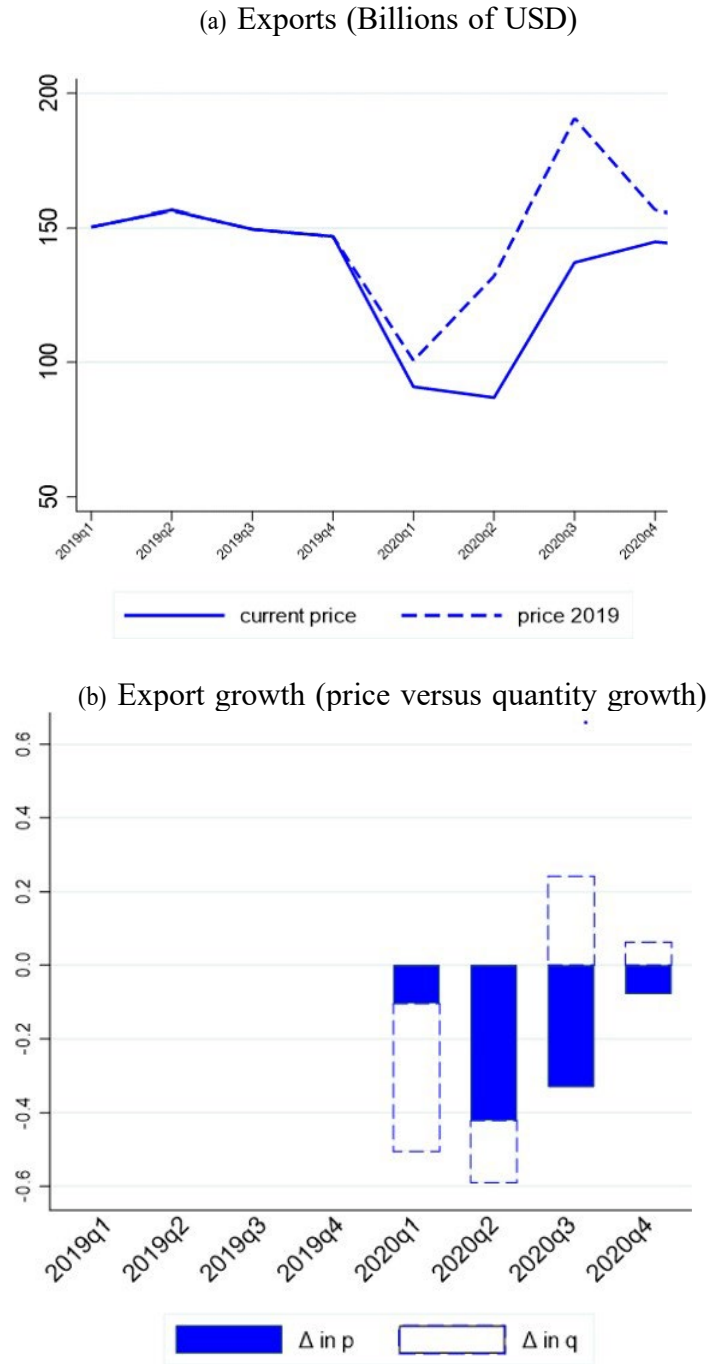
One important aspect associated with the behavior of export growth during the COVID pandemic has been the distinctive role played by movements in prices. Figure 5 shows the evolution of LATAM aggregate exports values (solid line) relative to the evolution of exports after controlling for price changes (dashed line), keeping prices fixed at their pre-Covid levels. As Figure 5 shows, if we control for price movements the value of exports will be higher. However, price movements are only part of the story. The bottom panel of Figure 5 shows that at the beginning of the pandemic, the significant contraction of exports was mostly driven by reductions in quantities. In the next quarters, this contraction was followed by significant declines in prices, while the recovery has been led by an increase in quantities and smaller price effects.

Importantly, global demand did not fall for all goods. And not all exports from all countries fell. Impacts depended on the sector and the country. Comparing what happened to demand and what happened to exports for each sector helps identify winners and losers.

For most sectors in most countries, both global demand and exports from the region fell. This is the bottom left quadrant of Figure 6a, labeled quadrant III. But even then, some sectors in some countries did better than others; these are the dots to the right of the 45-degree line in that quadrant where exports (measured along the horizontal axis) did better than expected given the fall in demand (measured on the vertical axis). For example, while aluminum and rubber exports from Colombia declined, as did global demand, Colombian exports in these sectors fell by less than the dip in demand, allowing them to gain in export market share (see Figure 6b).

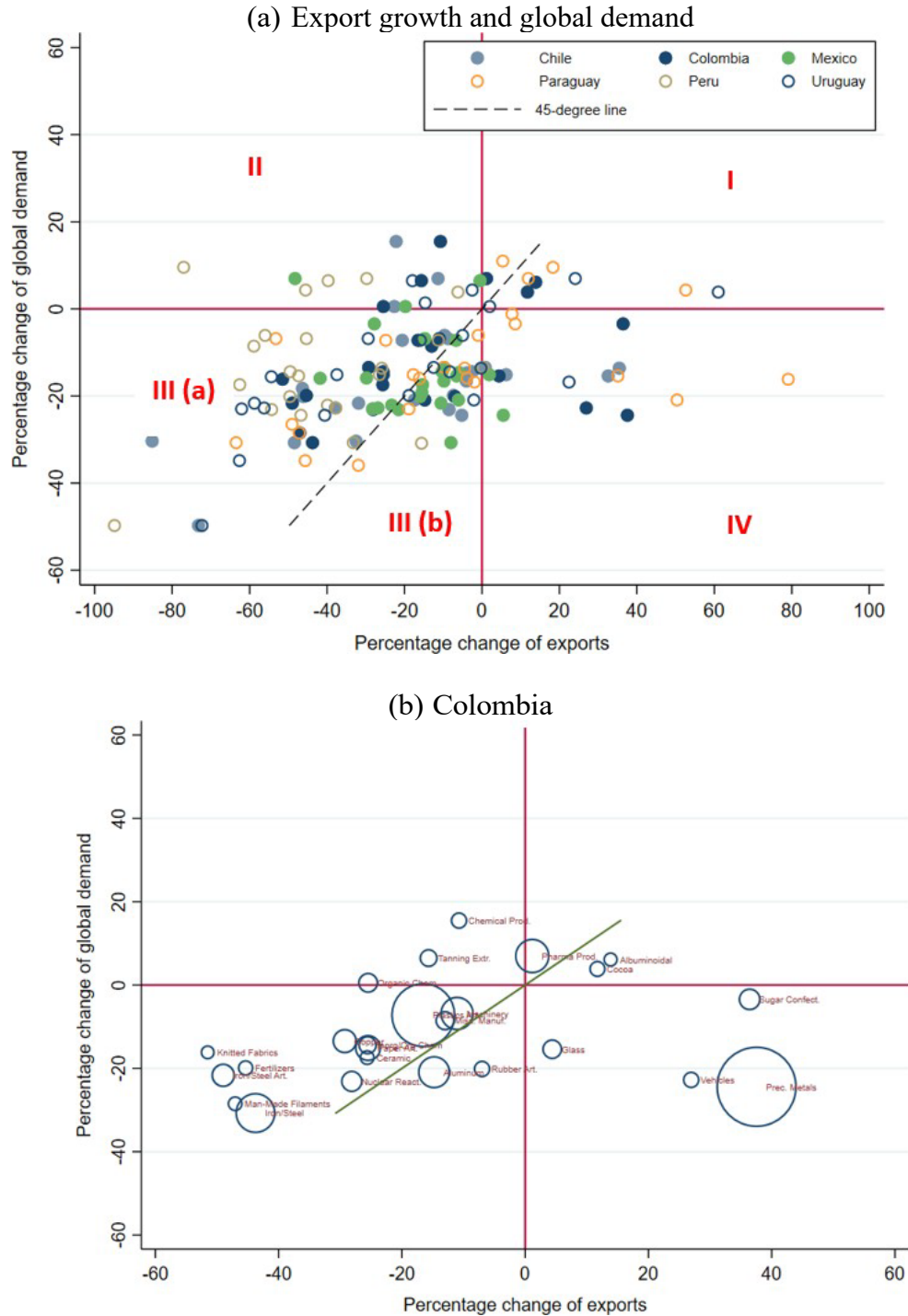
Quadrant IV in Figure 6 is of particular interest, as it contains sectors in which exports have increased despite falling global demand. Such was the case for vehicles and precious metals in Colombia, which therefore gained market share for exports in these areas. Quadrant II contains sectors in countries where exports have fallen even though demand has risen; in Colombia, this category includes chemicals, implying considerable market share was lost. Finally, quadrant I contains sectors in countries where both global demand and exports rose. In some cases, market share even grew (the sectors to the right of the 45-degree line). In Colombia, cacao products fall into this category. Employing individual firm data provides insight on these cases, the drivers of success or failure, and the direction of fruitful policies to consider.

Figure 5. LATAM Aggregate Export Growth (Price versus Quantity Growth)



Note: For the top panel, the blue straight line for the bottom panel, the white bars correspond to the growth of quantities exported and the blue bars correspond to the growth of unit prices of exported goods. The sample for the figure is restricted to those for which there is quantity information, so that the (price and quantity) decomposition can be done.

Figure 6. Export Growth versus Global Demand



Note: The top panel of the figure shows the export growth of each country-sector pair and the corresponding global demand growth for each sector classified as intermediate inputs outside mining and agriculture. The bottom panel shows the identity of the sectors in each quadrant for the case of Colombia. The size of the bubble indicates the relative importance of each sector in Colombia's exports of intermediate inputs.

Table 1. Sectors with the Largest Gaps between Exports and Global Demand

Country	Sector name	Quadrant	Supply growth	Demand growth	Gap = supply demand growth	Share of intermediates
Colombia	Iron/Steel	III (a)	-0.44	-0.31	-0.13	0.07
Colombia	Plastic Articles	III (a)	-0.17	-0.07	-0.09	0.18
Colombia	Precious Metals	IV	0.38	-0.24	0.62	0.29
Mexico	Machinery	III (a)	-0.15	-0.07	-0.08	0.24
Mexico	Vehicles	III (a)	-0.27	-0.23	-0.04	0.17
Mexico	Plastic Articles	III (b)	-0.07	-0.07	0.01	0.05
Peru	Precious Metals	III (a)	-0.47	-0.24	-0.22	0.46
Peru	Zinc Articles	III (a)	-0.4	-0.22	-0.18	0.05
Peru	Res. Food Indus.	III (a)	-0.26	-0.14	-0.12	0.11
Chile	Wood Articles	III (a)	-0.1	-0.06	-0.04	0.09
Chile	Pulp of Wood	III (a)	-0.33	-0.3	-0.02	0.09
Chile	Inorg/Org Chem	III (b)	-0.03	-0.14	0.12	0.08
Paraguay	Machinery	III (a)	-0.53	-0.07	-0.46	0.12
Paraguay	Plastic Articles	III (a)	-0.25	-0.07	-0.18	0.05
Paraguay	Res. Food Indus.	III (b)	-0.05	-0.14	0.09	0.5
Uruguay	Raw Hides	III (a)	-0.63	-0.35	-0.28	0.06
Uruguay	Animal Hair	III (a)	-0.72	-0.5	-0.23	0.06
Uruguay	Plastic Articles	III (a)	-0.16	-0.07	-0.09	0.11

Note: The table shows per country, the first three sectors (HS2 categories) ordered by the difference between their supply and demand growth and with export market share equal to or above 5 percent.

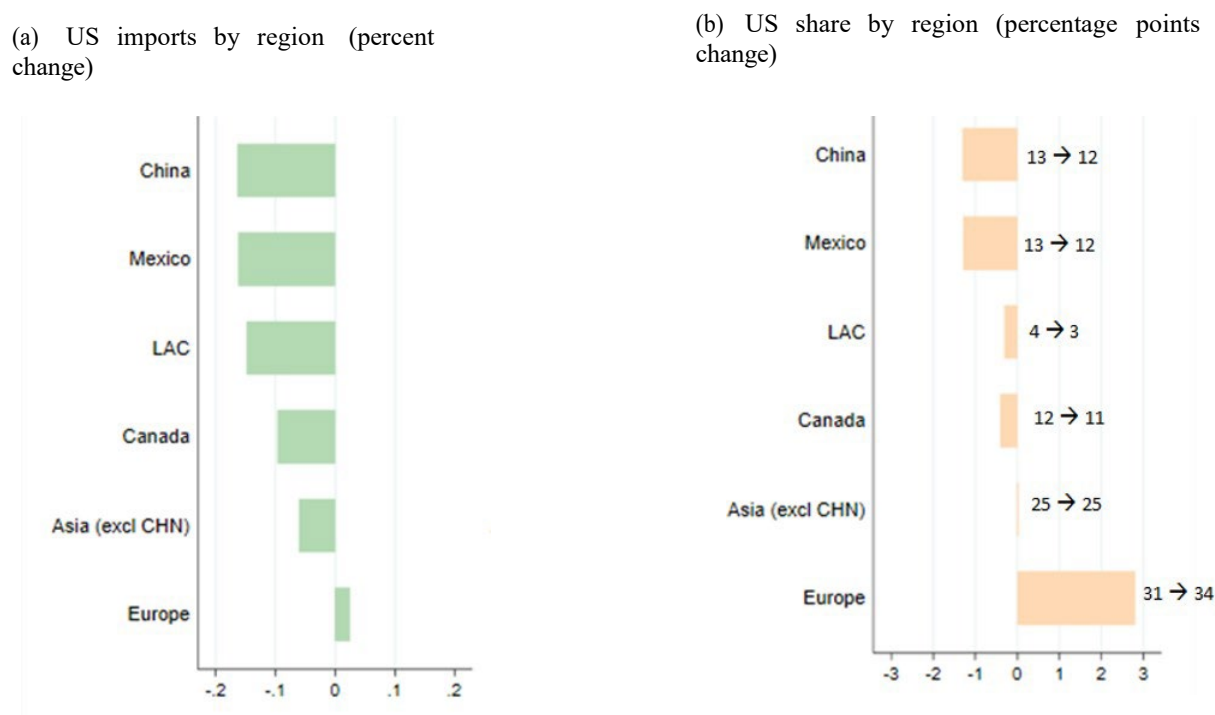
4. The Reallocation of Imports across Source Regions

During the Covid-19 crisis, U.S. overall imports fell, but they did not fall proportionally from all countries, creating a significant reallocation of the U.S. market share across world regions. U.S. imports from China fell more than 18 percent, followed by a 17 percent reduction from Mexico and 15 percent from other countries in Latin America and the Caribbean. Imports from other Asian countries only fell 6 percent and imports from Europe increased 2 percent (see Figure 7a). Around US\$56.5 billion (6.1 percent) of total U.S. imports switched source countries during the period. This contrasts with the reallocation observed in “normal” times; for example, in 2016-17, the reallocation of U.S. imports was only 2.6 percentage points, less than half the movement during the pandemic.¹⁶ This represents a considerable opportunity for the region, which exported just US\$26 billion in goods in 2019 to the United States. For intermediate goods, Europe raised

¹⁶ In 2018-19, another turbulent period due to the U.S.-China tariff increases, the United States reallocated 8.1 percentage points of imports.

its market share within U.S. imports by 3 percent or US\$5.6 billion, while Latin America and the Caribbean's share fell by 1 percent (see Figure 7b).

Figure 7. Reallocation of US Imports by Region



Source: UN Comtrade data.

Note: The left panel of the figure shows the percent change in US imports from each of the selected regions. The right panel shows the change in market share of U.S. imported intermediate inputs (in percentage points) from each region. The numbers on top of the bars show the market share of each region in 2019 (left) and in 2020 (right).

5. Margins of Trade Creation and Trade Destruction

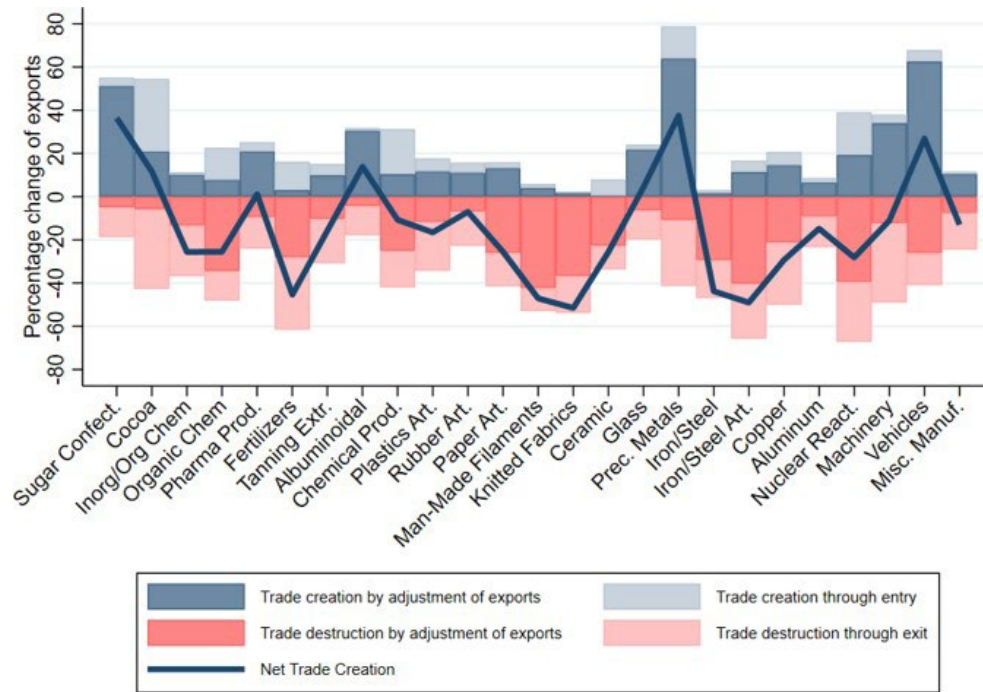
While exports fell in some sectors, some individual firms may have increased exports, and some may have exported less even though exports from the sector as a whole rose. Exports can rise or fall because firms increase or reduce their level of exports, stop exporting altogether, or enter the export market. In general, there are then four ways in which total exports can change, sometimes referred to in economics as the intensive and the extensive margin: i) firms reduce exports (intensive margin of trade destruction); ii) firms stop exporting (extensive margin of trade destruction); iii) firms increase exports (intensive margin of trade creation); and iv) firms start to export (extensive margin of trade creation).

Formally, net trade creation (NTC) is given by trade creation (TC) minus trade destruction (TD), $NTC_{ft} = TC_{ft} - TD_{ft}$. Trade creation is calculated as the weighted sum of the growth rate corresponding to those firms that increase trade, weighted by their relative importance in the economy, $TC_{ft} = \sum_{g_{ft} \geq 0} \left(\frac{x_{ft}}{x_{st}} \right) g_{ft}$. Notice that weights are constructed as the average of firm exports across the two periods, relative to the country's average total exports in the two periods. Similarly, trade destruction is defined as the weighted average of the absolute growth of firms with negative export growth rates: $TD_{ft} = \sum_{g_{ft} < 0} \left(\frac{x_{ft}}{x_{st}} \right) |g_{ft}|$. The export growth is calculated using mid-point method, $g_{ft} = 2 \left(\frac{x_{ft} - x_{ft-1}}{x_{ft} + x_{ft-1}} \right)$. This decomposition is based on the concepts of labor creation and destruction from the labor literature (Davis and Haltiwanger, 1992).

5.1 Unpacking Net Export Growth

During the Covid-19 pandemic period, exports declined in most sectors. Nonetheless, within each sector some exporting firms “created trade” either by increasing their level of exports during the first three quarters of 2020 relative to 2019 (intensive margin), or because some firms exported in 2020 but did not export during the previous year (extensive margin). Figure 8 shows the shrinking growth rate of exports (solid blue line) across Colombian macro sectors. In particular, overall export growth within a sector is decomposed into trade creation, represented by blue bars, distinguished between i) an increase in exports at expanding firms (dark blue bars), and ii) exports created by new exporters (light blue bars); and trade destruction, represented by red bars, and calculated by adding up export losses among shrinking exporters (dark red bars) and firms exiting from foreign markets (light red bars).

Figure 8. Net Trade Creation of Exports in Colombia (2020 compared to 2018-2019)



Note: Each bar in this figure represents a macro-sector, and each is decomposed into the four margins of net trade creation: i) an increase in exports by existing exporters (dark blue bars), ii) by firms entering the export market in 2020 (light blue bars), iii) a decrease in exports by existing exporters (red dark bars), and iv) a decline in exports by firms exiting the export market in 2020.

The startling fact captured by Figure 8 is the simultaneous trade creation and destruction in a given sector, indicating that net trade creation masks big differences among firms. For example, in Colombia, although exports of precious metals expanded by a robust 36 percent on net, certainly not all firms enjoyed export growth during this period. In fact, substantial trade destruction (41 percent) occurred in the sector. In the pharmaceutical products sector, net trade creation was relatively small (1 percent in the first three quarters of 2020), but both trade creation and trade destruction were substantial. Firms that exported in 2020 but not in 2019, or that increased their exports over this period, accounted for trade creation of 25.2 percent. On the other hand, the firms that stopped exporting in this sector, or that exported less than in the previous year, accounted for trade destruction of nearly the same magnitude but opposite signed (24.1 percent). Given the high levels of trade destruction in some sectors, trade creators have played a crucial role in compensating the negative effect of trade destruction on aggregate export growth. Our results indicate that five firm characteristics appear to play a key role in explaining

export performance during the pandemic: i) firm size, ii) diversification of export markets, iii) whether the firm also imports, iv) whether the firm imports intermediate goods from distant countries such as China, and v) the performance of the firms' suppliers and customers. The importance of these specific factors suggests how policies might be best designed to help firms participate in global value chains.

5.2 Firm Size

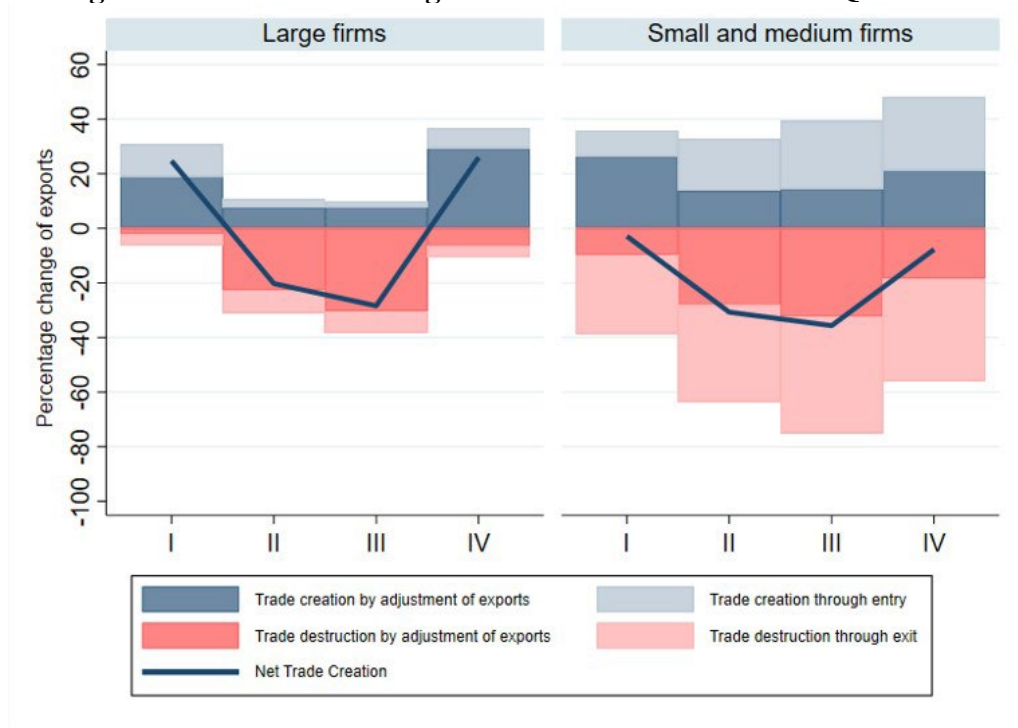
Large firms appear to adjust exports smoothly, while small firms destroy trade by stopping exports altogether. Adjusting in this manner is highly inefficient as broken links are likely to be permanent. The lower capacity of smaller firms to absorb negative shocks may explain this behavior. Although small firms represent a relatively small share of exports (15-20 percent on average), they account for a significant share of employment. Finding ways to preserve the links for small firms that are already exporting would be a valuable policy objective. Facilitating access to credit may boost a small firm's capacity to absorb negative shocks, helping them preserve links.¹⁷

Figure 9 considers each quadrant and graphs the four types of trade creation and destruction for large and smaller firms. Interestingly, in quadrants I and IV (where exports rise), large firms accounted for the net trade creation. For small and medium-sized firms, net trade creation was negative in these quadrants. In quadrants II and III, both larger and smaller firms engaged in net trade destruction. Moreover, large firms tended to adjust by increasing or reducing existing exports and thus maintained trading relationships—the intensive margin. In sharp contrast, smaller firms adjust more by stopping exporting altogether, or by starting to export—the extensive margin. The trade destruction created by the exit of small firms from the export market is particularly worrisome as relationships and links in the trade network may be destroyed.¹⁸ Trade destruction at the extensive margin is not just limited to those sectors in which exports fell (quadrants II and III) but is even present among smaller firms in sectors for which exports rose (quadrants I and IV).

¹⁷ Due to their scale, the exports of small firms are often concentrated in just a few clients—often only one.

¹⁸ The firm's export size distribution in each country-sector pair is divided into 20 quartiles. A firm is considered large if it belongs to the 20th quartile, and small otherwise. Large firms account on average for 83 percent of exports in a given country-sector pair. Notice that trade creation and destruction for each group are unweighted.

Figure 9. Size and the Margins of Trade Creation across Quadrants



Quadrant	Net Trade Creation	Trade creation by adjustment of exports	Trade creation through entry	Trade destruction by adjustment of exports	Trade destruction through exit
Large firms					
I	1.1	0.8	0.5	-0.1	-0.1
II	-0.4	0.2	0.1	-0.5	-0.2
III	-11.1	5.1	1.0	-13.7	-3.5
IV	4.4	5.6	1.1	-0.8	-1.5
Small and medium firms					
I	0.4	1.0	0.6	-0.4	-0.8
II	-0.3	0.1	0.1	-0.2	-0.2
III	-5.8	2.6	3.8	-6.1	-6.1
IV	-0.9	1.0	1.4	-0.6	-2.6
Total	-12.7	16.2	8.6	-22.5	-15.0

Note: Each bar in this figure represents one quadrant and each is decomposed into the four margins of net trade creation: i) an increase in exports by existing exporters (dark blue bars), ii) by firms entering the export market in 2020 (light blue bars), iii) a decrease in exports by existing exporters (red dark bars), and iv) a decline in exports by firms exiting the export market in 2020. The left (right) panel shows the margins of trade creation for large (small) firms located in each quadrant. A firm is considered large if it belongs to the 20th quartile, and small otherwise. The table above shows net trade creation, and each of its margins is already weighted by the relative importance of each sector and size in the economy.

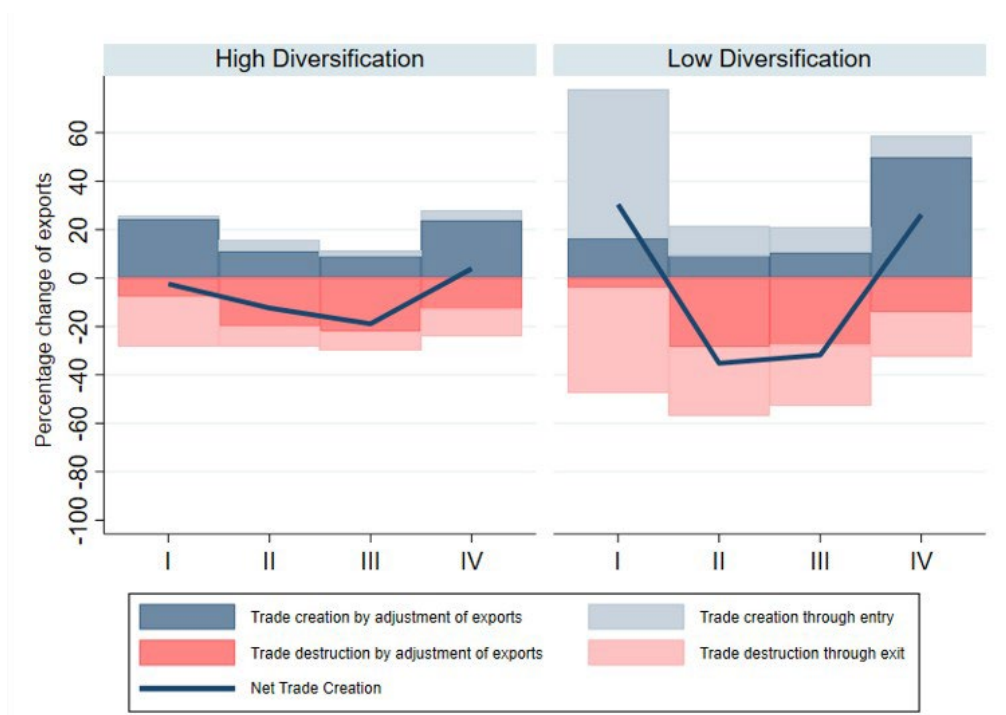
The table in the lower panel of Figure 9 shows each margin of net trade creation, but this time weighted by the relative importance of each quadrant and firms of different sizes. Thus, the numbers for the weighted net trade creation are not the same as in the figure illustrating unweighted trade creation. As expected, most of the trade destruction occurs in quadrant III, where most sector-country pairs lie. Large firms accounted for most of the trade destruction (as they export more given their size), but this was largely through an adjustment in exports. Small and medium-sized firms also accounted for substantial trade destruction, which was divided equally between an adjustment in exports and halting exports altogether.

5.3 Diversification in Export Markets

Having only a few customers for most of a firm's exports (a high concentration of customers) is risky. Figure 10 considers each quadrant and graphs the four types of trade creation and destruction for high and low diversification firms. Firms that export to only a few customers create more trade but also destroy more trade than more diversified ones. In all quadrants, trade destruction is greater for firms with low customer diversification. In quadrant III (referring to Figure 10), sectors in which global demand and exports fell, trade destruction was particularly acute for firms with high export concentration.¹⁹ In particular, more firms stopped exporting altogether (see Figure 10). As noted, this is an inefficient way to adjust trade, as re-establishing these broken links is costly. Moreover, in the case of quadrant IV (where global demand fell but exports rose), it was also firms with few customers that created more trade. Interestingly, this trade creation was led by existing exporters exporting more. One possibility is that these firms took advantage of problems with other suppliers. But firms were unable to create trade if they had to start exporting; only firms that were already exporters could do so.

¹⁹ A firm is considered to highly (low) concentrate its exports among their foreign buyers if the Herfindahl index is above (below) the median of the HHI distribution for firms in the same size category (small or large). This explains why small firms have fewer clients as a result of their scale).

Figure 10. Diversification and the Margins of Trade Creation across Quadrants



Note: Each bar in this figure represents one quadrant and is decomposed in the four margins of net trade creation: i) an increase in exports by existing exporters (dark blue bars), ii) new exports by firms entering the export market in 2020 (light blue bars), iii) a decrease in exports by existing exporters (red dark bars), and iv) a decline in exports by firms exiting the export market in 2020. The left (right) panel shows for each quadrant, the margins of trade creation for firms whose exports show a high (low) export concentration among their foreign buyers. A firm is considered to be highly (low) concentrated if its Herfindahl index is above (below) the median of the HHI distribution of firms in the same size category (small or large).

Perhaps the most relevant finding is that low customer diversification implies more trade destruction in the event of a negative shock. In fact, the contribution of exiting exporters in quadrant III was almost twice as larger among concentrated exporters as it was among exporters with a diversified clientele. Thus, having a more diversified portfolio of foreign customers can act as an insurance mechanism, especially under adverse demand and supply conditions. From a policy perspective, the strategy could be to help companies diversify their customer's portfolio, in good times when demand might be increasing, and even in turbulent times when firms from other countries exit the market, to become more resilient exporters. Policies that help firms preserve their customers in these difficult times will also make them more resilient for future crises.

5.4 Firms' Import Status and Distance from Foreign Suppliers

Exporters that are also importers tend to benefit from higher quality, cheaper intermediate products, but appear to be more exposed to external negative shocks and may not be able to rapidly take advantage of positive shocks. Non-importing firms accounted for most of the trade creation in quadrants I and IV, and importing firms accounted for most of the trade destruction in quadrants II and III (see Figure 11a). Specifically, in quadrant IV, where global demand fell but exports from the region rose, non-importers accounted for that net trade creation.

Importing from distant suppliers during the pandemic added further complications. Importing from China is used to illustrate this point. Firms that imported intermediate goods from China had lower trade creation in all quadrants compared to firms that imported from elsewhere (Figure 11). The vast majority of trade creation in quadrants I and IV, where exports rose, was due to firms that imported from elsewhere and not from China. Moreover, much of this trade creation came from firms starting to export. Little trade creation came from firms that started to export if those firms imported from China. There is also more trade destruction from firms that do not import from China, but net trade creation remains greater.

Figure 11. Import Status and Geographical Distance

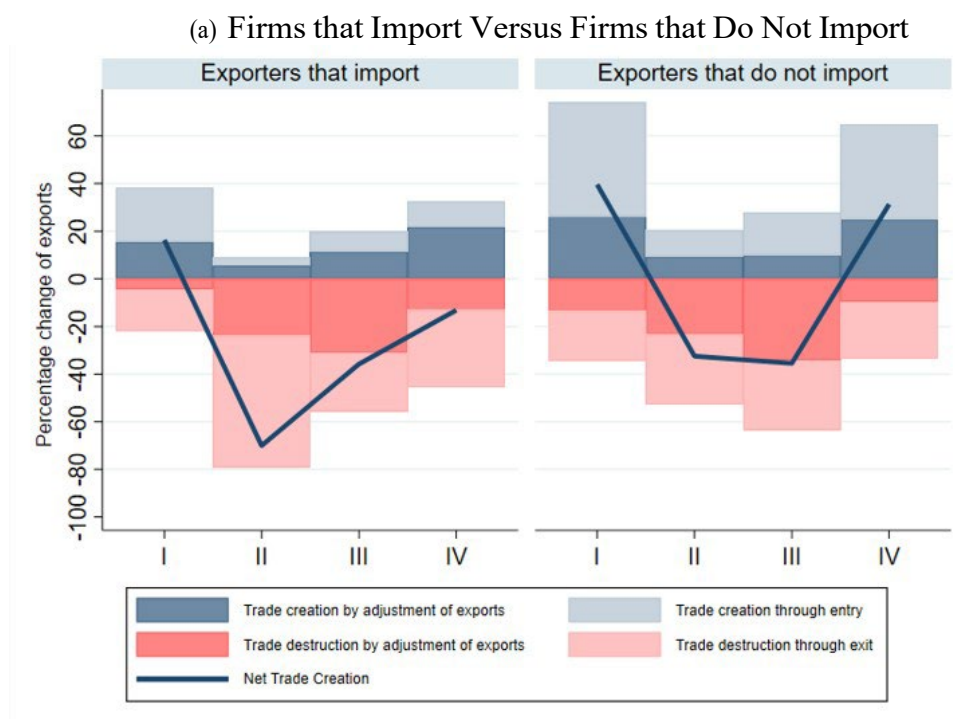
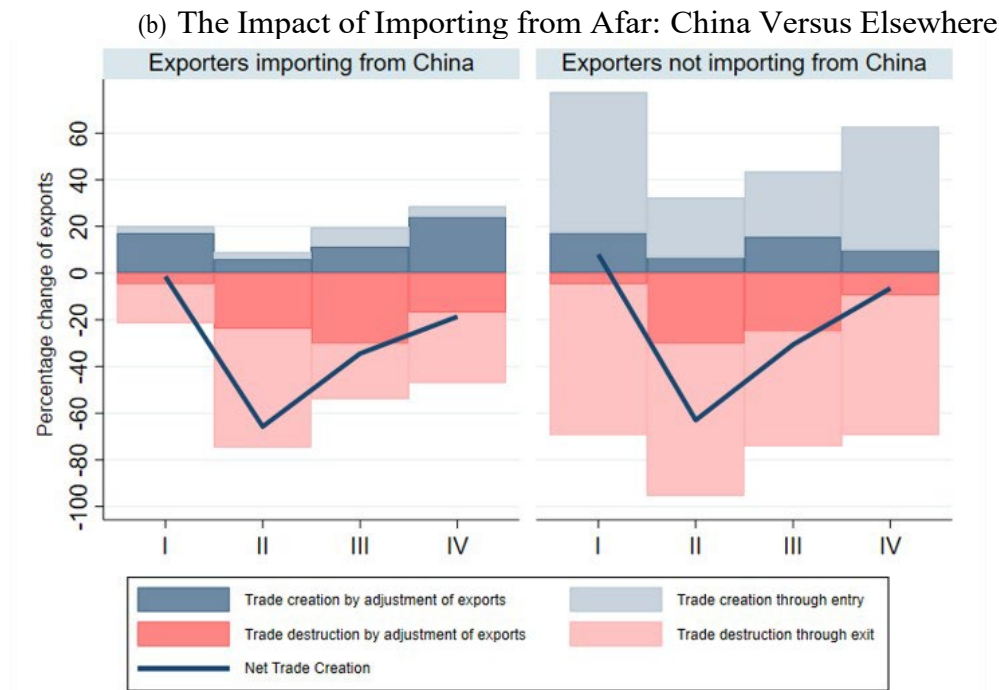


Figure 11, continued



Note: The left panel of the figure shows the percent change in US imports from each of the selected regions. The right panel shows the change in market share of US imported intermediate inputs (in percentage points) from each region. The numbers on top of the bars show the market share of each region in 2019 (left) and in 2020 (right).

5.5 The Performance of Firms' Suppliers and Customers: The Resilience of the Firms' Network

Building business relationships takes considerable time and effort. This is especially true in international business, where the parties of a transaction often do not speak the same language and conduct business in different time zones. In addition, the time that elapses between when orders are issued, customs procedures are fulfilled and the products are finally delivered is considerably longer than when purchased from domestic suppliers, creating additional risks that must be managed and that often require trust between the parties.²⁰

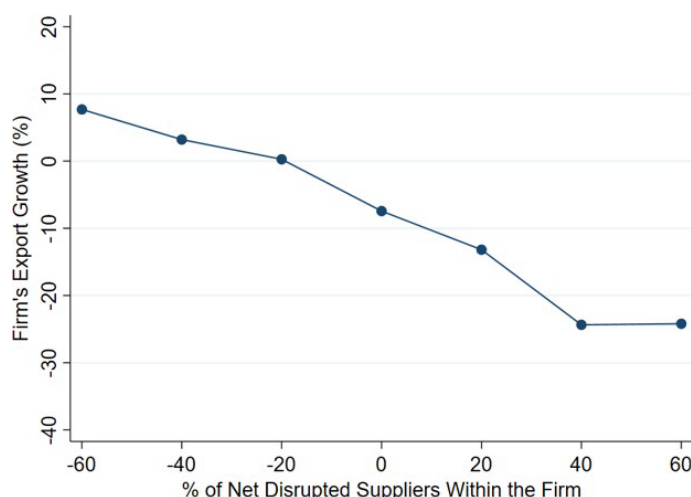
Exporters often rely on imported intermediate inputs tailored to specific needs, which demands significant investments by both suppliers and clients. Therefore, when an exporter loses an existing provider, it takes time to search and successfully establish a relationship with a new partner, which could take a significant toll on output. When facing a large-scale shock such as

²⁰ To partially overcome LATAM's lack of trust, as well as reputational and informational frictions related to international transactions, the market has developed financial instruments, such as letters of credit, as well as a complex informational technology system that allows sellers and buyers to share information about themselves and the products they offer.

the Covid-19 pandemic, many businesses are forced to stop fulfilling their orders, potentially disrupting many relationships.²¹

The COVID shock has had a serious impact on the foreign suppliers to firms in the region and also on firms' customers. Figure 12 plots the change in exports of firms (y-axis) against the fraction of suppliers that the firm lost.²² Clearly, the larger the fraction of suppliers that were lost, the more negative is the impact on firms' exports.²³ For example, for firms that lost about 20 percent of their suppliers, exports fell about 13 percent. On the other hand, firms that increased their suppliers by about 20 percent saw exports grow about 0.1 percent. A similar exercise considering customers, rather than suppliers, shows another strong correlation between the change in exports and the loss in customers.²⁴ Figure 13 plots the export growth of the firm against the share of customers lost. Firms that exported around a quarter less lost about a third of their customers.

Figure 12. Exporter's Network of Foreign Suppliers



Note: The x-axis shows the share of net disrupted suppliers. In this share, the numerator is calculated as the number of suppliers dropped minus the number of suppliers added within a given firm. The denominator is the number of suppliers the firm's sourced from in 2019. The y-axis is the export growth at the level of the firm.

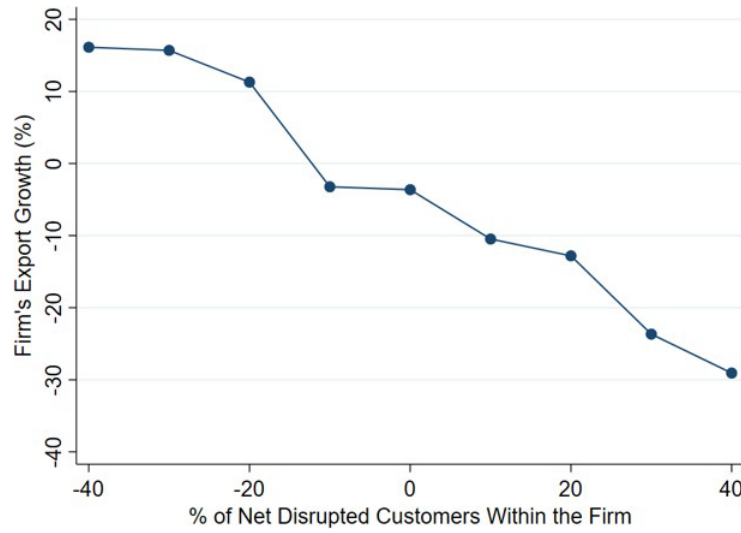
²¹ This analysis defines a new relationship as one observed in the current period, but not in the previous one. Similarly, a disrupted relationship is one observed in the previous period, but not in the current one. Some of these disrupted relationships could be re-established after the crisis while others may be permanently broken, especially if buyers connected with new suppliers or sellers found new customers. Therefore, the measure of network resilience here assesses whether a relationship was disrupted during the pandemic.

²² Firms may add some suppliers and lose others; the analysis is performed on the net change in suppliers for Colombia and Mexico.

²³ This analysis only attempts to show some correlations in the data, not a causal link between the variables.

²⁴ As with suppliers, firms may gain some customers and lose others; the analysis considered the net change.

Figure 13. Exporter's Network of Foreign Customers

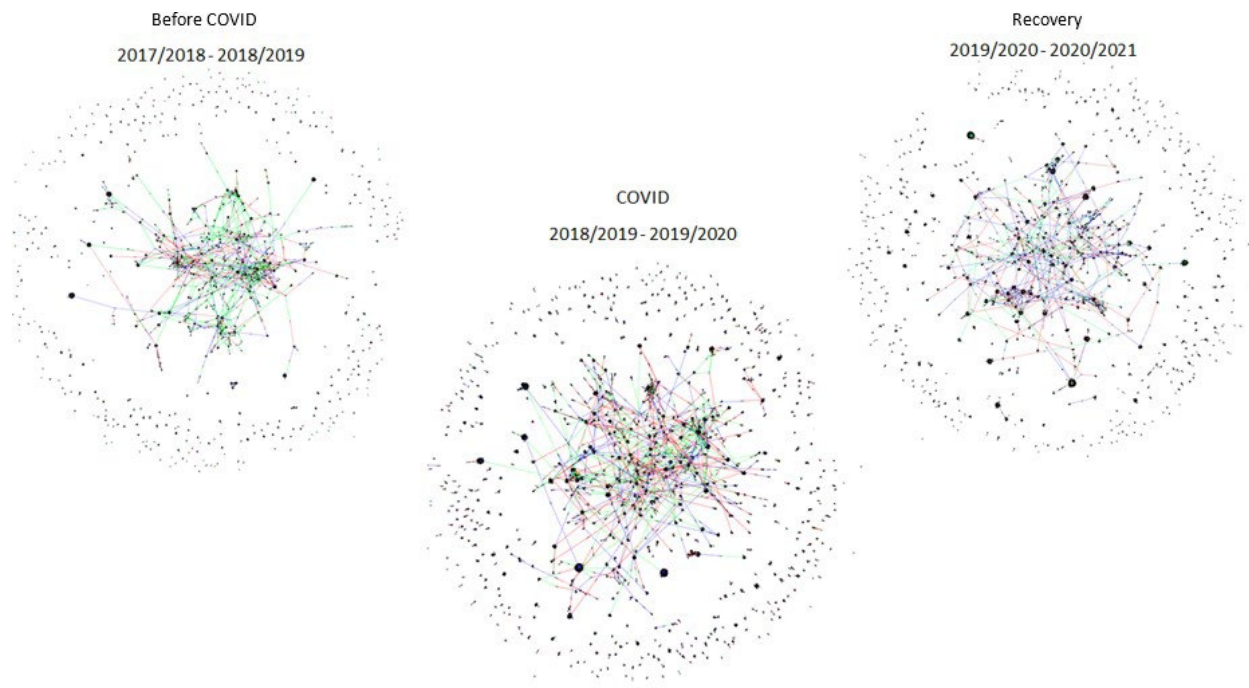


Note: The x-axis shows the share of net disrupted customers. In this share, the numerator is calculated as the number of customers dropped minus the number of customers added by a given firm. The denominator is the number of customers to whom the firm exported in 2019. The y-axis is the export growth at the level of the firm.

While there is uncertainty on how the health and economic crises will proceed, the destruction of the network of firms' suppliers and customers raises concern. Since it takes time and resources to build relationships, if the network continues to unravel, then the region could lose significant exports. On the other hand, the shake-up in global value chains may represent an opportunity that firms in the region can exploit.

Figure 14 shows the evolution of the client network of Colombian exporters in the machinery and transportation sector. The lines of the graph connect the exporters with their foreign clients. Green lines indicate continuing business relationships, red lines indicate terminating relationships, and blue lines indicate the creation of a business relationship. In the Covid-19 period, a significant fraction of relationships was disrupted (central panel). Although some relationships were reestablished during the recovery period, some relationships appear to have been permanently severed.

Figure 14. Evolution of the Customers' Network and Trade Destruction in Colombia



Note: This figure depicts the evolution of the client network of Colombian exporters in the machinery and transportation sector. The lines of the graph connect the exporters with their foreign clients. Green lines indicate continuing business relationships, red lines indicate terminating relationships, and blue lines indicate the creation of a business relationship.

6. Policy Implications and Final Considerations

Increasing participation in global value chains can help countries in the region improve productivity and growth, but it may also increase vulnerability to shocks. How can policies simultaneously enhance participation and reduce risks? Turbulent times like the present sometimes offer windows of opportunity. These windows may close rapidly and must be taken advantage of; the windows are temporary, but the possible benefits can be permanent.

Several policies can help firms participate in value chains more generally. Allowing multinational corporations to operate more freely, fostering trade facilitation, improving logistics performance, investing in infrastructure (both physical capital and its governance), promoting innovation by enhancing intellectual property protection, and investing in education and training to improve the technical abilities of workers are all examples of broader, horizontal policies that

can facilitate greater insertion into GVCs. Improving institutions including trade promotion agencies can also play an important role in this pursuit.²⁵

Deepening regional value chains that are less developed and less vulnerable to global shocks would also bring benefits. Removing the barriers to regional integration would go a long way toward promoting greater participation in regional value chains.²⁶ Unfortunately, a complicated “spaghetti bowl” of trade agreements across the region lacks consistent rules. Most trade that does take place could be under a preferential agreement, but the complexity of regulations increases the costs of compliance and results in little trade. For example, rules of origin differ across agreements and in many cases do not accumulate across agreements.²⁷ To form regional value chains involving several countries becomes difficult indeed. A bottom-up approach ensuring that the rules of origin are consistent among the many different agreements and removing other barriers would provide a significant boost to regional integration.²⁸

The analysis in this chapter suggests a set of more specific policies could be beneficial: **Small and medium enterprises as exporters (SMEs).** Large companies tend to be the leading actors in GVCs, and most exports are driven by a limited number of medium to large firms, often multinational corporations. However, supply chains have become much more fragmented and dispersed with longer and wider-growing networks of small and medium- sized upstream and downstream enterprises (SMEs) around the world. Moreover, SMEs account for substantial trade creation and destruction, especially as new firms export but then firms drop out of the export market. Policies that allow SMEs to enter and remain as exporters on a more consistent basis could yield significantly greater overall participation in GVCs. Difficulties creating a resilient network of foreign clients and access to credit appear to be the main problems. Policies to help efficient firms weather transitory negative shocks and thereby prevent their exit from the export market could be highly beneficial.

Exporters’ network resilience: Having a robust set of supplier networks enhances firm export performance, since firm-level idiosyncratic shocks propagate across their production networks. Evidence from the aftermath of natural disasters, for example, indicates that affected suppliers impose substantial output losses on their customers, especially when they produce

²⁵ For a more detailed discussion please refer to Mesquita and Stein (2019).

²⁶ These barriers affect the gains from trade and multinational production, distorting the levels and the sectoral allocation of foreign investment (Alviarez (2019)).

²⁷ Some firms do not even bother to ensure that the preferences are applied given the high costs of compliance.

²⁸ See Powell (2017) and Mesquita and Stein (2019).

specific inputs, which is the typical case in complex GVCs. Diversification at the source country level is also important. For example, from January to March 2020 some U.S. firms shifted their imports of particular goods from China to Vietnam and Bangladesh in response to the initial stages of the Covid-19 pandemic (Heise, 2020). This sourcing diversification strategy was implemented by firms that already imported from the alternative locations, indicating the importance of pre-existing commercial relationships and the usefulness of market diversification to build resilience of GVCs. In addition, diversification of GVCs among foreign suppliers can reduce macroeconomic volatility by lowering the exposure to any single country. Countries that source from a variety of locations are better shielded from shocks and experience less aggregate volatility. Concentration in a single country can increase the risk of a country-specific shock propagating through supply chains and negatively affecting the economy, both domestically and globally (Caselli et al., 2020).

Given the importance of maintaining existing relationships and creating new ones when facing a significant shock like the Covid-19 pandemic, it is critical to support business networks on this front. Online networks for businesses are an important tool provided through the internet for SMEs to connect to international markets. Supporting firms' participation in trade fairs and having active and effective export promotion agencies are also helpful. These policies enhance the ability of firms to connect with new suppliers and customers.

The Covid-19 pandemic can become an opportunity for Latin America and the Caribbean, as foreign markets are restructuring their sourcing strategies and the region may be able to take advantage of these shifts. Windows of opportunity that open during crises, however, may close rapidly, and countries that fail to take advantage of them may miss out on lasting benefits. For example, policies that promote trade credit today may be more effective in allowing firms to jump on opportunities—including avoiding dropping links to clients and suppliers—than similar efforts in normal times. Nonetheless, this paper suggests the need to emphasize some of these policies on a more consistent basis. Turbulent times may lead to great gains when earlier and more sustained efforts to help firms participate in GVCs are in place. By grouping firms by their export performance relative to global demand, and by analyzing which characteristics are most likely to be associated with their capacity to create and destroy trade, this paper contributes to finding the right mix of policies to help the region achieve greater and more stable participation in value chains and foster longer-term growth.

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