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Post-COVID-19 Trade Scenarios and Priorities for Latin America

Jens Arnold, Christine Arriola, Przemyslaw Kowalski, Cyrille Schwellnus, and Colin Webb

International trade and in particular global value chains have provided many economies with new opportunities to participate in international trade and access new technologies. The COVID-19 pandemic has brought to the fore specific vulnerabilities in some supply chains and ignited a discussion about future lessons to be learned from these events. This paper reviews patterns of integration into trade and global value chains among Latin American economies, traces some recent developments, including during the pandemic, and provides a look at future trade risks and opportunities for Latin American economies through model simulations.

Key words: International trade, Global value chains, GVCs, International supply chains, Latin America and the Caribbean

JEL codes: F1, F2, F6

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1. Introduction: LAC trade in a post-COVID world: Opportunities and challenges

International trade and in particular production networks, characterized by close production relationships between leading firms and suppliers across borders, have provided many economies with new opportunities to participate in international trade and access new technologies. To some extent, the Latin American and Caribbean (LAC) region has been slower than others to seize these opportunities, with a few notable exceptions. There is also significant heterogeneity across LAC countries.

The COVID-19 pandemic and, more recently, the Russian Federation's (hereafter "Russia") invasion of Ukraine and other growing geopolitical tensions have brought to the fore specific vulnerabilities in some supply chains and ignited a discussion about future lessons to be learned from these events. Some observers have associated these vulnerabilities with global value chains (GVCs), while others emphasise the resilience offered by GVCs, relative to local or regional production. Finding ways to enhance the resilience of global production networks is in the interest of all private actors involved, but public policy also has a role to play, given its broader concern with public welfare and systemic vulnerabilities. The severe economic and social damage caused by the pandemic makes stronger policy efforts to propel the recovery and ensure future resilience all the more important.

The present paper attempts to take stock of relevant past developments and look into the future at the same time. Section 2 describes the salient features of trade and GVC participation in LAC economies, and reviews some of the developments and lessons that emerged during the pandemic. Section 3 sheds light on the potential benefits of stronger engagement in trade and GVCs, and reviews the policy levers that are likely to help Latin America reap more benefits from this engagement in the future. Section 4 looks at some aspects of exposure to shocks in global value chains and uses model simulations to shed light on the specific situation of Latin America in this context. Section 5 summarises the main findings as well as region-specific conclusions and policy priorities.

2. The starting point: How much trade matters for LAC

2.1. Trade and GVC integration of LAC economies

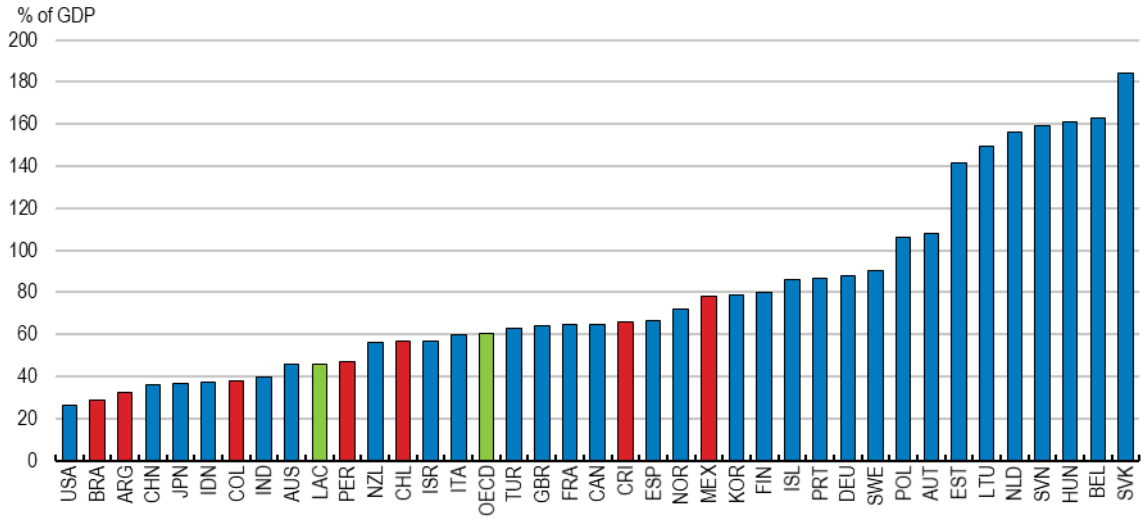
In contrast to other emerging market regions, most notably Southeast Asia, Latin America's role in international trade has been moderate. Most, but not all, Latin American economies have remained on the side lines of an increasingly integrated world economy. In some economies, this reflects several decades of inward oriented policies including a strategy of industrialisation through import substitution, a pattern that was prevalent across much of the region until the 1970s and has been undone to different extents since then.

Brazil, Argentina and to a lesser extent Colombia have participated the least in international trade, with exports and imports together amounting to an equivalent of less than 40% of GDP (Figure 2.1). Peru and Chile take middle positions at 47 and 57% of trade to GDP ratios. Only Costa Rica and Mexico are exceptions to the regional pattern and trade at a level comparable to well-integrated western European nations. Especially in the case of Mexico, this reflects important trade relations with North America.[1]

Relating trade flows to GDP may give a biased picture as larger economies and geographically isolated economies tend to satisfy their supply needs to a larger extent with domestic production. Nonetheless, these comparisons point to the fact that many Latin American economies have failed to grasp their full potential in terms of the benefits of international trade.

Figure 2.1. Latin American countries are very heterogeneous in terms of their openness to international trade

Countries by trade openness in 2019 or latest available



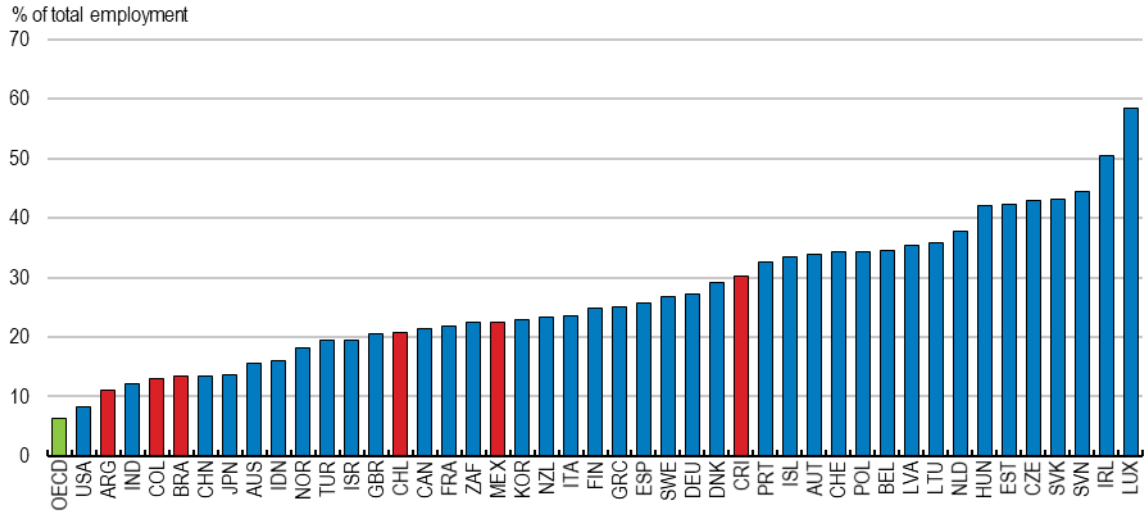
Note: Latest available year is 2018 for New Zealand and Japan.
Source: World Bank, available at https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS up to 2019).

[1] Most of the analysis in this paper focuses on seven Latin American countries which are included in the OECD's Trade in Value Added (TiVA) database, that is: Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru.

Owing to the limited engagement of many Latin American countries in international trade and investment, the contribution of trade to domestic employment has been limited, especially compared to European nations. On the high end, in Costa Rica, Chile and Mexico trade sustains between 20 and 25% of domestic employment while only 7.5% of employment in Argentina and 11 % of employment in Colombia depend on foreign final demand. This strong heterogeneity reflects divergent paths that these countries have taken in their past to trade integration as well as specialisation in trade of different products.

Figure 2.2. Large heterogeneity in domestic employment sustained by trade among LAC

Employment sustained by foreign final demand, as % of total employment



Source: OECD TiM Trade in Employment indicators.

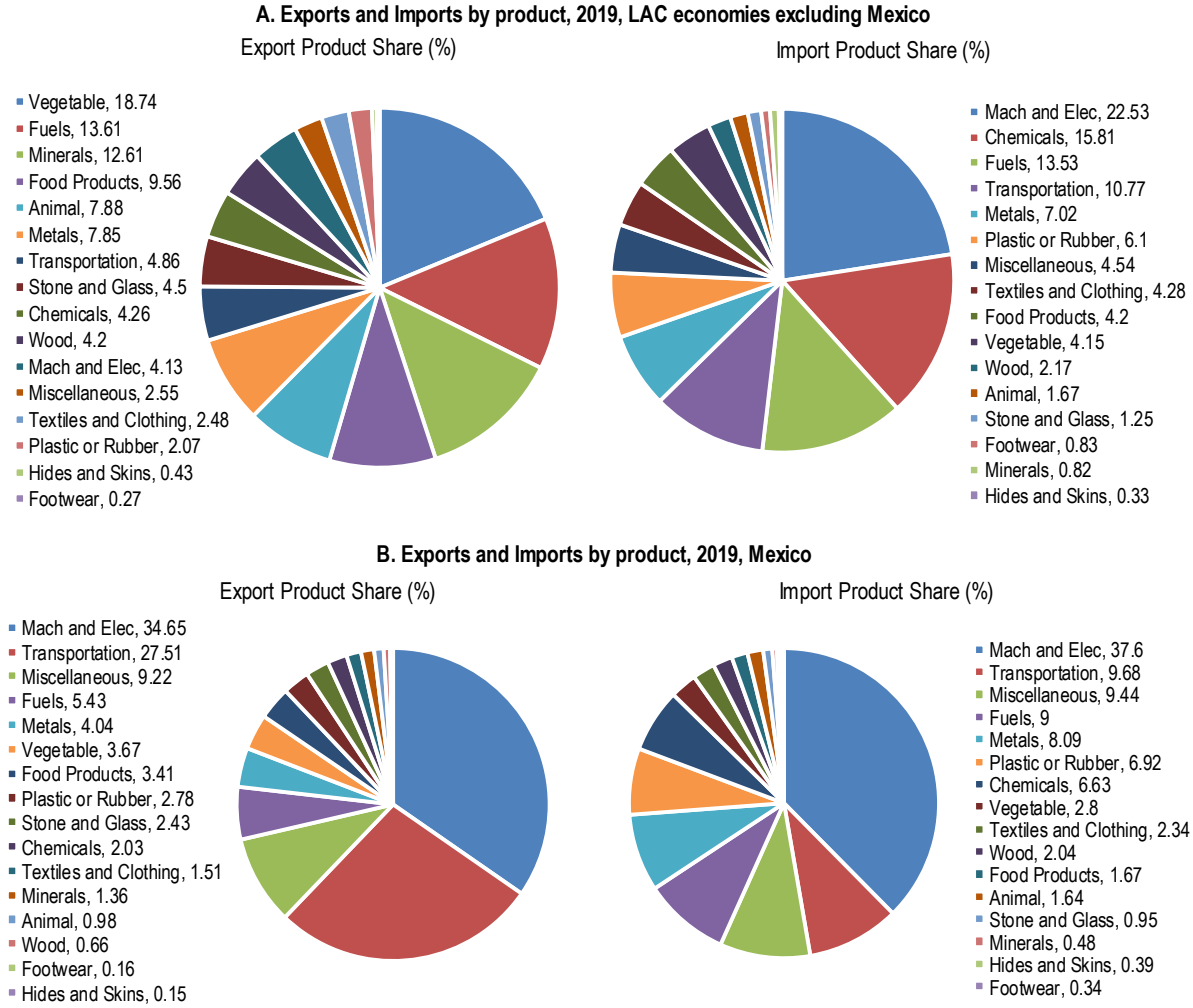
Trade patterns by sector

Despite long-present efforts to diversify Latin American economies away from natural resources-based activities, commodities continue to play a major role in merchandise exports of Latin American countries, with the exception of Mexico (Figure 2.3). Plant and animal products (19% and 8%, respectively) make up some of their largest groups of exports, reflecting export specialisation in coffee in Brazil and Colombia and in soya and beef in Brazil and Argentina. Beyond agriculture, many Latin American countries are specialised in the extraction of oil (Brazil, Colombia, Venezuela and Ecuador) or minerals (Chile, Peru, Brazil and Colombia). These products are often exported by Latin American countries for further processing by their trade partners, often located on other continents. This means that some of the value that could potentially be added in the region is added elsewhere. Technologically more advanced exports, such as transport equipment and machinery play minor role in the exports of these countries (5% and 4%, respectively).

By contrast, Mexico shows a different pattern, as its exports are heavily specialised in machinery and motor vehicles, which account for 35% and 28% of its exports, respectively. This is related, among other things, to Mexico's strong integration with supply chains of the United States and Canada, in the context of the North American Free Trade Agreement (NAFTA) which was implemented in 1994 and replaced in 2020 by the United States, the United Mexican States, and Canada Agreement (USMCA). Costa Rica is also an exception given its specialisation in higher value products, including medical appliances.

On the import side, most Latin American countries are significant importers of machinery, electrical equipment and transport equipment for final consumption, in addition to fuels. Interestingly, only Mexico frequently uses these imports as intermediate inputs in their export-oriented production of cars, electronics and other manufactured products.

Figure 2.3. LAC exports are biased towards commodities, except for Mexico

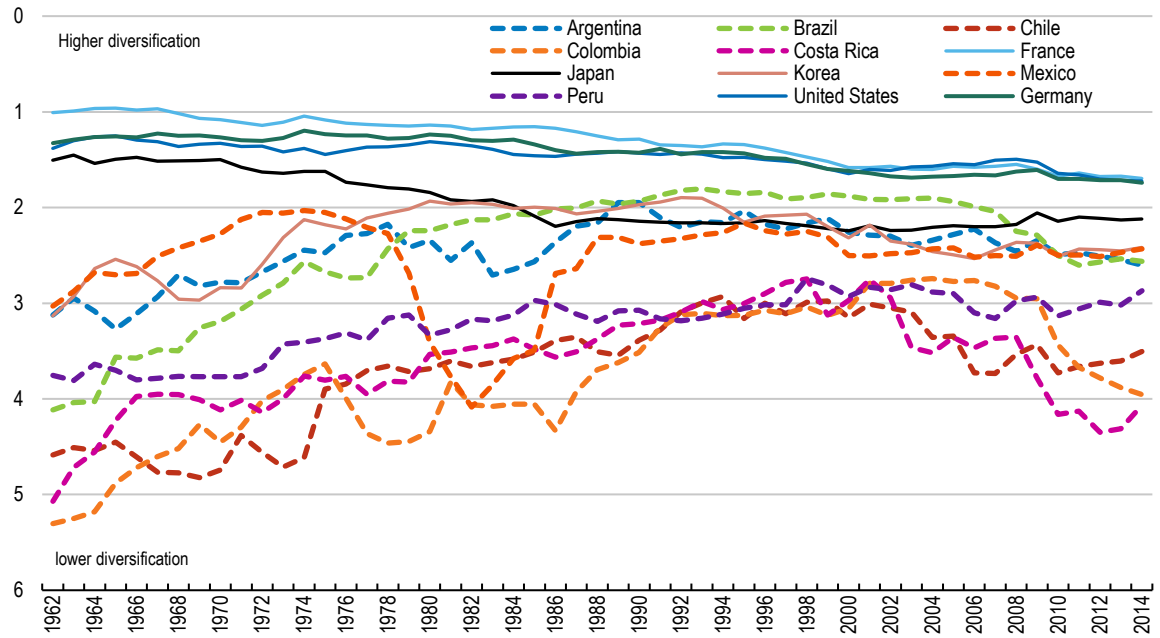


Note: Data are for 2019.
Source: WITS.

Over the last 60 years, the strong role of commodities in Latin American exports has led to repeated policy efforts to diversify the export basket to reduce exposure to volatile commodity prices. A look at the long-term trends in export diversification suggests some success stories in this regard (Figure 2.4). Episodes where diversification advanced significantly include Mexico in the 1980s, Chile, Colombia and Costa Rica up to the turn of the millennium, Brazil prior to the 1980s, and Peru.

Figure 2.4. Merchandise export diversification has made some limited progress in Latin America

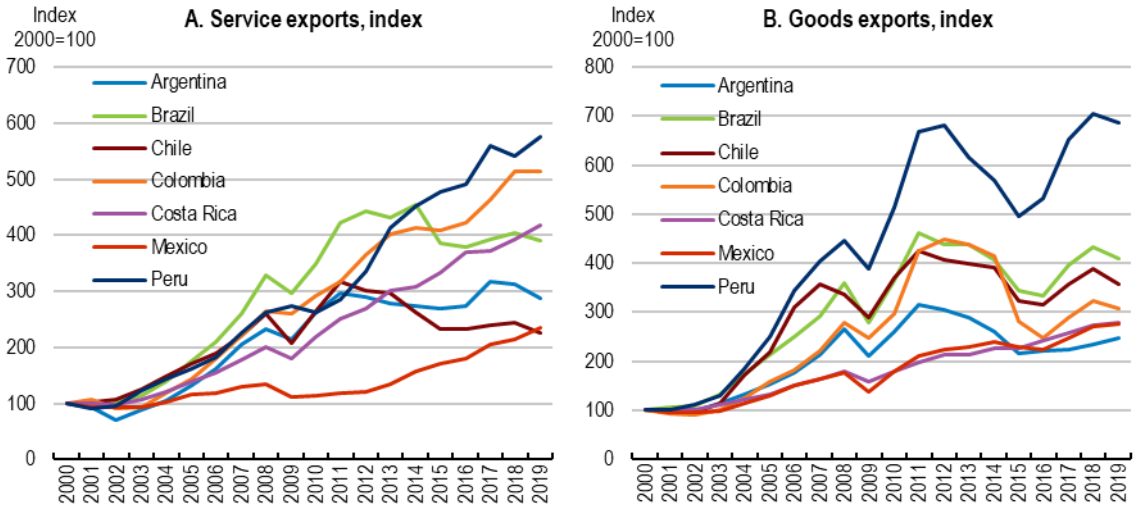
IMF Export Diversification Index



Note: Higher values correspond to lower merchandise export diversification.
Source: IMF (2018[1]), available at https://data.imf.org/?sk=A093DF7D-E0B8-4913-80E0-A07CF90B44DB.

While goods exports have traditionally been at the centre of the policy debate, services exports have grown rapidly over the last 20 years in most Latin American countries, albeit from a low base (Figure 2.5). Peru and Colombia have been particularly successful multiplying their service exports by a factor of 5.7 and 5.1 respectively since the year 2000, while Costa Rica saw a 4.2-fold increase. Services exports of Argentina, Brazil, Chile and Mexico also grew strongly but continue to be more correlated to their goods exports.

Figure 2.5. Service Exports of Latin American countries have seen strong and stable growth

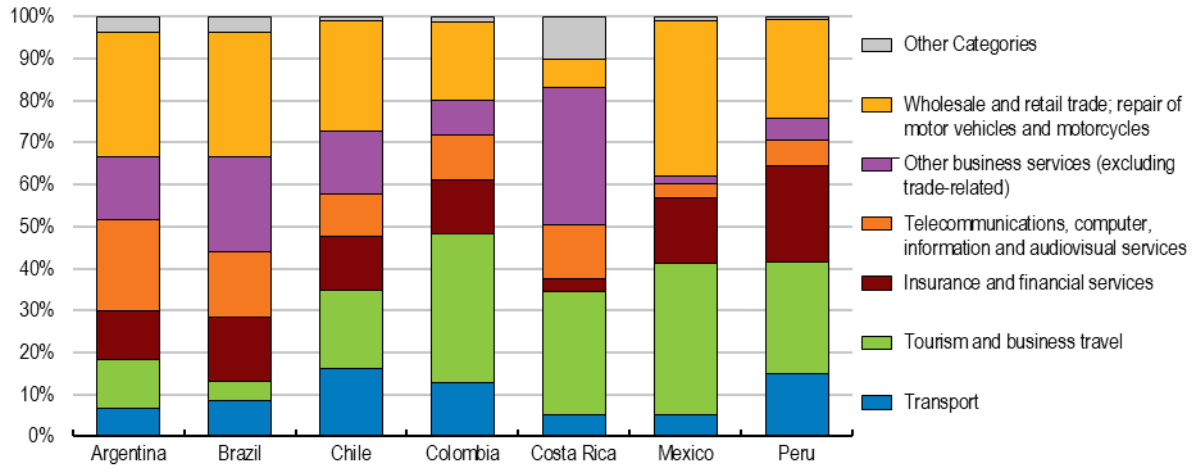


Source: WITS from Balance of Payments Statistics.

LAC services exports span a wide variety of activities, ranging from the collection of royalties to tourism. In Colombia, Costa Rica, Mexico and Peru, tourism contributed around 30% to services export income in 2017 (Figure 2.6). Where services exports are detached from the country's primary goods exports as in the case of tourism or remote administrative support activities, this may enhance resilience against shocks to goods exports. For Colombia, for example, direct tourism receipts were the largest source of foreign exchange outside of mining and oil. Trading and retailing activities make up between 23 and 37% of service exports for all countries except Costa Rica. By the same token, they can of course also be affected by specific shocks, such as the devastating effect of COVID-19 on tourism revenues.

Some LAC countries have also been successful in non-traditional services exports. Costa Rica, for example, is annually exporting USD 405 million (4.4% of exports) of health tourism services, building on its cost advantage *vis-à-vis* the United States, the principal client base. Similarly, Chile has leveraged its mining industry to develop mining-related engineering service exports (USD 327 million, 1.7% of exports). Having started by providing low value-added designs to local copper mining operations, Chilean engineering companies quickly took the lead in copper mining projects around the world and, at the height of the copper boom in 2008, represented the largest offshore service export of Chile employing 3 500 engineers ((Fernandez-Stark, Bamber and Gereffi, 2013[2]). In recent years, Costa Rica has established itself as a major exporter of remote legal and accounting services (USD 1.2 Bn, 13.1%) whereas Colombia has a significant presence in the call centres and business process outsourcing industry (USD 638 million, 4.8%). Both countries benefit from lower labour costs and their convenient time zone to serve North American customers.

Figure 2.6. Latin American countries specialise in different service activities

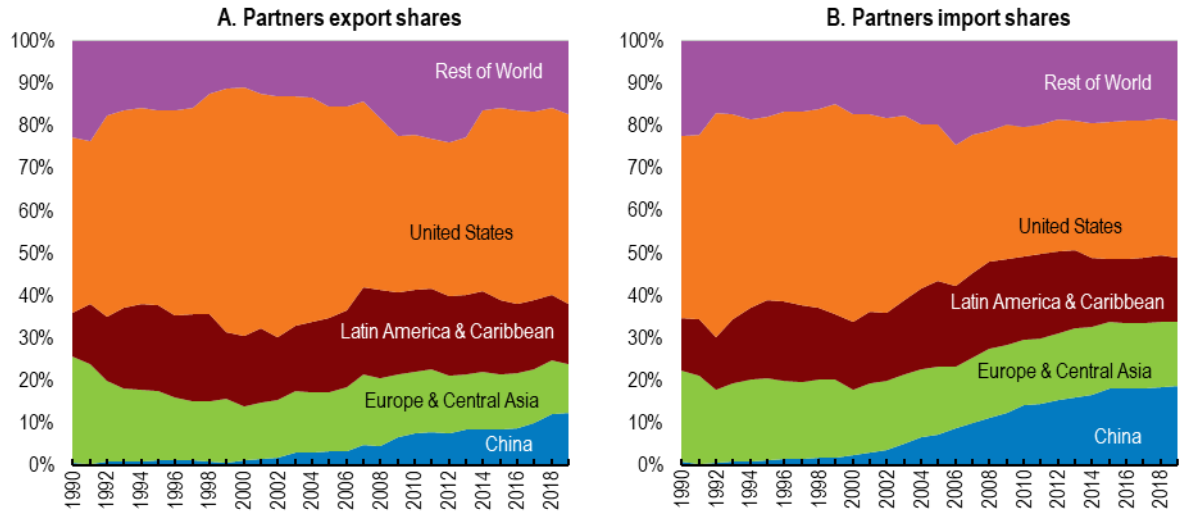


Source: WTO (2017), Trade in Service data by Mode of Supply (TiSMOS) based on Balance of Payment Information.

Trade patterns by trading partners

Latin America trades heavily with the United States and, to a lesser extent, European and other Latin American countries (Figure 2.7). A newer trend, however, is the growing importance of the People's Republic of China (hereafter "China") both in exports and in imports of Latin American countries. Since joining the WTO in 2001, China has increased its share in Latin American exports and imports from negligible levels to 12.4% and 18.8% respectively (Figure 2.7). This development has been accompanied by a reduction in the share of US, European and intra-Latin American trade.

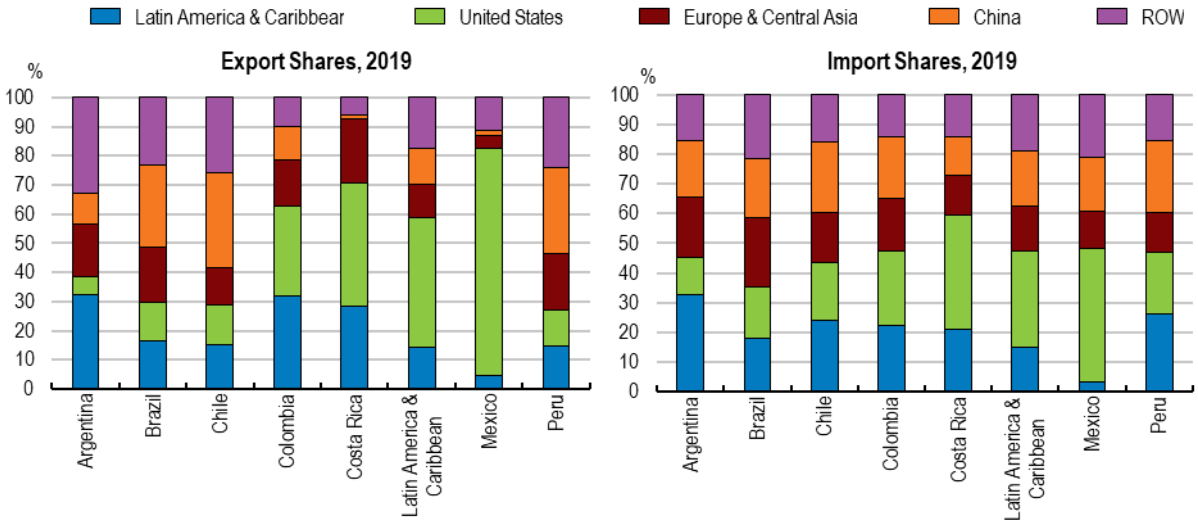
Figure 2.7. COVID accelerated the growing importance of China in Latin American trade



Source: WITS.

This average pattern, however, again masks significant heterogeneities among LAC economies with respect to their trading partners (Figure 2.8). For Mexico, and to a lesser extent Costa Rica and Colombia, the United States is the major export destination, whereas Pacific countries such as Chile and Peru but also Brazil ship around a third of their exports to China. European destinations account for around 20% of exports of Costa Rica, Peru, Brazil and Argentina. Import sources are much more similar across LAC countries than export destinations, which is a regular pattern consistent with the observation that consumption patterns are usually more homogeneous across countries than endowments and competitive advantages. On average, the United States provides a third of imports whereas China comes in second with 19%. Europe and other Latin American countries both supply 15% of total imports.

Figure 2.8. Export and Import shares by major trading partner in 2019



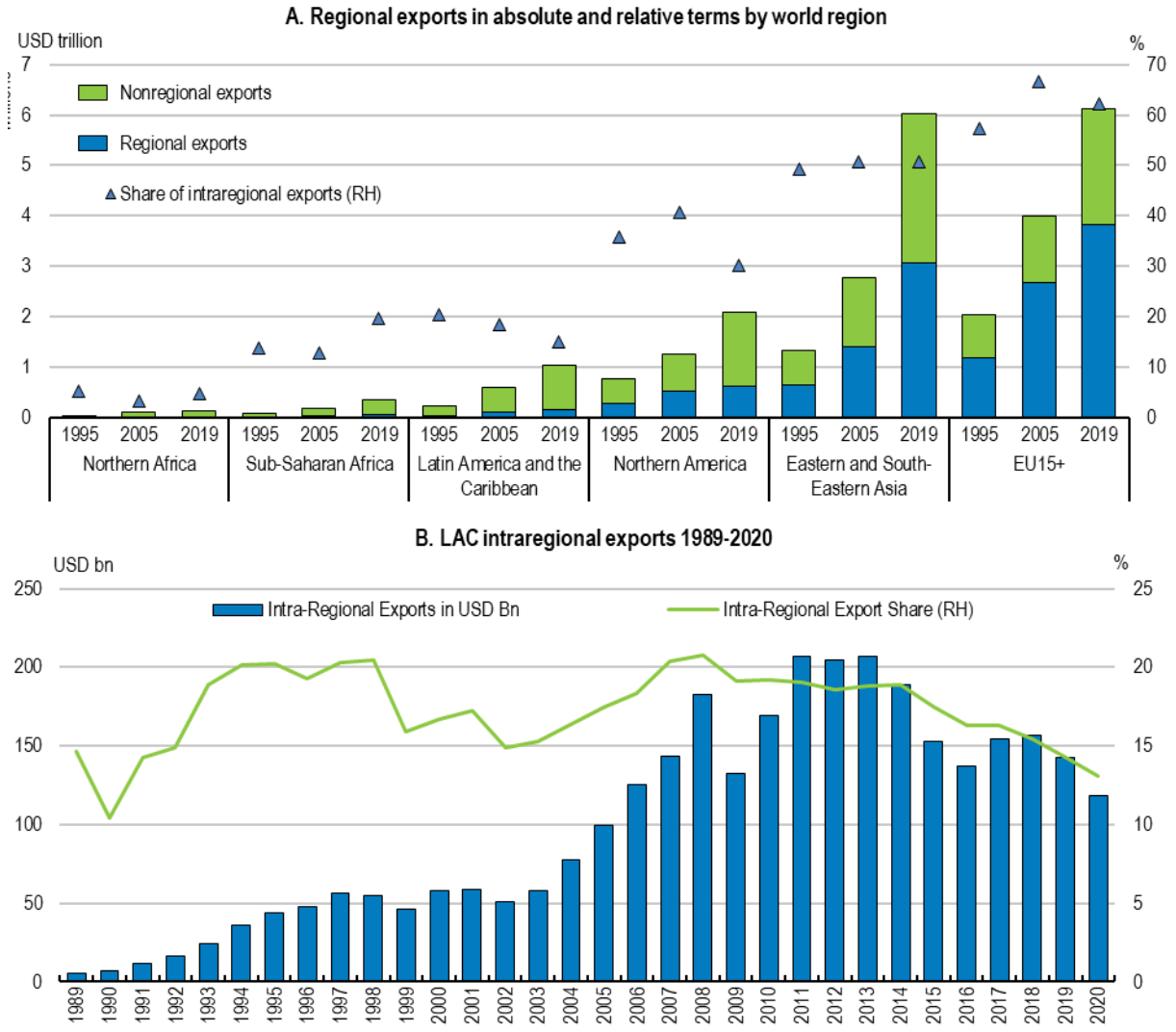
Source: WITS.

The role of intra-regional trade

Regional integration is generally less pronounced than in other regions of the world, with respect to both imports and exports (Figure 2.9, Panel A). Only for Colombia and Argentina, are other Latin American countries the most relevant region in terms of export shares. This contrasts with Europe and the East Asia and Pacific regions, where intraregional exports are predominant. These regions are characterised by strong intraregional value chain links, while Latin American export links within value chain links are mostly with partners outside of the region.

Over time, the role of regional exports has been stagnant or falling (Figure 2.9, Panel B). Only 11% of Latin American exports went to partners in the region in 2020, after significant declines since 2008 when that share exceeded 20%.

Figure 2.9. Latin America's regional trade integration is shallow compared to other world regions

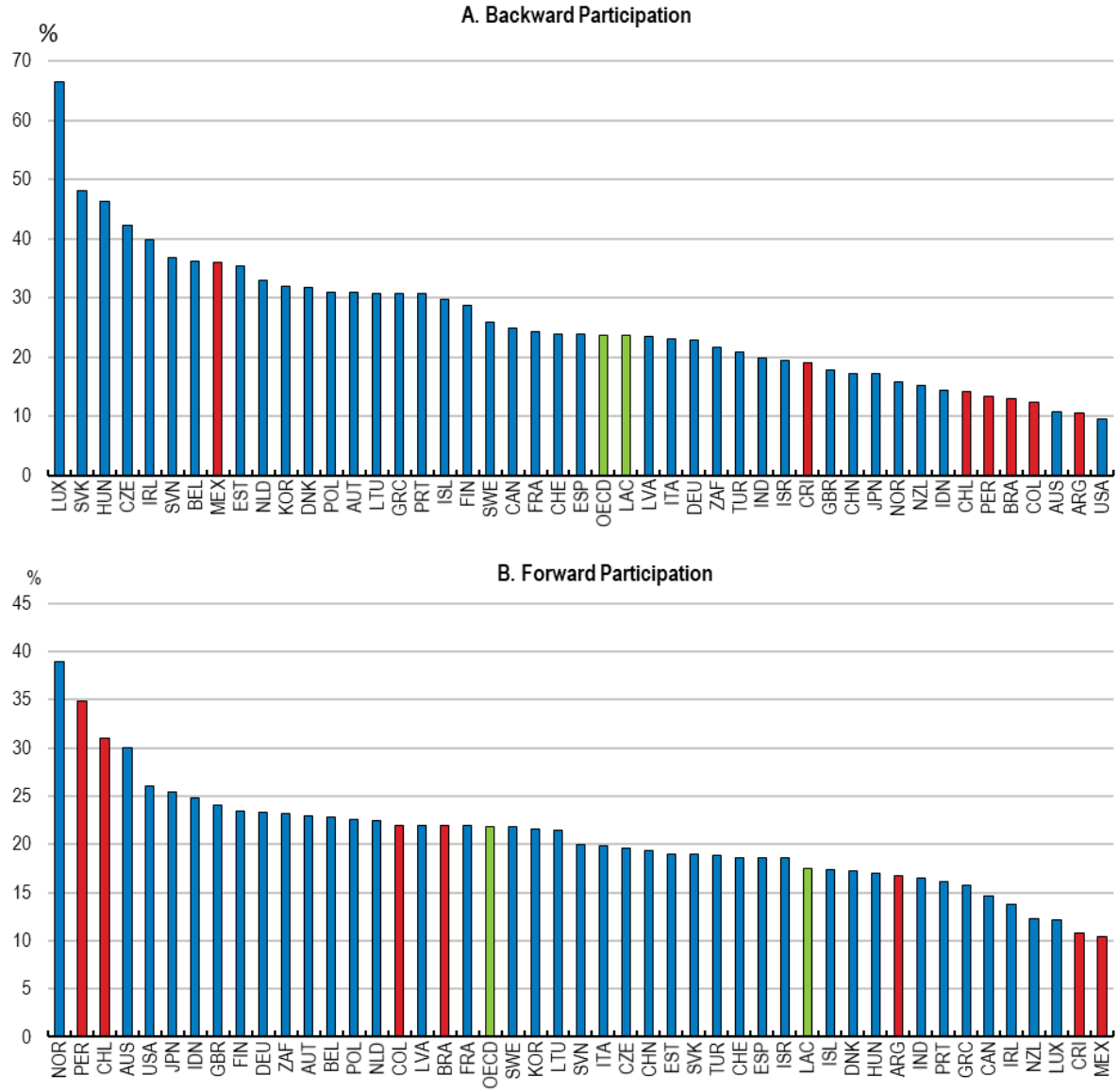


Source: UNCTAD secretariat calculations, based on UNCTAD, UNCTADstat Merchandise Trade Matrix.; WITS.

2.2. Integration into global value chains

Countries' integration into global value chains (GVCs) is typically measured by backward participation (the extent to which a country's gross exports depend on foreign imported value added) and forward participation (the extent to which other countries' exports depend on a country's domestic value added). In terms of backward participation, Mexico stands out as the Latin American economy that is most deeply integrated into global value chains, on par with smaller European countries and Korea (Figure 2.10). This mainly reflects sourcing inputs from the two other USMCA member countries and processing them for further exports to USMCA or elsewhere. Most other Latin American economies rely only to a very limited extent on imported inputs for their exports, which may partly reflect trade policy barriers, but also the levels of industrial development and sectoral specialisation in mining and agriculture, as well as geographical remoteness.

Figure 2.10. Integration of Latin American countries into global value chains



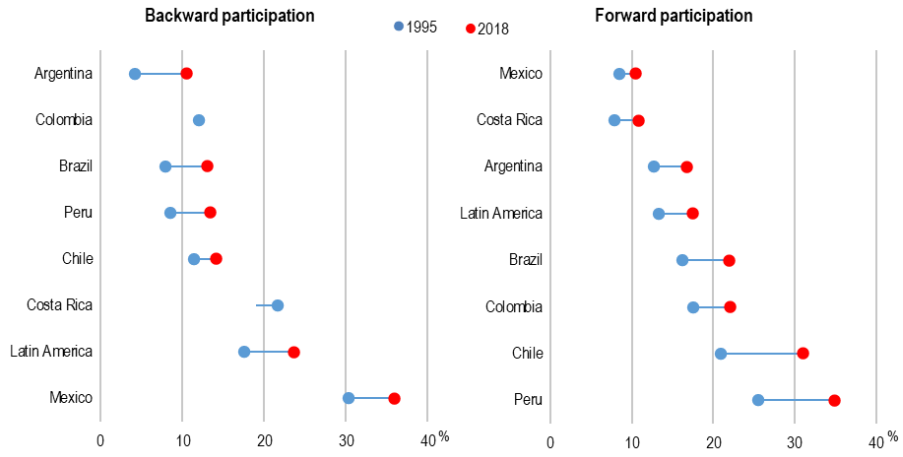
Note: Backward participation is measured as foreign value added as a share of gross exports. Forward participation is measured as domestic value added incorporated in other countries' gross exports as a share of gross exports. Data pertain to 2018. OECD and LAC are weighted sums, where the weights are gross exports.
Source: OECD (2021), Trade in Value Added Database.

In terms of forward participation, Chile and Peru are among the economies most closely integrated into GVCs in the world. This can partly be explained by these countries' specialisation in the extraction of natural resources, especially oil and copper, that are used as intermediate inputs in the production of a wide range of manufactured products with high export intensities, such as computers and electronic equipment (for more on natural resources and mining, see Section 4). By contrast, other Latin American economies, especially Costa Rica and Mexico, are specialised in activities that are located further downstream in the value chain, implying that only a very small share of their domestic value added is used in other countries' exports.

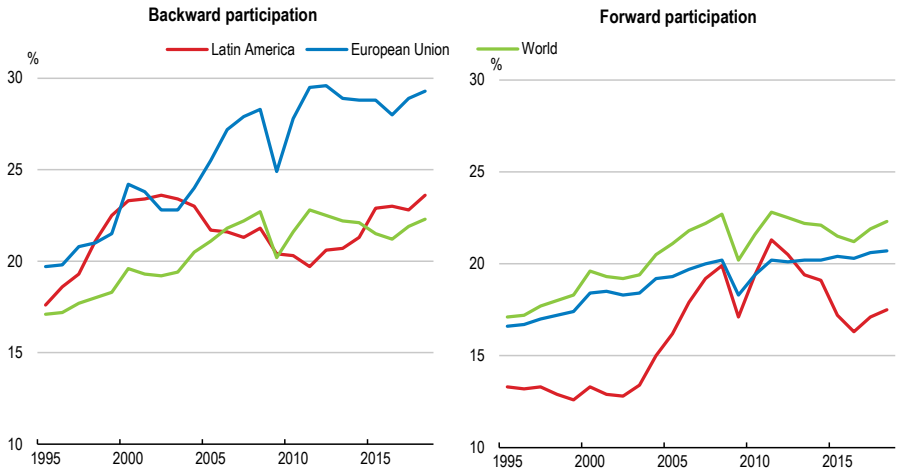
Over the past two decades, backward and forward participation in global value chains has increased in most Latin American countries (Figure 2.11, Panel A). In terms of backward participation, increases have been particularly pronounced in a range of initially inward-looking countries, such as Argentina, Brazil and Peru. In these countries, trade liberalisation may have contributed to higher global value chain integration. In terms of forward participation, increases have been particularly pronounced in Chile and Peru, which reflects the Chinese export and construction boom – and the related global commodities boom – over the past two decades that heavily relied on Chilean and Peruvian mining products as intermediate inputs.

Figure 2.11. Global value chain participation has increase over the past two decades

A. Forward and backward participation by country



B. Forward and backward participation over time

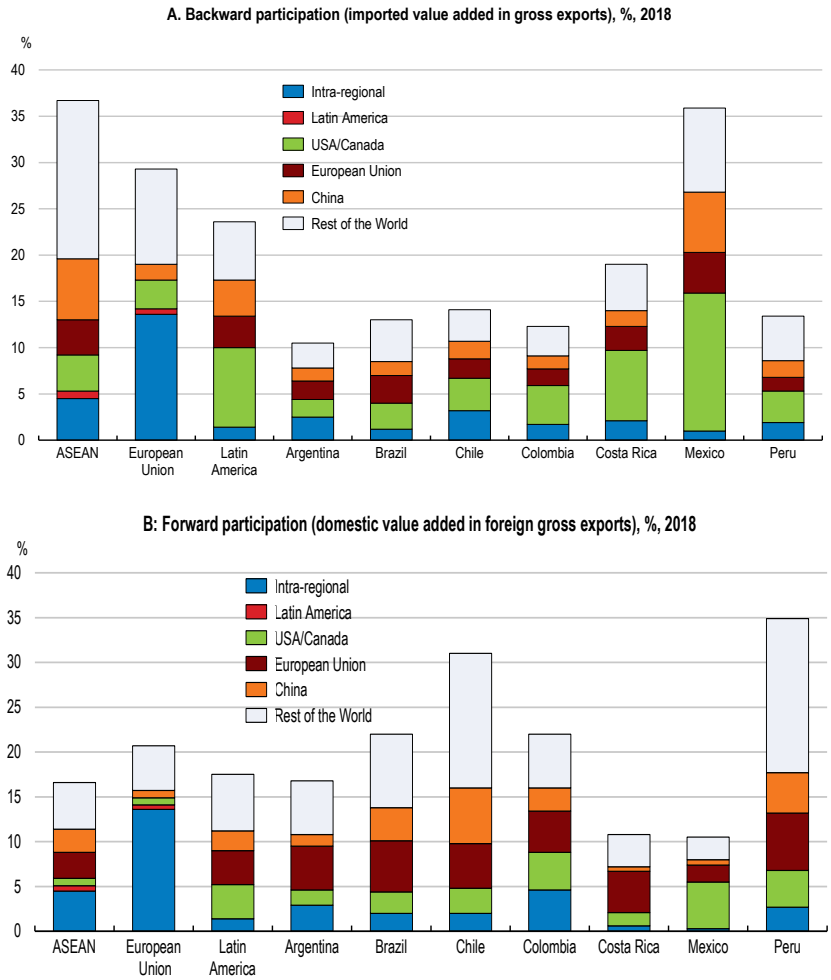


Note: Backward participation is measured as foreign value added as a share of gross exports. Forward participation is measured as domestic value added incorporated in other countries' gross exports as a share of gross exports. Regional and global aggregates are calculated as weighted sums, where the weights are gross exports.
Source: OECD (2021), Trade in Value Added Database.

The increase in backward and forward participation of Latin American countries over the past two decades has been far from continuous (Figure 2.11, Panel B). Backward participation surged in the second half of the 1990s as trade liberalisation contributed to rapid growth in imported intermediate goods, including through integration of Mexico into North American value chains facilitated by NAFTA. However, backward participation retreated for more than a decade, possibly related to the reconfiguration manufacturing value chains in the wake of China's WTO accession and its growing role in international trade and GVCs. By contrast, forward participation surged over the same period as booming manufacturing production in China led to rapidly growing demand for mining products, especially from Chile and Peru.

Regional integration of Latin American value chains remains limited compared to Asian and European value chains (Figure 2.12). In terms of backward participation, only about 6% of imported value added incorporated in gross exports of Latin American economies originates from other Latin American countries. Regional integration is significantly higher in ASEAN economies (about 12%) and the European Union (about 46%) (Figure 2.12, Panel A). The low intra-regional GVC integration may partly reflect geographical factors, such as close proximity of the North American market for Costa Rica and Mexico, as well as lower levels of intra-regional trade liberalisation than in Asia and Europe. A similar picture of limited Latin American regional integration also emerges in terms of forward participation (Figure 2.12, Panel B). Overall, Latin America appears to be most highly integrated with North American value chains, especially in terms of backward participation, but also with Europe and China, especially in terms of forward participation where Europe is one of the most important users of Latin America's inputs, followed by China.

Figure 2.12. Regional value chain integration remains limited

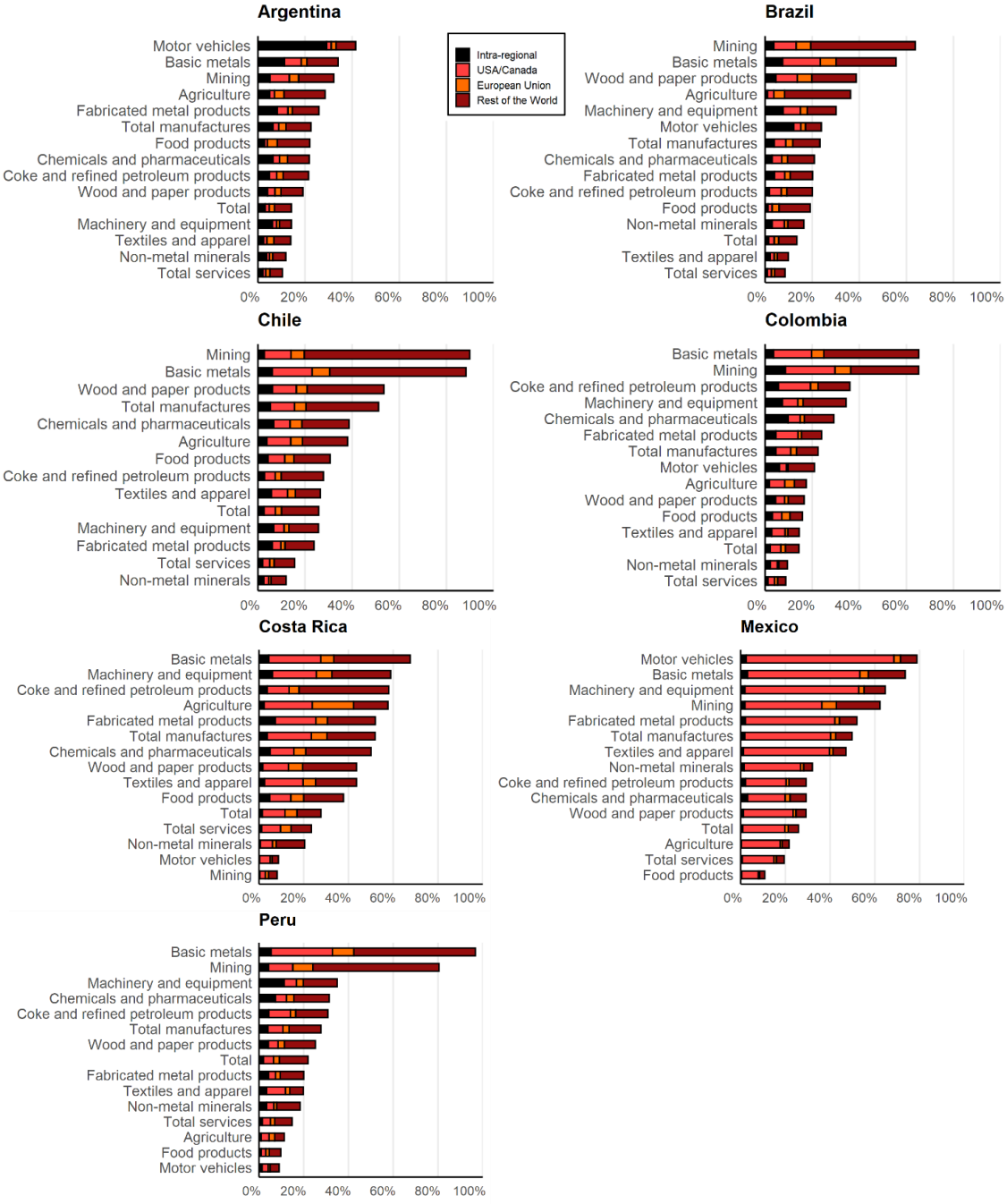


Note: Backward participation is measured as imported value added as a share of gross exports. Forward participation is measured as domestic value added incorporated in other countries' gross exports as a share of gross exports. Regional and global aggregates are calculated as weighted sums, where the weights are gross exports.
Source: OECD (2021), Trade in Value Added Database.

A number of Latin American industries are highly dependent on final demand from abroad (Figure 2.13). This is particularly the case of mining, basic metals and agriculture, where the share of domestic value added directed at foreign final demand as a share of total domestic value added reaches values above 90% in some countries, including Chile and Peru. By contrast, external dependence tends to be low in services, as, similarly also to other regions, most services are produced for the domestic market. In terms of regional dependencies, mining, basic metals and agriculture mainly depend on final demand from the rest of the world, most notably China. Dependence on final demand from the European Union in these industries is fairly limited and typically significantly lower than dependence on demand from North America.

Figure 2.13. Dependence on external demand is high in some industries

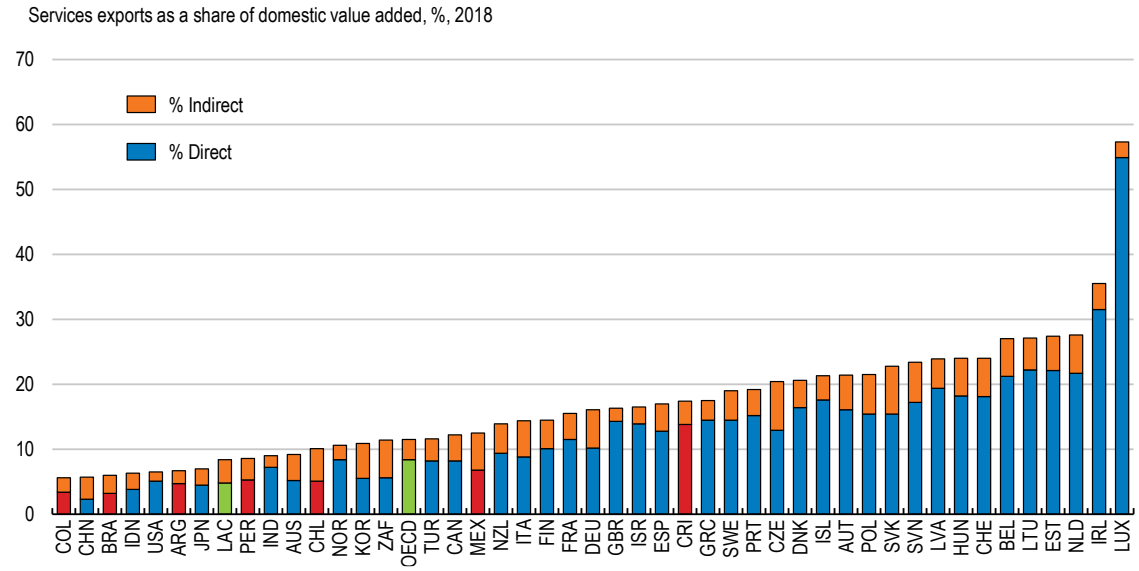
Domestic value added incorporated in foreign final demand as a share of domestic value added, %, 2018



Source: OECD (2021), Trade in Value Added Database.

Services exports of Latin American countries are among the lowest in the world (Figure 2.14). Direct services exports, i.e. exports generated directly and exported by the services sector rather than being incorporated in agriculture, mining and manufacturing exports, are low even relative to economies with large domestic markets, such as China and the United States. This suggests high export growth potential in a number of services sectors to catch up with other OECD countries, especially in the area of travel and tourism. Costa Rica, for instance, performs significantly better in terms of direct services exports than a range of higher-income OECD countries, not least thanks to travel and tourism exports.

Figure 2.14. Services exports are low



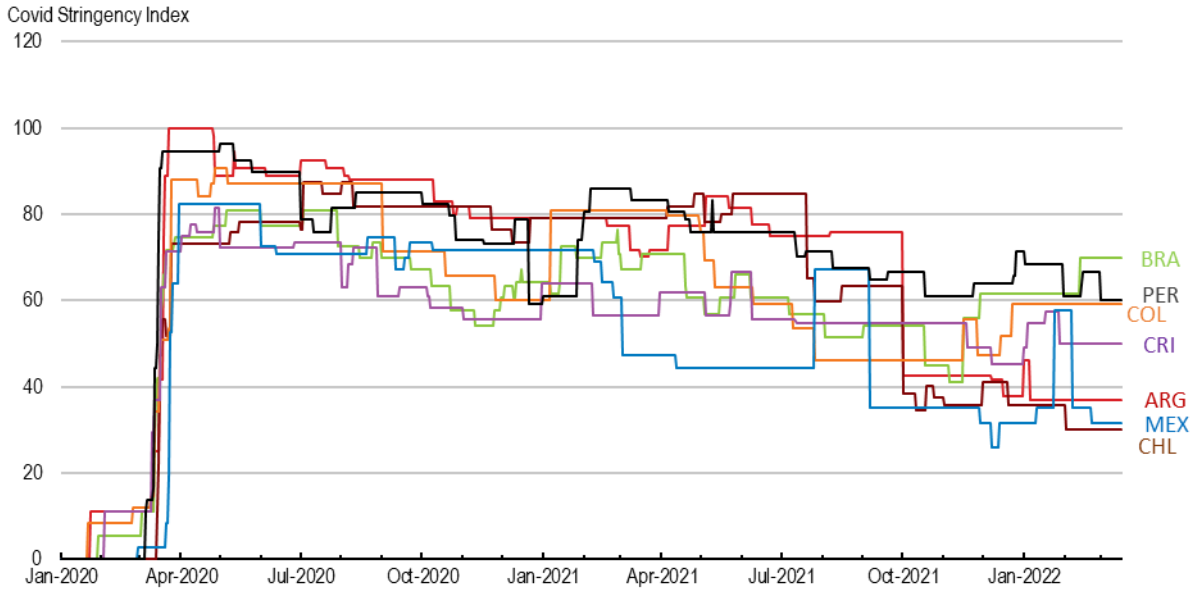
Source: OECD (2021), Trade in Value Added Database.

2.3. COVID-19-related developments and impacts on the LAC region

Latin America is the world region that was hit hardest by the COVID-19 pandemic. With 8% of world population Latin American countries accounted at the same time for 28% of world deaths from COVID-19 (OurWorldInData, 2021[3]). These casualties occurred despite strict mobility restrictions to contain the spread of the virus (Figure 2.15), all of which triggered a steep recession across Latin America. Output fell on average by almost 15% across Argentina, Brazil, Chile, Colombia, Costa Rica and Mexico, before recovering during 2021. However, by the end of 2021, output exceeded pre-pandemic levels in all of the above countries except Mexico by an average of 4% (OECD, 2022[4]).

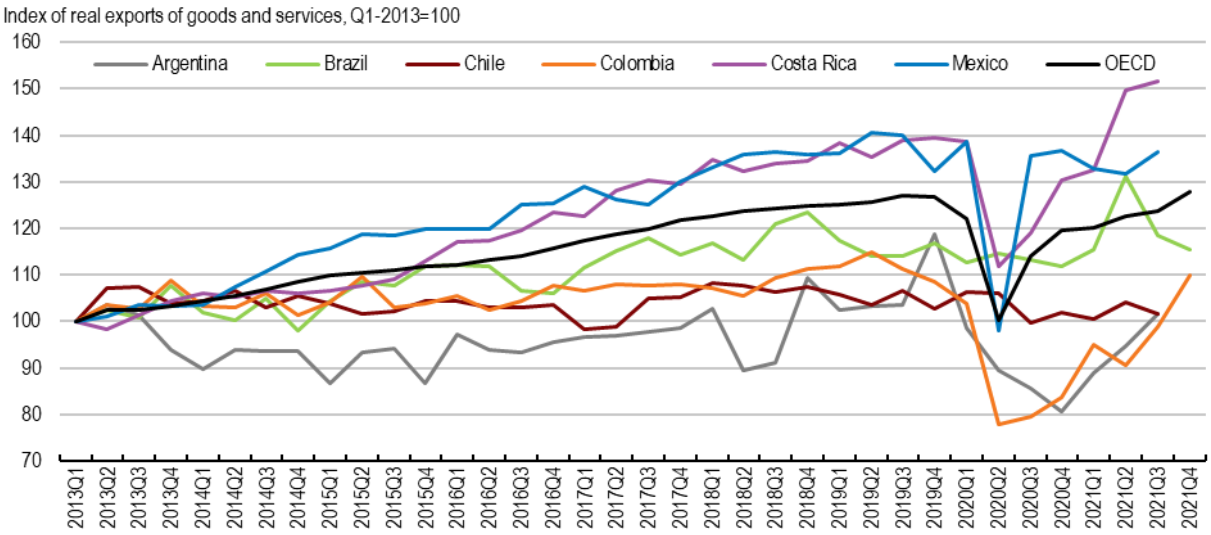
Concomitant with the decline in GDP, Latin American exports experienced a sharp but brief slump during the onset of the Coronavirus pandemic in 2020. Countries strongest hit include Mexico (-36%), Colombia (-32%), and Costa Rica (-20%) in line with the OECD-wide decrease of trade of -22% in the second quarter of 2020 (Figure 2.16). Countries like Chile and Brazil, on the other hand, did not experience a decrease in their aggregate exports during the initial shock.

Figure 2.15. Strict mobility restriction measures precipitated sharp recessions across LAC



Source: Oxford Blatnavik School, Lockdown stringency index, Our World in Data (2021).

Figure 2.16. LAC exports have recovered strongly from the COVID-19 crisis

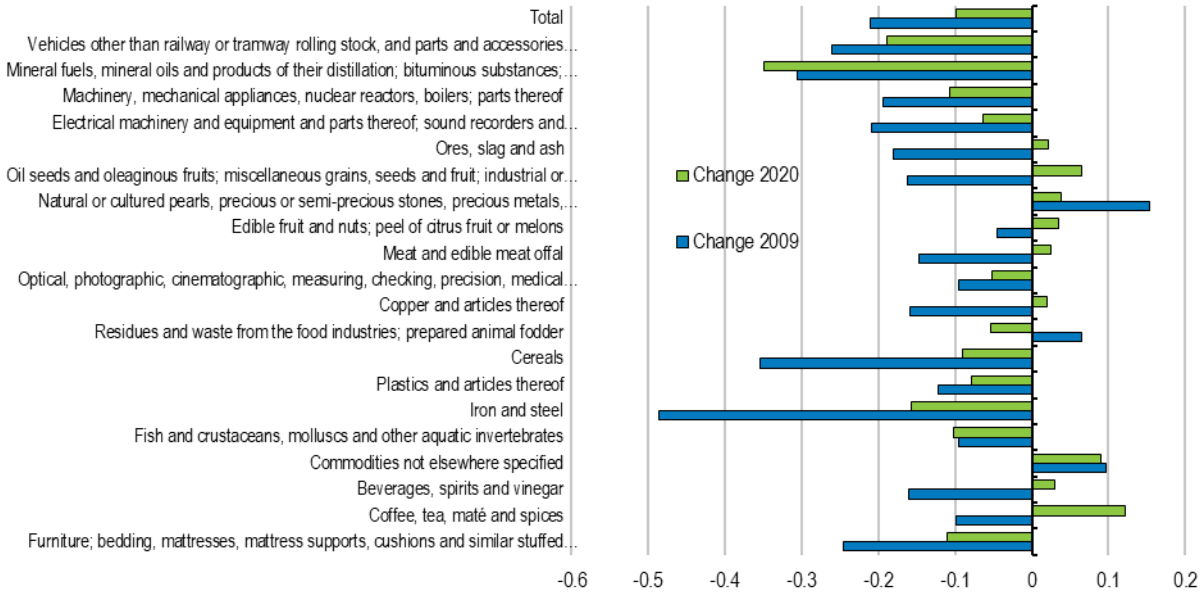


Source: OECD Economic Outlook database.

Similarly to global trends (Arriola, Kowalski and van Tongeren, 2021[5]), the steep decline in Latin American exports during 2020 was less uniform than the export decline experienced during the Great Financial Crisis of 2009 (Figure 2.17). In 2009, the continent's 20 largest export sectors declined by 21% in an almost uniform fashion. In 2020, the sudden drop mostly affected mining, oil and to a lesser extent manufacturing exports. In particular, most food industries registered increases in exports as the prices of many agricultural commodities started to rise above pre-crisis levels in 2020. This helped buffer declines in minerals and manufacturing products and led to an overall decline of Latin American exports of 9.8% in 2020.

Figure 2.17. The product structure of goods exports of Latin America has shifted

Export changes in 2009 (left) and in 2020 (right) for the 20 largest exports sectors in 2019



Source: OECD calculations based on ITC Trade Map data.

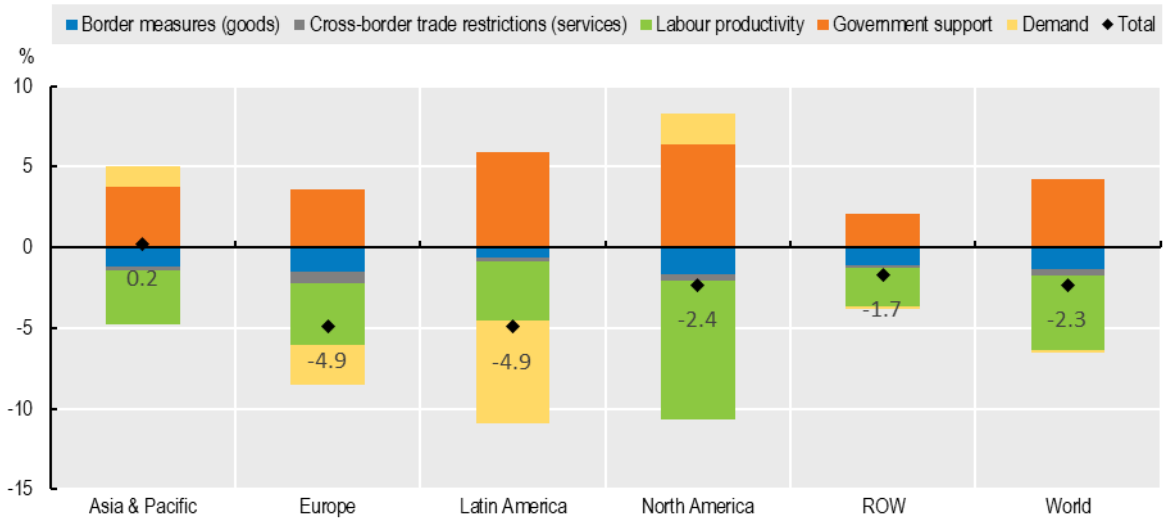
The COVID-19 pandemic has accelerated the rising role of China as a trading partner for the region. Whereas imports of Latin American countries from the United States, Europe and Latin America decreased 15% in 2020, imports from China have decreased only 6%. This is related to the composition of trade flows and the fact that the Chinese economy actually grew in 2020, and it remains to be seen to what extent this reorientation will become a permanent feature of the Latin American trade profile.

A recent OECD analysis using the OECD's CGE model METRO aimed to disentangle the impact of the main government measures taken during the pandemic and the main mechanisms through which these had an impact on economic performance of broad world regions (Arriola, Kowalski and van Tongeren, 2022[6]). The measures accounted for in the analysis were those affecting labour productivity, goods and services trade costs, the structure of consumer demand, as well fiscal support to households and firms. Incorporation of these measures into the model did a relatively good job in replicating the key features of the COVID-19 pandemic, although unsurprisingly some of the features of 2020 could not be fully captured in a general equilibrium framework. For Latin America, the modelling results suggested a decline in real GDP of 4.9%, compared to an actual 6.5% decline in the six major LAC economies covered by the *OECD Economic Outlook*.

Results of this analysis suggested that globally, the output declines observed in 2020 were driven primarily by reductions in labour productivity due to the pandemic-related restrictions and varying abilities to telework across countries (on its own lowering world real GDP 4.6%). For Latin America, the reduction in output was not only driven by lower productivity but also shifts in demand away from many services sectors where a large majority of the population work. Restaurant closures, rules limiting public gathering, among other measures to control the virus reduced real GDP in Latin America 6.3% in the model. Lower labour productivity added an additional 3.7% in the region, while government support substantially mitigated these output declines.

Figure 2.18. Model decomposition of change in real GDP by COVID-19 factors

Percentage change from base



Source: OECD METRO model.

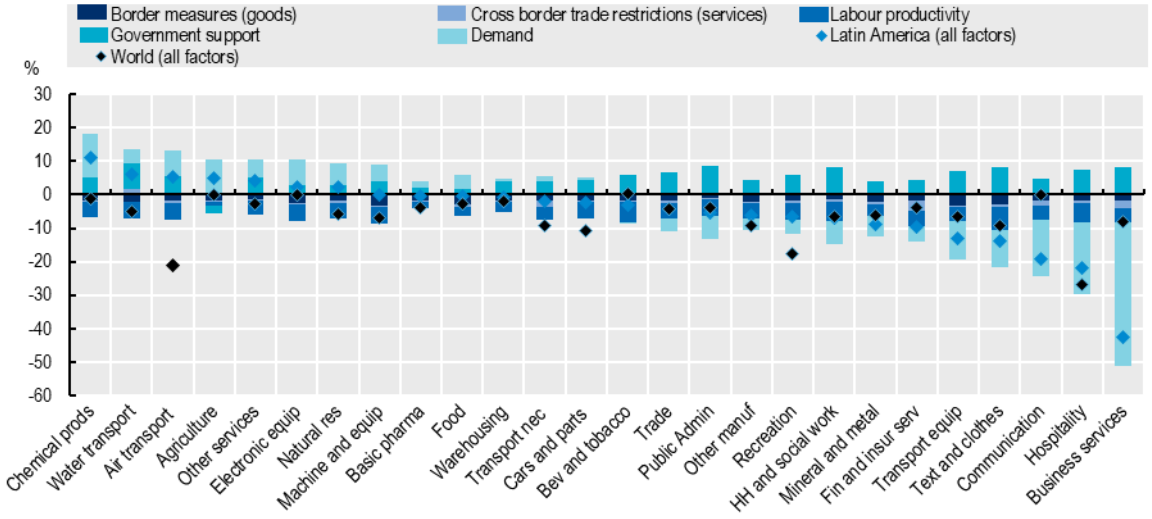
Across the world on average, demand shifts overall had the smallest impact on world GDP but had significant and heterogeneous impacts on consumption, output and trade changes across countries and sectors, a factor that contributed to pressures on some supply chains and trade flows. In particular, COVID-19-related factors had a more negative effect on the services sectors. A few sectors, such as electronic equipment and agriculture, saw positive growth in the simulation, thanks to government support and shifts in consumer and intermediate demand. In Latin America, the shifts in demand had a larger impact on the real GDP in the region than the other factors studied in the analysis. Almost all goods and services consumed by households come from domestic sources and are consumed domestically. Moreover, many of the service sectors negatively affected by the demand shifts account for a larger share of labour demand. As a result, despite government support, output in all sectors in Latin American countries declined in the simulation.

The trade impacts across sectors implied by the factors accounted for in this exercise were indeed uneven globally as well as in Latin America (Figure 2.19). Sectors which were virtually shut down due to strict lockdown measures were most negatively impacted. Exports of the hospitality, air transport, and recreation sectors declined globally 26.6, 20.7 and 17.6% respectively in the simulation, where shifts in demand were the predominant factor. Exports of cars and parts declined by 10.7% in the simulation, due to shifts in demand, productivity and border restrictions on goods. A few sectors saw positive growth in the simulation, thanks to government support and shifts in consumer and intermediate demand. Cases in point are beverage and tobacco products, electronics and communication, which experienced small but positive trade growth globally in this modelling exercise. In Latin America, more sectors including chemical products, air and water transport, agriculture, and electronic equipment sectors, had positive export growth compared to world totals. Though the decline in the exports of communication, business and financial services were much steeper compared to world totals. Shifts in demand away from services to towards home nesting equipment and medical products account was the primary driver in the uneven impact on Latin American exports by sector.

Across the world, the negative economic impacts were largely mitigated by government support to firms and households (on its own raising world real GDP by 4.2%) and these measures, particularly support to firms, was a particularly important crisis mitigation measure in Latin America. Measures placed at the border to control the spread of the virus had less of an impact, reflecting the efforts some governments made to include trade facilitating measures to assist in the flows of goods and services across borders, and this was also the case for Latin America.

Figure 2.19. Change in Latin America's export volumes by sector decomposed by COVID-19 factors

Percentage change from base



Note: Includes all COVID-19 factors implemented in the model.
Source: OECD METRO Model.

Two years into the pandemic, major Latin American economies have regained their pre-crisis export levels. In countries like Brazil, Argentina, Chile and Costa Rica, post-pandemic developments including high commodity prices led to an unprecedented export boom, with exports shooting well above their pre-crisis levels, even if COVID-19 has left deep scars on these and other LAC economies. Subsequent changes to trade flows and prices resulting from Russia's aggression against Ukraine have further added to price hikes in some commodities, improving terms of trade for some countries in the region, while reducing them for others. Overall, even if some exporters in the region benefited from the increase is commodity prices and could serve as alternative sources of supply in medium to long-term, Russia's aggression adds significantly to the already significant disruptions to world trade and uncertainty of the economic environment caused by the pandemic, highlighting the growing importance of understanding how shocks are transmitted and how they can be mitigated in the global economy (Section 4).

3. Potential benefits of stronger participation in international trade

The relatively limited participation of Latin America in global trade flows and value chains raises the question whether economies in the region could benefit from stronger efforts to embrace global trade and reap more economic gains from international value chains participation.

This section first lays out the channels through which stronger internationalisation could affect LAC economies. This implies evaluating the link to weak productivity growth and weak competitive pressures in the economy, which are long-standing challenges of Latin American economies, as highlighted in several OECD Economic Surveys on Latin American countries (OECD, 2022[7]; OECD, 2020[8]). In that context, the section also sheds light on the potential for raising consumer purchasing power through lower prices. The discussion also comprises a historical overview of Latin America's participation in trade and global value chains, in an attempt to distil lessons from past developments. A brief characterisation of trade policies is then provided to outline the scope for potential trade policy reforms that could support stronger engagement in cross-border trade, followed by a discussion on interactions and complementarities with other policy dimensions such as infrastructure, labour markets and training policies.

3.1. The role of international trade for domestic competition and productivity

International trade has been a powerful engine of growth and improvement in living standards across many countries (Irwin et al., 2019[9]). Both consumers and producers can reap benefits from trade and the potential efficiency enhancements it creates.

For producers, one of the benefits of trade is the ability to source imported intermediate inputs and capital goods at a lower cost, thus raising competitiveness. Improved sourcing options for intermediate inputs and capital goods lowers production costs and may allow domestic firms to upgrade their production processes through technology embedded in new machinery (Amiti and Konings, 2007[10]) Moreover, there is evidence that increased importing activities of firms can help building foreign networks and acquiring knowledge about foreign markets, which is crucial for increasing export activities (He et al., 2017[11]). International value chains are also vehicles of technology transfer and they enable drawing not only countries' own capabilities but also on those of trading partners and thus growing economically through production and exports of more sophisticated products (Hausmann, 2013[12]).

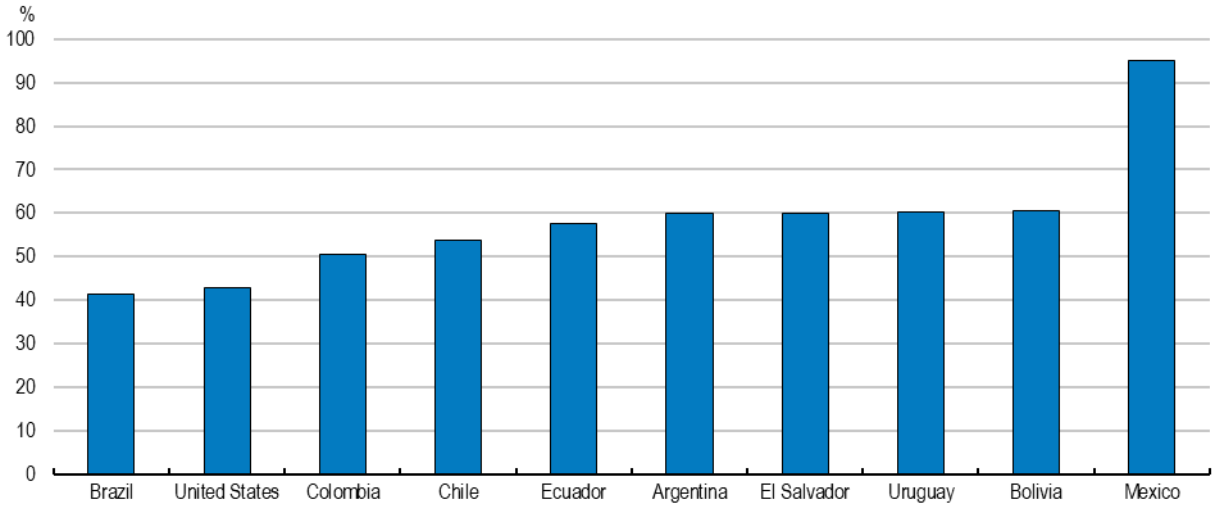
This aspect is particularly relevant for LAC countries where domestic producers lack access to advanced and competitively-priced inputs, such as Argentina and Brazil (OECD, 2018[13]; OECD, 2019[14]). A substantial body of empirical work has confirmed the relevance of access to competitive production inputs (Krishna and Mitra, 1998[15]; Tybout, 2002[16]; Pavcnik, 2002[17]; Cavalcanti and Rossi, 2003[18]; Schor, 2004[19]; Amiti and Konings, 2007[10]; Fernandes, 2007[20]). In the case of Brazil, the reduction in tariffs undertaken in the first half of the 1990s made a substantial contribution to lowering input prices, particularly capital goods and led to a significant increase in productivity (Lisboa, Filho and Schor, 2010[21]; World Bank, 2019[22]). Such an effect was significantly stronger in the technology and capital-intensive sectors than in the natural resources and labour intensive ones.

At the same time, more trade also implies stronger competition for domestic producers on their home markets. This disciplining effect of import competition in the same sector can lead companies to reduce inefficiencies, upgrade their production processes through more advanced technologies and better foreign inputs, increase product quality and reduce high prices that result from low domestic competition (De Loecker, 2007[23]; Atkin, Khandelwal and Osman, 2017[24]). Across the region, shielding domestic producers from foreign competition has curbed competition in many sectors, which has in turn reduced the incentives and discipline for undertaking constant improvements and innovation (OECD, 2015[25]; World Bank, 2018[26]).

In theory, apart from better linking the internal prices with those observed in world markets – and thus enabling a more productive, comparative advantage-driven, resource allocation within economies, trade opening reinvigorates competition by allowing the most productive firms to grow while the least productive firms shrink or exit, freeing resources for the more productive ones to grow (Melitz, 2003[27]). It is precisely this reallocation process that allows capital and labour to flow to more productive sectors or firms where new and better-paying jobs can be created (Elfayoumi et al., 2018[28]). A significant share of productivity growth in advanced economies can be attributed to these reallocation effects (OECD, 2019[14]). Estimates for Latin America suggest significant potential productivity gains from further improvements in resource allocation, which range from 40 to 95% across countries in the region and mostly exceed those of the United States (Figure 3.1).

In reality, however, firms may be able to influence their own efficiency. In this case, the mere threat of foreign competition may be sufficient to trigger within-firm productivity improvements that lead to aggregate productivity benefits, and stronger import competition does not necessarily imply a massive substitution of domestic production by imports. Domestic producers of such goods would react to the stronger foreign competition by reducing their prices, reducing slack and improving their products.

Figure 3.1. Potential aggregate TFP gains from improving resource allocation



Note: The underlying firm sample includes firms of all size classes for El Salvador, Mexico and the United States; firms with 10 or more workers in Argentina, Bolivia, Chile, Colombia, Ecuador and Uruguay; firms with 30 or more workers in Brazil and Chile. The time periods covered are as follows: Argentina 1997-2002, Bolivia 1988-2001, Chile 1996-2006, Colombia 1982-1998, Ecuador 1995-2005, El Salvador 2005, Mexico 2004, Uruguay 1997-2005, United States 1977-1997.
Source: Busso, Madrigal and Pagés (2013), Productivity and resource misallocation in Latin America, *The B.E. Journal of Macroeconomics*, https://doi.org/10.1515/bejm-2012-0087.

The historical experiences of Latin American countries can shed some light on the extent to which these productivity effects have materialised in the past. A recent review of the large literature on the impact of trade liberalization on firm productivity finds that especially in Latin America, the measured effects have been particularly positive (Shu and Steinwender, 2019[29]).[2] In particular, evidence suggests that trade integration in Latin America has been able to enhance the productivity and competitiveness of firms through cheaper and better imported inputs, which in turn allows these firms to pay higher wages (Amiti and Konings, 2007[10]; Goldberg et al., 2009[30]).

In Chile, which exhibited a strong commitment to free trade since the late 1970s, the productivity of plants in sectors that were opened to import competition grew between 3% and 10% more than in non-traded sectors (Pavcnik, 2002[17]; Bas and Ledezma, 2010[31]). This was accompanied by the exit for less productive plants, freeing up resources to be used elsewhere. Imported intermediate inputs also played an important role in lifting firm productivity during the Chilean liberalization episode (Kasahara and Rodriguez, 2008[32]).

Colombia undertook a significant trade liberalisation that reduced average applied tariffs from 27% in 1984 to 10% in 1998. This reform magnified the importance of firm productivity for the firm's ability to survive in the market (Eslava et al., 2013[33]). Existing plants in sectors with larger tariff reductions increased productivity the most. The increase in selection due to the tariff reduction explained a quarter of the productivity improvement in Colombia during the same period.

Mexico has signed trade agreements with 46 countries since its accession to GATT in 1985 and NAFTA in 1994, underlining its strong commitment to trade openness.[3] As a result, Mexico has experienced strong growth in export-oriented manufacturing which represents 89% of exporting in 2019 creating employment opportunities for wide swaths of the population (OECD, 2017[34]).

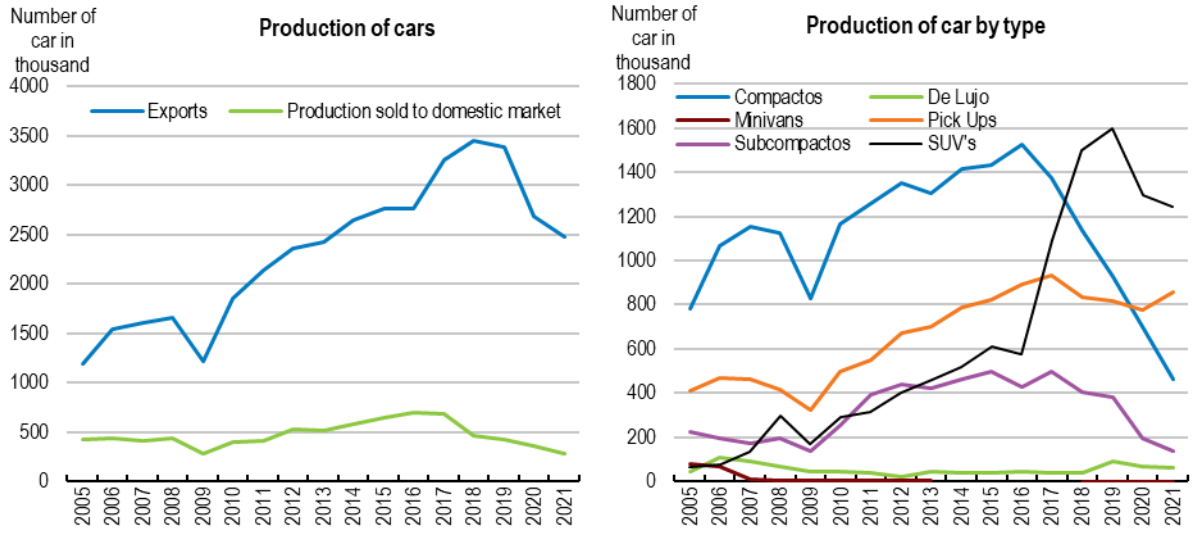
[2] Positive effects on firm productivity and innovation are found in this review among others for Brazil, Chile, Colombia, and Mexico.

[3] https://www.gob.mx/se/acciones-y-programas/trade-and-investment

An example of this success story is Mexico's car industry. Even though foreign car manufacturing has been present in Mexico since the 1960s, the last two decades have seen significant cumulative FDI making the car industry a consistent contributor to export growth (OECD, 2017[34]). As export opportunities expanded, production technologies were updated, the industries skill demand increased and the quality of its output improved (Verhoogen, 2007[35]), Figure 3.2). This led to higher white-collar workers wages and higher returns on education.

On domestic product markets, the entry of the US retailer Walmart in Mexico reinvigorated competition among its suppliers, bringing down profit margins and reallocating market shares to the suppliers that were able to match its quality standards (Javorcik, Keller and Tybout, 2008[36]; Eckel et al., 2015[37]). More recently, the efforts of Mexican authorities have focused on diversifying away from integration with the United States which makes up two thirds of the value added of Mexican exports, leaving the Mexican economy highly exposed to US supply shocks (OECD, 2017[34]).

Figure 3.2. Mexico's car industry: A success story



Source: INEGI Mexico, and OECD, *2017 Mexico Survey*, Box 2.1, p. 95.

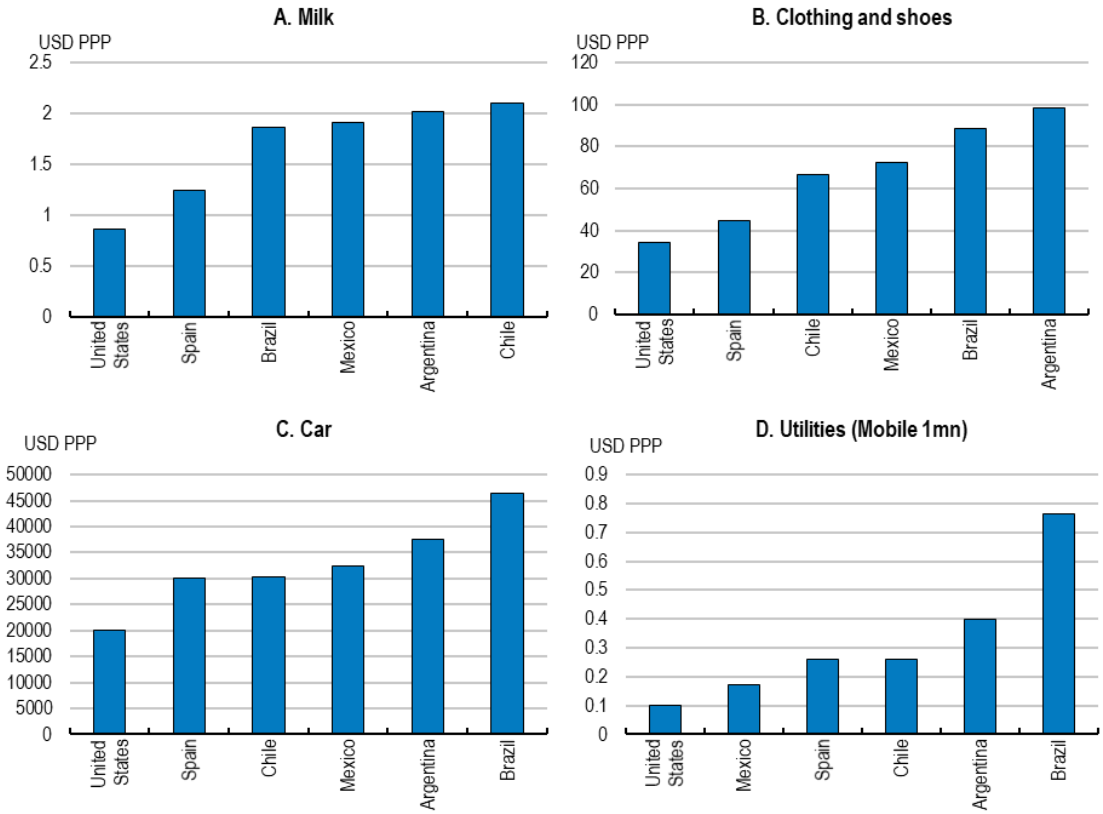
Costa Rica's strong commitment towards trade openness has been key to attract foreign direct investment and move towards activities relying more on skilled human capital and intangible capital. Free trade zones play a central role in this successful diversification strategy and there is multiple evidence for positive spillovers between foreign-owned firms and domestic firms (OECD, 2020[38]; Alfaro-Urena, Manelici and Vasquez, 2020[39]; Sandoval et al., 2018[40]).

Even firms in Brazil and Argentina, countries that are less integrated into international trade flows, have benefitted from past integration episodes. In the wake of the introduction of Mercosur, Brazilian tariffs applied to imports from Argentina fell from an average of 29% in 1992 to zero in 1995 (Bustos, 2011[41]). Subsequently, Argentinean exports to Brazil quadrupled and more Argentinean firms entered the Brazilian market. In sectors with larger tariff reductions Argentinian exporters increased their spending on productive technologies by more than in sectors with smaller reductions. While regional integration within the European Union is much deeper, this evidence of positive effects of Mercosur on the car industry has traits of the large positive effects of the European single market. On the Brazilian side the reduction of tariffs on exports during the 1990s also led to market share reallocations and productivity increases at incumbent firms in the affected sectors (Cavalcanti and Rossi, 2003[18]; Schor, 2004[19]; Muendler, 2004[42]). The entry of Chinese products to the Brazilian market after China's entry into the World Trade Organization in 2001 had an additional procompetitive effect that raised the productivity of Brazilian firms, albeit with a negative impact on product innovation (Mesquita et al., 2020[43]).

3.2. Benefits for domestic consumers and prices

While households are affected principally in their capacity as income earners through the growth and productivity effects outlined above, they also face short-run, partial equilibrium effects as consumers. Where foreign competition is limited through trade barriers, these act as taxes on imported goods and create room for economic rents or slack among domestic producers. In both cases, the result can be higher domestic prices. In some LAC economies, prices for tradable goods can be substantially higher than in other countries (Figure 3.3). For example, a 2017 Toyota Corolla passenger car costs 40% more in relatively closed Brazil than in the more open Mexico, which like Brazil is a producer of this model.

Figure 3.3. Some LAC economies have relatively high prices for several tradable goods

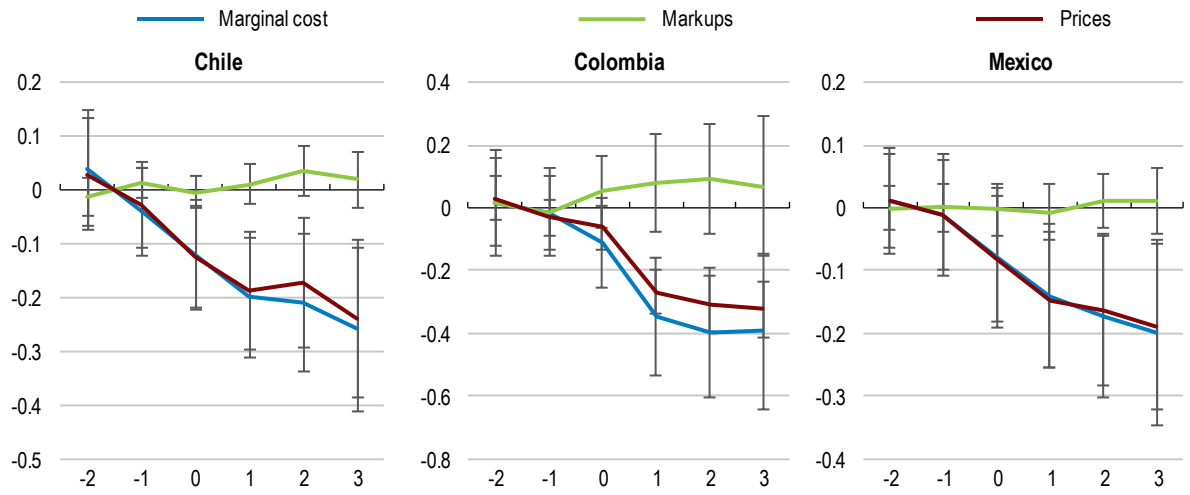


Note: Clothing and shoes prices are proxied by the price of a dress in a chain store. Car prices are proxied by the price of a Toyota Corolla or equivalent new car. Mobile prices are those of 1 min. of prepaid mobile tariff local. Prices are converted to PPP dollars by using conversion rates published in IMF's *World Economic Outlook*.
Source: Numbeo database.

StatLink http://dx.doi.org/10.1787/888933656346

Evidence suggests that when trade has strengthened foreign competition in Chile, Colombia and Mexico during the late 1990s and 2000s, consumers reaped substantial benefits, as trade-induced productivity enhancements were passed on to consumers in the form of lower prices (Figure 3.4; (Garcia-Marin and Voigtländer, 2019[44]). This kind of evidence requires carefully separating improvements to technical efficiency from pricing decisions, an exercise that will not always be possible due to data constraints.

Figure 3.4. Productivity enhancements after trade liberalizations were passed on to consumers



Note: Event study estimates of price, marginal cost and markup (De Loecker, Warzynski, 2012 methodology) around the date of entry into exporting of manufacturing firms for Chile, Colombia and Mexico. Chile data: ENIA 1996-2007, Colombia: EAM 2001-2013, Mexico: EIM and EIA 1994-2003.

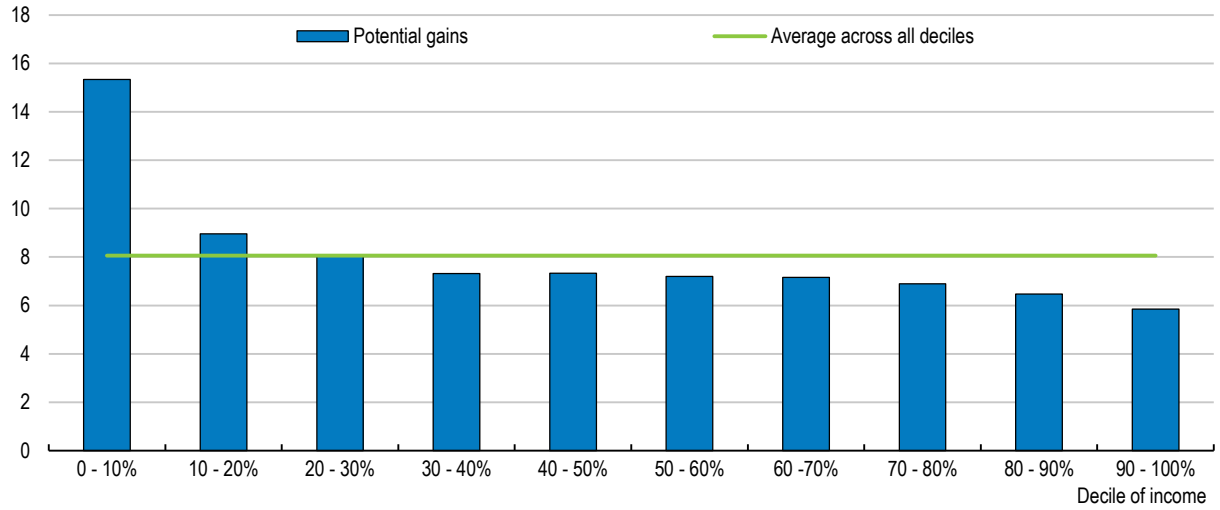
Beyond boosting average purchasing power, there will also be distributional effects across different groups of consumers. For example, households with different levels of income consume goods at different intensities, so price changes related to international trade will affect different groups of households differently. Several studies have analysed the effect of trade from this perspective (Fajgelbaum and Khandelwal, 2016[45]; Atkin and Donaldson, 2015[46]). They focus on how international trade affects individuals through the expenditure channel and conclude that trade is pro-poor as the relative prices of goods consumed more intensively by the poor fall more. Analyses of the incidence of tariffs themselves across the income distribution are less frequent. But existing studies conclude that tariffs tend to have a regressive effect (Furman, Russ and Shambaugh, 2017[47]; Porto, 2006[48]; Luu et al., 2020[49]) (Furman and Shambaugh, 2017[50]; Porto, 2006[51]).

Evidence suggests that consumers benefit from deeper trade integration through lower prices and a larger variety of available goods (Amiti, Redding and Weinstein, 2019[52]; Grundke and Arnold, 2019[53]). Since low-income households spend a proportionately higher share of their income on traded products such as food, home appliances, furniture and clothing, they disproportionately benefit from the lower prices often associated with lower trade barriers (Grundke and Arnold, 2019[53]; Fajgelbaum and Khandelwal, 2016[45]; Porto, 2006[51]).

An analysis based on Brazilian household survey data reveals similar results (OECD, 2018[13]). Reducing tariffs would result in income gains across the entire income distribution, but the largest benefits of the tariffs cut would accrue to lower income households (Arnold and Grundke, 2021[54]). In a potential scenario of tariffs being reduced to zero, the purchasing power of the poorest households, i.e. those in the lowest income decile, would increase by 15% (Figure 3.5). Overall, average household income would increase by 8%. The marked pro-poor feature of the tariff reduction is explained by the fact that lower income households spend more on traded goods as a share of their income. In addition, the higher tariffs are placed on key consumer goods, such as food, home appliances, furniture and clothing, which represent a relatively larger share in the consumption basket of lower income families. Thus, from a consumption perspective, the Brazilian tariff structure is clearly regressive and reducing tariffs would contribute to reduce income inequality.

Figure 3.5. Reducing tariffs would benefit especially low-income households in Brazil

Potential gains in purchasing power by deciles of income distribution



Source: Arnold et al. (2018).

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3.3. An overview of trade policies in Latin American economies

The region's limited engagement in international trade flows is likely related to several factors, some of which can be influenced by policies and others not. Distance from major economic centres and economic remoteness may be a factor for some parts of the region, although certainly not for others such as Mexico. Distance is also less relevant for non-tourism services exports. Geography can of course not be altered by policies, although infrastructure investments can affect the cost associated with economic distance and are being addressed (CAF, 2022[55]). A salient policy lever, however, is trade policy. Where trade barriers augment the costs of cross-border trade relations, this is likely to put limits on both imports and exports, as access to high-quality imports is often a precondition for successful export performance.

Countries in the region show strong heterogeneity with respect to applied tariffs, a key trade policy instrument (Figure 3.6. Applied tariffs in some countries are still high

). While Mexico and Chile apply rates of less than 1% on average, average applied rates in Argentina and Brazil exceed 12%. For the case of Brazil, this high level of protection by international standards reflects the absence of trade policy reforms since its broad-based tariff reductions at the beginning of the 1990s (Grundke et al., 2021[56]). These barriers to trade are high compared to those of other emerging economies outside of Latin America.

Besides tariffs, many Latin American countries continue to limit trade and investment with non-tariff measures (NTMs). While typical NTMs, such as standards, technical regulations and conformity assessment procedures, are not normally aimed at discriminating against imports[4] they can have unintended effects on trade when they are more restrictive than necessary to achieve their policy objective or when diverging national standards are used to achieved the same policy objectives. They have proven to impose disproportionate costs on trade in GVCs which relies on timeliness and often involves operations and transactions across multiple countries. Cadestin et al., (2016[57]) estimated that on average, NTMs used by Latin American countries impose additional costs equivalent to a tariff of 20% for primary intermediate products and 12% for processed intermediates and that their incidence is correlated negatively with GVC participation. They also estimated that Latin American countries where NTM

[4] Given their consumer protection or other public policy objectives, usually the same standards and requirements apply to domestically produced and imported products.

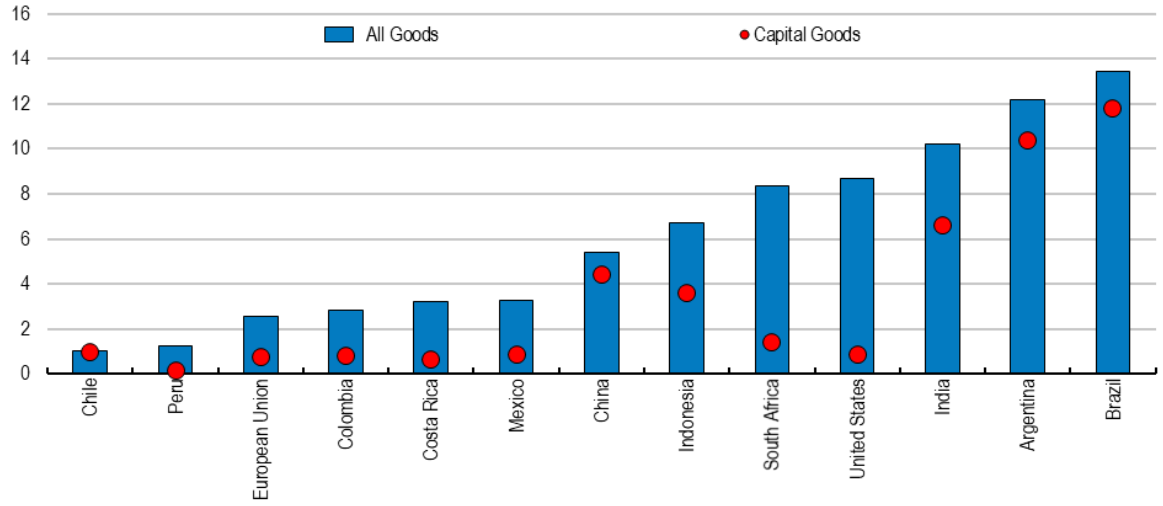
restrictiveness with respect to intermediate trade is high and which do not have appropriate NTM-related provisions in their preferential trade agreements are generally less integrated into GVCs.

The OECD's product market indicator database confirms that Brazil, Mexico, Argentina, Colombia and Costa Rica maintain some of the highest non-tariff barriers to international trade compared to OECD countries. Some countries also apply restrictive rules when it comes to the participation of foreign firms in public procurement (Figure 3.7). Reducing domestic content requirements in public tenders could be a way to increase the efficiency of public spending and service provisions (OECD, 2018[13]). Barriers to FDI are relatively elevated in Mexico and Brazil and reducing them could be a way to enhance knowledge spillover that the import of foreign capital tends to bring.

Latin American countries maintain a large number of trade agreements both between each other and outside the region. However, the existing trade agreements between Latin American countries are relatively shallow in that they achieve harmonisation of regulations and practices only in a narrow range of topical areas. Indeed, the overlap, duplication and conflicts among the different rules and standards governing trade under these agreements have been estimated to reducing the benefits of these agreements (Cadestin et al., 2016[57]). In the late 2010s, this has prompted renewed interest in the idea of linking, harmonising and deepening the various Latin American agreements. Fontagné, Rocha, Ruta, Santoni (2021[58]) classify trade agreements worldwide according to their depth. Of the 36 agreements between LAC only two are 'deep' by world standards (Andean Community, Peru-Mexico agreement), whereas 8 are 'medium' and 26 are 'shallow'. Of the 61 extra-regional trade agreements encompassing LAC countries, only four (NAFTA, Canada-Chile, EFTA-Chile, Chile-Japan) are classified as 'deep'. Broadening the scope and depth of existing trade agreements could therefore be a fruitful way forward for Latin American countries to reap the benefits of regional and global integration.

One specific area of possible harmonisation that received a lot of attention are rules of origin (RoO), which the provisions in trade agreements that establish the conditions that a product must satisfy to be deemed eligible for preferential access to member countries' markets. In the world of GVCs, where products from countries outside of the agreement can serve as inputs into products of participating countries, RoO can have negative consequences not only for extra but also intra-agreement value chain formation. Cadestin et al., (2016[57]) estimated that RoO in agreements of Latin American countries undo more than 15% of the potential positive trade effect of these agreements, particularly for intermediate products (30%). On average, RoO are estimated to have tariff equivalents of around 9% for both intra- and extra-PTA imports of intermediate products. Average MFN tariffs on intermediate products are below this threshold in more than 60% of Latin American countries, which suggests that in many cases the average protection that these tariffs afford to intra-PTA input providers may be less than the cost of administering preferential market access through RoO. MFN liberalisation of tariffs on intermediate products could thus be a cost-efficient way of alleviating the problems related to RoO and stimulating both intra- and extra-PTA value chains. Other viable – although more costly – initiatives include harmonisation of existing product-specific RoO or renegotiation and improvements to overall RoO architecture (Cadestin et al., 2016[57]).

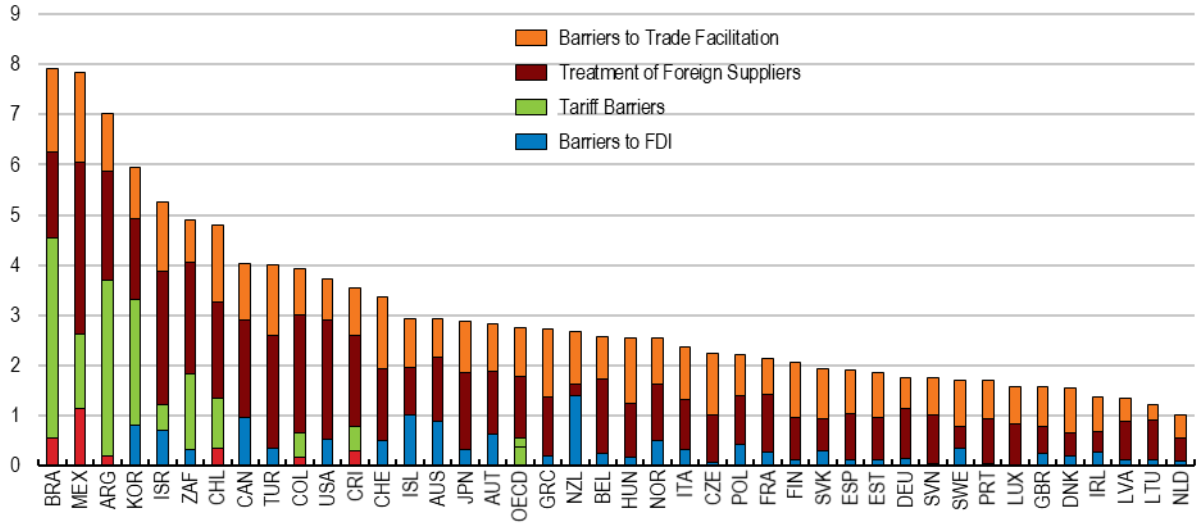
Figure 3.6. Applied tariffs in some countries are still high



Source: WITS, 2019 or latest.

Figure 3.7. Barriers to trade and investment are high in Latin American countries

OECD Product Market Indicator, 2018



Note: The indicator on differential treatment of foreign suppliers measures the level of discrimination that foreign firms may experience when participating in public procurement processes, and the barriers to entry that foreign firms may experience sectors relative to domestic firms in key network and service. "Tariff barriers": reflect the value of a cross-product average of effectively applied tariffs. The source of the relevant information is the UNCTAD Trade Analysis Information System database. "Barriers to trade facilitation": measures the level of complexity of the technical and legal procedures for international trade, ranging from border procedures to the simplification and harmonization of trade documents. This indicator reflects the value of the average of a subset of the Trade Facilitation Indicators developed by the OECD Trade and Agriculture Directorate. "Barriers to FDI": measures the restrictiveness of a country's FDI rules in 22 sectors in terms of foreign equity limitations, screening or approval mechanisms, restrictions on the employment of foreigners as key personnel and operational restrictions. This indicator reflects the value of the FDI Restrictiveness Index developed by the OECD Directorate for Financial and Enterprise Affairs.
Source: OECD Product Market Regulation Indicators, available at https://www.oecd.org/economy/reform/indicators-of-product-market-regulation/

3.4. Complementarities with domestic policies

Certain domestic policies can be catalysts for Latin American countries of reap the benefits of a tighter integration into the world economy. Domestic policy reforms can not only support participation in international trade, but they can also facilitate adjustment processes that often take place during episodes of rising internationalisation of an economy[5] on in the face of economic shocks transmitted through GVCs.

3.4.1. Infrastructure

One area with particular ramifications for exporting activities is transport infrastructure. Often, infrastructure shortcomings act in the same way as trade policy barriers, by adding to the costs of importing and exporting. Evidence suggests that improvements in transport infrastructure can amplify the productivity enhancements of tariff liberalization (Fiorini, Sanfilippo and Sundaram, 2019[59]).

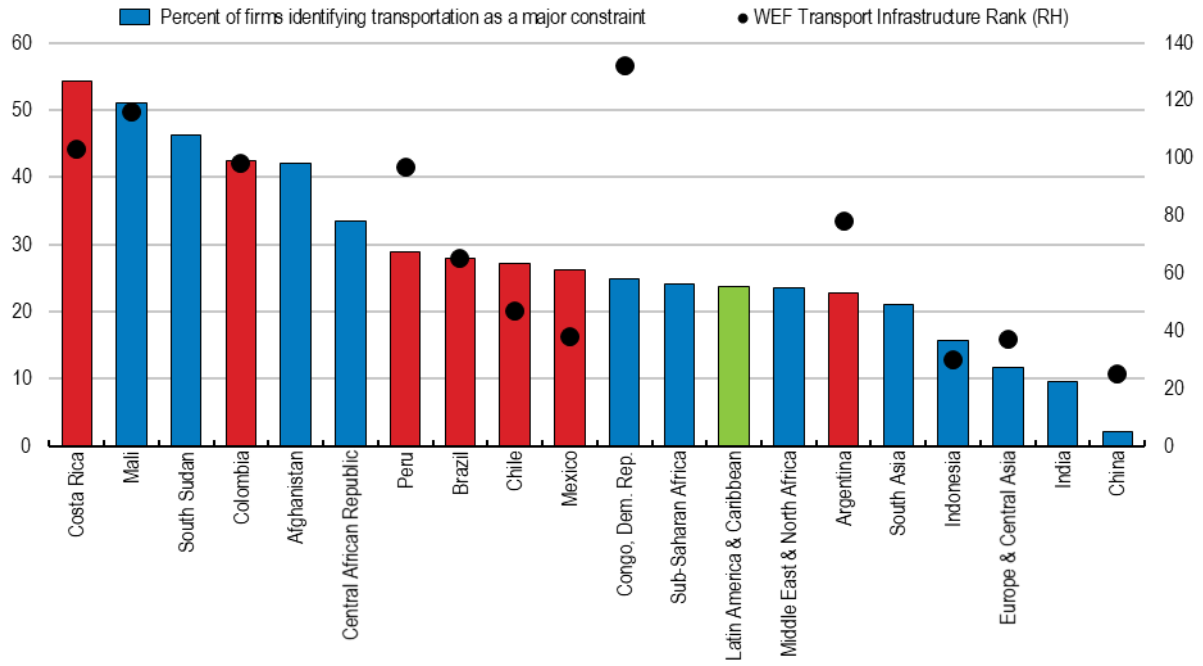
Latin American countries show scope for improvement in the World Economic Forum's ranking of transport infrastructure (Figure 3.8). Out of 152 countries in the raking, Costa Rica, Colombia and Peru rank 103rd, 98th and 97th respectively. Mexico, the highest ranked Latin American country, still ranks lower than large Asian countries, such as Indonesia. This shortfall in infrastructure capacity can be a large obstacle for businesses when it comes to bringing their goods to the market. 52% of firms in Costa Rica and 42% of firms in Colombia indicate that transport is a major constraint to their business, with slightly lower percentages in Peru, Brazil, Chile, Mexico and Argentina, but still above emerging Asian economies such as India and Indonesia. On average, the percentage of Latin American countries mentioning transport as a major constraint to their business (24.8%) was on par with Sub-Saharan Africa (24.2%) in the latest waves of the survey.

The infrastructure shortfalls experienced by producers translate into high transportation costs. Recent studies find that in Colombia bringing a good from the place of production to the seaport represents 5% of the goods price while shipping it to its final overseas destination represents only 4.5% (Garcia et al., 2017[60]). In Brazil, the transport cost of soy beans, the country's most important export commodity, are three times higher than in the United States when exporting to China (OECD, 2018[13]). This hampers the competitiveness of actual and potential Latin American exporters.

In the past, investments have often fallen short of bridging these substantial infrastructure gaps. Estimates for Brazil, for example, indicate that from 2016 to 2019, infrastructure investments have fallen short of depreciation, with only slight improvements in 2020 (de Castro Souza and Cornelio, 2020[61]). Similar figures for Costa Rica show that between 2002 and 2013, investment in transport infrastructure at 0.8% of GDP was less than the OECD average (Pisu and Villalobos, 2016[62]). But there are also encouraging examples of countries pushing aggressive investment programmes in transport infrastructure. Since 2014, Colombia has pushed for the upgrading of its road and fluvial infrastructure. The USD 8.4 billion program, which has been financed as a public-private partnership of the Colombian government, private investment firms and multilateral-lending organizations, has reached 60% completion at the end of 2021 and is expected to significantly reduce transportation times and cost. For Latin America as a whole, there are tentative signs of progress, as the extension of roads relative to the territory increased by 8% from 2007 to 2019 (ECLAC, 2020[63]).

[5] A recent report by the OECD reviews the existing literature on how policy reforms have managed to support structural change of economies (Grundke and Arnold, 2022[121]).

Figure 3.8. Transport Infrastructure is an obstacle to trade integration in Latin America



Note: The WEF transport infrastructure rank is composed of objective measures of transport capacity and the subjective impressions of service quality of experts in the transport modes road, rail (where available), air and sea (where available).

The limited fiscal space, severely aggravated by the COVID-19 pandemic, is severely constraining the scope for public investment in many Latin American countries. This will require careful prioritization, including coordination at the central government level in federal countries, transparency in project selection and thorough project planning. Crowding-in private investment has been a successful avenue in several countries in the region, for example through concessions of private-public partnerships.[6] In the latter case, recording all future contingencies from public private partnerships on-budget is key for achieving value for money and ensuring transparency.

3.4.2. Social protection

Periods of opening up to international trade typically combine strong medium-term benefits, such as more and better jobs, with short-run adjustment costs as jobs will be lost in some firms, sectors and regions, and created in others. For example, opening up to trade may raise unemployment in the short run but shows no or a negative effect on the unemployment rate in the long-run (Dutt, Mitra and Ranjan, 2009[64]; Felbermayr, Prat and Schmerer, 2011[65]). More specifically, there may be a lag between the loss of jobs in import-competing sectors and later job creation in exporting sectors, raising the unemployment rate during the transition (Menezes-Filho and Muendler, 2011[66]; Hoekman and Porto, 2010[67]; Autor, Dorn and Hanson, 2016[68]). Effective social safety nets can cushion the adjustment cost for individual workers as they make this transition from less productive into more productive jobs.

Social protection is significantly weaker in LAC than in advanced economies, with few countries offering well-functioning unemployment subsidies, while informal employment is widespread. This backdrop raises particular challenges for mitigating the short-term effect on workers. Effective income support measures should be put in place to offset the income losses that some households may face in the transition. Cash-transfers that are not tied to formal employment, for example, have been effective in preventing families from falling into poverty across the region (Stampini and Tornarolli, 2012[69]). To act as effective backstops

[6] The OECD Principles for Public Governance of Public-Private Partnerships provide guidance to policy makers on how to make sure that Public-Private Partnerships represent value for money for the public sector. For more, see https://www.oecd.org/gov/budgeting/oecd-principles-for-public-governance-of-public-private-partnerships.htm.

against income losses, however, these transfers should be targeted to all households in need, including those experiencing reallocation, and benefit enrolment should be sufficiently rapid, avoiding long waiting lists.

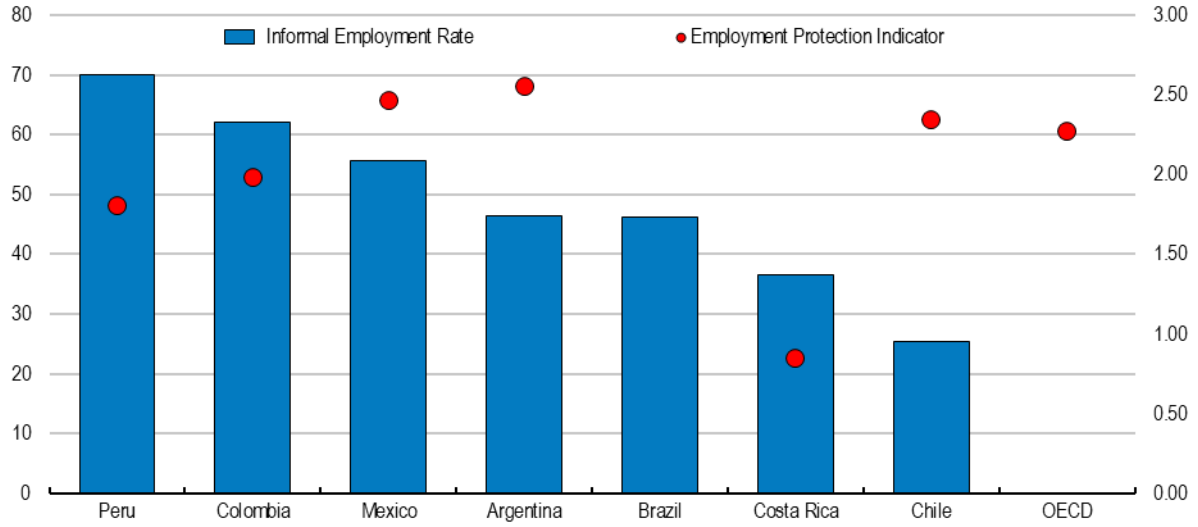
3.4.3. Labour markets

Many studies emphasize the that the combination of flexible labour markets and a robust social safety net can smooth the reallocation of workers during the process of tariff liberalization (OECD, 2011[70]; OECD, 2006[71]). Labour market flexibility facilitates the reallocation of workers to more productive activities during structural changes in the economy such as tariff liberalizations and during adjustments to shocks. Job reallocations are key to avoid keeping resources trapped in sectors and activities with diminishing prospects for future success, and to free resources for new, more productive ones.

Many labour markets in Latin America are characterized by fairly rigid regulations on formal labour markets, often combined with minimum wage levels that are comparatively high relative to average or median wages. Formal-sector employment protection legislation in most Latin American countries is on par with other OECD economies except in Costa Rica where employment protection is the lowest in all OECD economies.

These formal labour markets tend to co-exist with persistently high levels of labour informality, often subject to no regulations and very limited social protection benefits. Informality, which usually entails the absence of health and social security benefits, minimum wage constraints and employment protection, affects between 70% of the labour force in Peru and 25% in Chile (OECD, 2021[72]). By comparison, most high-income economies have informality rates of below 20% (ILO, 2018) and countries in African and Central Asia with income levels similar to Latin American generally have informality rates below 50% (ILO, 2018[73]).

Figure 3.9. Formal employment protection in LAC is on par with OECD countries, but informal employment is wide-spread



Note: The OECD Employment Protection Index for 2019 incorporates protection against collective and individual dismissal. Informal Employment data is not available for most OECD countries. Informal employment for 2020; 2019 for Colombia
Source: OECD, ILO Stats.

Labour market informality has many causes, including low skills among informal-sector workers, cumbersome regulations in the formal sector, high non-labour costs and weak law enforcement. One powerful way to boost formal job creation is to reduce non-wage labour costs, for example by financing social security benefits for formal workers from general taxation revenues rather than social security contributions, which act as a tax on formal labour (OECD, 2022[74]) OECD Economic Survey of Chile,

forthcoming). As a result, the common setup where social protection for formal workers is financed through labour charges often generates a vicious circle where informal workers are excluded from most benefits, while informality is perpetuated by high non-wage costs that finance formal-sector benefits (Levy and Cruces, 2021[75]; Meléndez, Alvarado and Pantoja, 2021[76]; IMF, 2021[77]; OECD, 2019[78]). Reductions in non-wage costs have proven an effective catalyst of formalisation in a 2012 tax reform in Colombia (Morales and Medina, 2017[79]; Fernandez and Villar, 2017[80]; Bernal et al., 2017[81]; Kugler, Kugler and Herrera-Prada, 2017[82]).

Reforms in the labour market can help in the context of trade integration, for example by strengthening incentives for formal job creation in expanding sectors and firms, or by reducing hiring costs and thus bolstering export competitiveness. This would reduce the extent to which the burden of short-term adjustment would fall onto the informal sector. An adjustment on the back of informal employment has been a common form of adjustment to shocks in the face of segmented labour markets in Latin America, both when firms exposed to foreign import competition reacted by shedding jobs or replacing formal with cheaper part-time and subcontract workers in informal work arrangements (Goldberg and Pavcnik, 2003[83]; World Bank, 2019[22]), or when non-tradable and service sector activities with higher informality rates partially absorbed the initial trade-induced shock to employment.

Beyond the short run, international trade may itself be a driver of formalisation, as jobs created in exporting firms are more likely to be formal and to pay better. Argentinian exporters, for example, pay 31% higher wages than non-exporters (Brambilla, Depetris Chauvin and Porto, 2017[84]). Analysis for the case of Brazil suggests that the reduction of informality induced by a trade opening would be one of the principal channels through which trade can raise productivity (Rafael Dix-Carneiro et al., 2021[85]).

3.4.4. Professional training and skills policies

As an economy embraces trade, the resulting structural changes may require new skill profiles. When moving towards more productive positions workers usually need to upgrade their skills. For many low skilled and informal workers this may mean acquiring literacy and numeracy skills in adult education courses (Bechichi, 2018[86]; OECD, 2020[87]). For another set of workers training in job-specific skills will be required to facilitate inter-industry transitions (Blyde and Fentanes, 2019[88]). Even workers who remain in their jobs will likely need skill upgrading as firms change to more advanced production technologies and increasingly use high-quality imported inputs (Hummels et al., 2012[89]; Becker and Muendler, 2015[90]; Becker, Ekholm and Muendler, 2013[91]). The need for upskilling makes job training is an essential complementary policy to trade opening.

Currently, most Latin American countries spend less than the OECD average on training measures (Figure 3.10). Only Colombia, at 0.28% of GDP, outspends the majority of OECD countries when it comes to worker training. Compared to other active labour market measures, vocational training and adult learning programmes have been shown to be particularly cost effective in the long run as benefits accumulate (Brown and Koettl, 2015[92]).

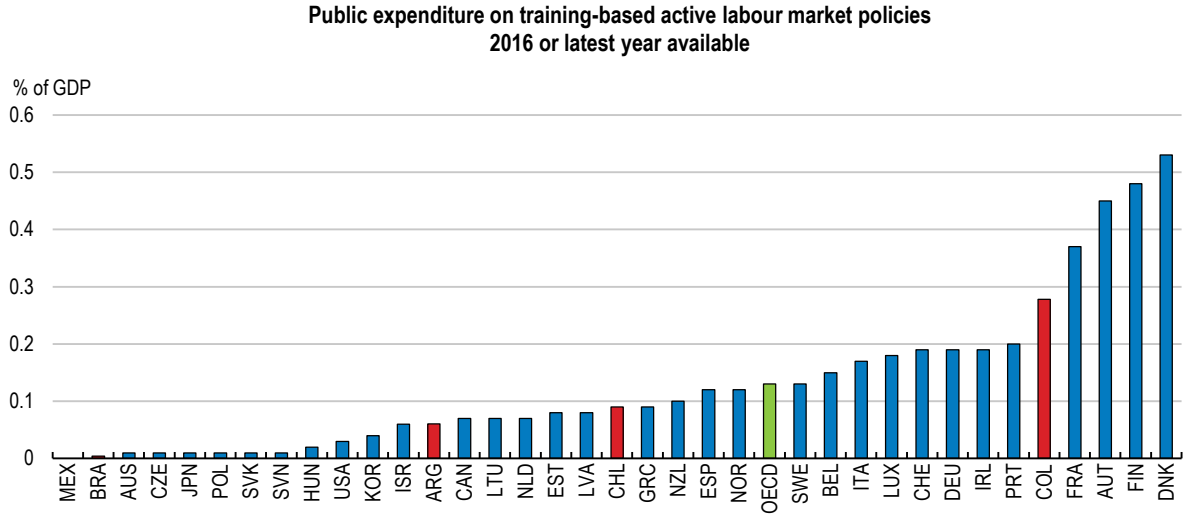
A successful design of training programs requires close alignment with the skill demands of local firms, which has not always been the case. In the context of Brazil's PRONATEC training programme, for example, training suppliers had financial incentives to set up substantial training capacities in professions that were easy to teach rather than in high demand, while local firms continued to face difficulties hiring staff with technical skills (Box 1) (OECD, 2018[93]). The experience of Peru's *Construyendo Perú* public works and training program echoes that of Brazil's PRONATEC, as its training was poorly targeted to the skill needs of its participants and local labour market conditions, resulting in low uptake (ILO, 2016[94]).

Getting the private sector on board and ensuring close collaboration in content design and implementation of training programs is a key message from these experiences (O'Connell et al., 2017[95]; OECD, 2018[93]). In fact, within Brazil's large-scale training programme PRONATEC, the small fraction, referred to as PRONATEC-MDIC or SuperTec, that was organised by the Ministry of Industry (MDIC), did not suffer from misalignment with labour market demands, as courses were set up in response to requests by local firms.

Using household data, significant employability effects could be identified for PRONATEC-MDIC (OECD, 2020[8]; Grundke et al., 2021[56]). Vocational training courses targeted to local skill demands have narrowed the gap in employment growth between regions that were more exposed to international trade and those

less affected by around 50%. Other types of training courses, by contrast, had much smaller effects on employment growth. In many cases, the effects were negligible, highlighting the importance of targeting.

Figure 3.10. Spending on worker training in Latin American countries is usually lower than in OECD countries



Source: Grundke, Arnold (2019), OECD, ILO.

Box 1. Training targeted to local skill demands can mitigate adjustment costs for workers

Brazil's PRONATEC programme was a government-led initiative that strongly expanded the offer of short-term vocational training courses for workers from 2011 onwards. Training subsidies targeted particularly the poor and low-skilled parts of the population including informal and unemployed workers. The regional coverage was extensive and included many poor and remote areas.

The Ministry of Education coordinated the programme, but other ministries could request training courses for specific localities and select training participants (OECD, 2018[93]). There were no guidelines to collaborating ministries on how to identify training needs in their respective areas of intervention. Most ministries organised their requests centrally without consulting regional and local authorities. This resulted in many courses not meeting the skills required by recruiting firms in local labour markets and not addressing individuals' actual re-skilling needs (O'Connell et al., 2017[96]; OECD, 2018[93]).

The Ministry of Industry (MDIC) was the only PRONATEC partner that developed a systematic method to assess and anticipate skills needs before submitting course requests. Their method explicitly took into account the location, scale and skill content of firms training needs, and training classes started in 2013. Initially, staff at MDIC contacted firms in different sectors and locations informally to enquire about their training needs. At a later stage, MDIC developed a web platform called "SuperTec" where employers could register and provide information regarding their skills needs and the volume of training desired. The platform significantly increased the efficiency of the information collection procedure. As a result, training courses demanded by MDIC were demand-driven, as opposed to the courses from other collaborating ministries (O'Connell et al., 2017[95]; OECD, 2018[93]).

Source: OECD (2020[97]).

4. LAC's exposure to shocks in global value chains

4.1. Efficiency and risks in GVCs

The economic shocks of the COVID-19 pandemic, and most recently the ramifications of Russia's aggression against Ukraine, have reinvigorated the debate on whether the benefits of production in global value chains (GVCs) outweigh the associated risks and what might the best ways of tackling these risks.

The geographical fragmentation of production inherent to GVCs has been a source of significant productivity gains and it has allowed greater participation in the global economy of smaller actors specialised in specific tasks, most notably smaller firms and participants from emerging and developing economies (Baldwin, 2011[98]). GVCs are also channels of international technology transfer and they allow pooling together larger sets of capabilities which are essential for production of more sophisticated and diversified products (Hausmann, 2013[12]). Characterised by high levels of specialisation and depending vitally on seamless flows of material inputs, services and personnel, GVCs can, however, also entail certain risks: they can create critical dependencies on specific suppliers and transmit economic shocks (Freeman and Baldwin, 2021[99]). At the same time, in the face of some shocks, GVCs can also support resilience, as it may be easier to manage inventories of materials and finished products, reconfigure or relocate just a segment of a supply chain, or switch to another supplier, rather than overhaul a whole production process (e.g. Lafrogne-Joussier (2021[100]).

At the beginning of the COVID-19 pandemic, it might seem supply chain risks materialised for many countries when they found it difficult to source masks, respirators and other medical equipment from countries which specialised in their production and where factories were unable to cope with surging demand and were in some instances shut due to lockdowns. The initial medical products shortages were resolved relatively quickly but in 2021 the world economy started to show symptoms of broader disturbance of global production and trade due to COVID-19 response measures. Due to the spread of lockdowns, border closures, disruptions of transport and logistics, and significant shifts in consumer demand and government spending, shipping rates soared as schedules had been disrupted and backlogs accumulated, and containers were out of place and retailers were unable to source from Asia (Financial Times, 2021[101]). Supply disruptions were reported for a wider range of products such as, for example, plastic, glass, lumber or semiconductors, and in related downstream industries such as construction and automobiles. Trade policy tools were also used at various stages of the pandemic by some countries to facilitate the importation of medical equipment while other countries took measures to restrict their exports (Arriola et al., 2020[102]). It was estimated that half of these measures remained in place in most OECD countries as of October 2021 (Global Trade Alert, 2021[103]).

Supply chain disruptions have become one of the key themes discussed in media and policy circles during the COVID-19 pandemic. However, it is not clear to what extent the supply problems seen during the pandemic were due specifically to what might be called insufficient resilience of supply chains[7] and indeed whether the shortages would have been any smaller with less internationally fragmented supply chains.[8] In several cases, GVCs reconfigured swiftly to address the new realities (increases of imports exceeding 1000% over just three months in some cases), for example, when it came to supplying masks, tests and vaccines, home-nesting products and semiconductors (OECD, 2022[104]) and (Arriola, Kowalski and van Tongeren, 2022[105]). Still, the heterogeneity of changes in trade flows across products, sources and destinations seen during the pandemic does suggest an increased uncertainty and high adjustment costs (Arriola, Kowalski and van Tongeren, 2021[106]). Russia's recent aggression against Ukraine is acting as a "multiplier in an already disrupted world".[9] The war and the sanctions imposed by several countries on

[7] For example, emerging empirical research suggests pressures on some supply chains were aggravated by unprecedented shifts in consumer demand and policy interventions affecting the functioning of factor, product markets (Arriola, Kowalski and van Tongeren, 2022[6]).

[8] In several cases, GVCs faced reconfigured swiftly to address the new realities (increases of imports exceeding 1000% over just three months in some cases), for example, when it came to supplying masks, tests and vaccines, home-nesting products and semiconductors (Arriola, Kowalski and van Tongeren, 2021[106]).

[9] "War in Ukraine is causing a many-sided economic shock", *Financial Times*, 26 April 2022, https://www.ft.com/content/d4bde497-edbf-4baa-bfa3-d06b07c63f79.

Russia are already resulting in disruptions of supplies of several agricultural commodities, natural resources as well as steel and a number of other manufacturing products. Both the pandemic and the war imply an increased need – and incentives – for consumers, firms and governments to adopt new or intensify existing risk mitigation strategies

Since the beginning of the pandemic, many governments have been considering new measures such as tightening domestic content requirements in government procurement and subsidizing industries considered critical to domestic production (White House, 2021[107]; European Comission, 2021[108]). Even though there have been few calls for blanket increases in tariffs, it is conceivable that the supply chain disruptions during the COVID-19 pandemic will also lead to demands for classic trade protection by interest groups. The geopolitical rifts which opened in the context of Russia's aggression against Ukraine also shed new light on the global economic interdependencies. These events have reminded us about the possibility of forming trading blocs based on geopolitics, where "like-minded" countries facilitate trade with each other while at the same erecting trade policy barriers on exchanges with the outside world, or where the private sector reorients the supply chains in similar ways to minimise political risks (WTO, 2022[109]). These new realities add to the more conventional calls for making supply chains more domestic or regional or located in 'friendly' countries (as in "friendshoring"), for example in order to improve their security and environmental and social sustainability.

Minimisation of supply chain risks is in the best interest of private profit-maximising firms. These firms invest in assessing risks in different segments of their business and manage their supply chains so as to, on the one hand, minimise the costly inventories of intermediate inputs and final products and, on the other hand, maximise continuity and reliability of supply of their products to clients in the face of shocks (e.g. (Lafrogne-Joussier, 2021[100]). In this sense, an efficient private sector is a key element of resilience in GVCs. However, private firms concentrate on risks specific to their business and may not fully account for systemic risks which matter from a public policy perspective. Such systemic risks are typically defined not at the level of specific firms but rather in terms of supply of specific essential products or viability of systemically important industries (e.g. OECD (2022[110]). Governments therefore also have an incentive to develop their view of systemic GVC risks and can play a useful role in identifying their potential sources, diagnosing the possible wider economic and social impacts and identifying the best policies that can minimise exposure to these risks (OECD, 2021[111]).

Relocalisation of supply chains closer to or within one's own country can be seen as a means to insulate the domestic economy from physically distant suppliers and buyers which are regarded as less reliable sources of supply or destinations of sales. Here, relocalisation may take the form of 'reshoring' where production is shifted to a domestic location or "nearshoring" where production is shifted to neighbouring, but still foreign, locations. While reshoring has been a long-standing policy consideration in rich countries, it has traditionally been justified on the grounds of repatriating manufacturing production and employment because of their posited large positive economic spillovers into the domestic economy rather than reducing the risks in GVCs (De Backer et al., 2016[112]). 'Nearshoring', especially if triggered by regional integration initiatives, may also have some positive aspects because it saves transport costs and supports FDI attraction. There is also evidence that integration with regional supply chains is often the first step of GVC integration for SMEs and firms from developing countries (Kowalski P., 2015[113])

While relocalisation and nearshoring by definition lower the exposure to shocks originating in remote production locations, they tend to decrease diversification and increase the exposure to the nearby countries which is already large for highly integrated economies. The case of Latin America may be different because of the documented relatively weak regional supply chain links, but the fact of relatively similar specialization of these economies (and thus low potential for diversification through nearshoring) remains.

In particular, in the case of reshoring, a supply shock to domestic producers may also come from domestic suppliers, in which case a reshored supply chain may be more and not less vulnerable in comparison to an open economy that can flexibly shift to imported intermediate products. Identifying which shocks--originating in which segment and location of a value chain—might be more destabilising for a given domestic industry is not straightforward. It depends on several structural factors, including on who the industry competes within domestic and international markets and where it sources its inputs from. Moreover, when relocalisation is driven by government policies such as tariffs and subsidies to domestic industry, its potential benefits must be weighed against the cost of the induced market distortions and lost efficiency as close by suppliers may not be the cheapest or the ones that have advantage in performing

specific tasks.[10] Consequently, while the problem of relocalisation has been often couched in the context of a purported 'trade-off' between insulation from shocks and economic efficiency it is not clear to what extent such a dichotomy actually applies.

Diversification of trade flows across goods and trading partners can be one way to mitigate risks. Whether such a strategy is a good way to increase export resilience from shocks more broadly depends, however, on whether shocks tend to be specific to certain sectors or to countries. While the traditional view is that sector-specific shocks are dominant, more recent evidence shows that country-specific shocks are at least as important as a source of volatility (Caselli et al., 2020[114]). When this is the case, a strategy that promotes trade openness generally in order to reduce the exposure to domestic shocks as well as a strategy of diversification across partner countries may be best suited to build resilience in supply chains.

There are, however, limits to risk mitigation through a diversification of suppliers and buyers. In particular, if shocks to suppliers suddenly become highly correlated as many industries have experienced over the course of the pandemic, diversification cannot achieve an effective risk reduction and may even create a false sense of security. Moreover, if production is structured such that an individual specialized component is essential for the final product, diversification across suppliers may be impractical or prohibitively costly for buyers when economies of scale are important in its production. An example is the semiconductor industry, where 56% of world supply in the first quarter of 2021 was produced by a single company, TSMC, in Chinese Taipei (TrendForce, 2021). Since semiconductors are essential in the production of everything from cars to toys, the mismatch between supply and demand during the COVID-19 pandemic has stalled numerous GVCs, leading Toyota, the world's largest carmaker to cut its annual production target by 3% (Financial Times, 2021[115]). Lastly, it is not yet clear whether diversification will emerge after the experience of the COVID-19 pandemic or which is the role of government policy. After the Tohoku earthquake and the ensuing tsunami on the Japanese east coast evidence on diversification is mixed with some studies pointing at diversification away from their primary suppliers in the automobile sector (Matous and Todo, 2017[116]), while others found no evidence of diversification or reshoring among automobile and electronics manufacturers (Freund et al., 2021[117]).

Beyond diversification or relocalisation, a strategy to increase resilience to supply or demand shocks is to increase inventories. At the national level, many countries are already keeping stocks of strategic resources, such as the US "Strategic Petroleum Reserve" established after oil shock of the early 1970s. At the firm level, higher levels of inventories have helped French exporters to buffer the dwindling supply of inputs at from China during the first months of the COVID-19 pandemic more effectively than a diversified set of suppliers (Lafrogne-Joussier, Martin and Mejean, 2021[118]). An advantage of stockpiling is that it does not require substantial "rewiring" of existing supply chains, but whether the necessary reconsideration of a "just-in-time" production model will take place remains to be seen.

4.1.1. Costs of relocalisation

To shed more empirical light on the costs and possible benefits of relocalisation, a recent OECD analysis used detailed trade and Trade in Value Added (TiVA) statistics to identify some of the potential supply chain bottlenecks (Arriola et al., 2020[102]). The analysis also used the OECD computable general equilibrium (CGE) trade model METRO (OECD, 2020[119]) to broadly compare economic efficiency and international transmission of trade cost shocks under different assumptions about countries' openness, support to domestic industries and flexibility of adjustments in GVCs at the global level. It found that policies that may result in more localised and less flexible value chains, are likely to be costly in terms of efficiency and do not necessarily offer more stability in the face of shocks. This is because in some circumstances openness, geographical diversification of sources of inputs and destinations of output in flexible GVCs offer better possibilities of adjustment to disruptions

The analysis considered two stylised GVC regimes: 'interconnected' and 'localised' economies. The interconnected economies regime used the model's conventional baseline, reflecting the world economy which includes the demand and supply changes resulting from the COVID-19 pandemic and accounting

[10] In addition, relocalisation necessarily discriminates between countries and is therefore hard to distinguish from protectionism more broadly. As countries have increasingly resorted to subsidies for exporters or import competing firms (Evenett, 2020[122])market distortions in the case of a broad push for GVC relocalisation may become less transparent, more targeted to specific firms and potentially easier to influence by domestic producers.

for most of the characteristics of GVC participation as reflected in the OECD's Trade in Value Added database. It further assumed the relatively low barriers to internationalisation of production we saw in the late 2010s would persist and adopted conventional modelling assumptions and standard supply, demand and trade elasticities. The localised economies regime, in turn, assumed an implementation of a suite of hypothetical and stylised relocalisation policy responses where national economies are less interconnected via GVCs due to a combination of higher import tariffs,[11] subsidies to domestic production[12] and have less flexible sourcing possibilities in GVCs.[13] To explore how the two regimes compare in terms of the propagation of or insulation from shocks, a stylized set of "supply chain" shocks were applied in the model. The spectrum of shocks considered in both these regimes included equally probable and spatially uncorrelated, increases and decreases in the cost of bilateral trade (for both imports and exports) between each country and all its trading partners.[14]

When it comes to efficiency costs of relocalisation, the results of the modelling indicate that, in spite of significant heterogeneity, countries are likely to lose between 1.1 and 12.2% of GDP in a scenario with localised supply chains (Figure 4.1, vertical axis). Among the Latin American countries modelled in this exercise individually, Argentina and Brazil recorded relatively modest efficiency losses, -2.9 and -2.5% of real GDP respectively, while for Mexico the loss was more significant (-5.9%).[15] The relatively large decline for Mexico is explained by its higher levels of GVC integration and the fact that it draws relatively intensely on foreign inputs in its export-oriented production. Downstream producers with a high share of imported value added in their exports and high exposure to competition in foreign markets tend to get hit particularly hard in such a scenario as they are forced to make the greatest adjustments. Prices of foreign intermediates go up due to tariffs and prices of competing domestic inputs also increase as domestic producers switch to domestic sources, reducing competitiveness further, and access to foreign consumer markets is impeded.[16]

In contrast, Argentina and Brazil have generally lower levels of GVC involvement and participate in GVCs mainly upstream as providers of relatively unprocessed inputs into other countries' production. In the relocalisation scenario, such forward GVC participants are also crowded out from foreign markets and experience losses due to falling prices of their products because of higher tariffs in foreign markets, but these upstream products also feed as inputs into production in their domestic economies and this has a cushioning effect. This illustrates a more general point about the benefits of GVC participation, which is particularly relevant to Latin America. While it is clear that countries located both upstream and downstream in GVCs gain from GVC participation, for countries located downstream, the lowering of trade costs brought about during the globalisation era has more direct positive effects by lowering production costs of domestic industries. For countries located upstream, lowering of trade costs has two opposing effects: they sell more to their downstream foreign partners, but this also drives up prices of domestic inputs. The increase in production costs diminishes the competitiveness of their domestic industries. This

[11] A global rise in import tariffs on all traded merchandise products to 25% in all countries was assumed. The imposition of a 25% import tariff is a stylised scenario which approximately moves import tariffs back to the level seen in advanced countries in the first years following the Second World War.

[12] This consisted of national value added subsidies equivalent to 1% of GDP directed to labour and capital in domestic non-services sectors in each country in order to mimic rescue subsidies that favour local production.

[13] Implemented through halving the standard Metro model's trade elasticities.

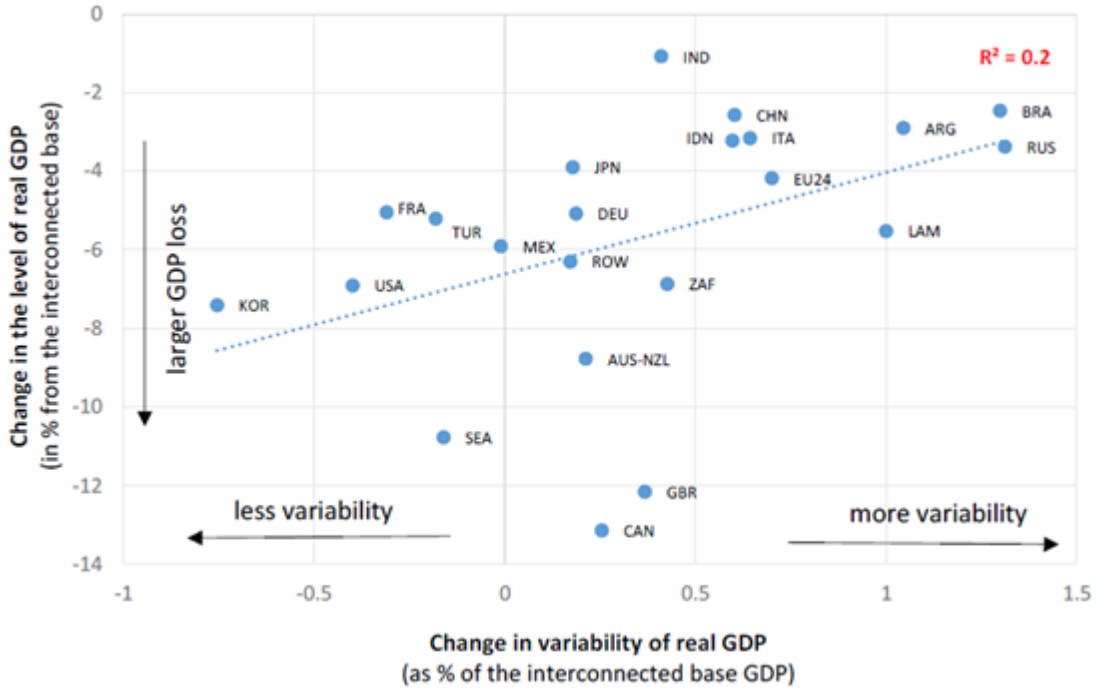
[14] Symmetric 10% increases and decreases in the costs of trade were investigated. Since countries experiencing the shocks are often both sources and destinations of intermediate and final products, the set of shocks mimics the kind of disruptions experienced during lockdowns to contain the COVID-19 pandemic, when transport, labour and logistics disruptions affected both exports and imports of different products to a similar extent. For details of the shock design see (OECD, 2022[120]).

[15] For the purposes of that exercise, which was not focused specifically on Latin America, the other Latin American economies in the model database such as Chile, Colombia, Peru, and Costa Rica were aggregated into one composite region – the Rest of Latin America – and this region lost 5.5% of GDP in real terms in the move to the localised regime. Other LAC economies due to data limitations were aggregated into Rest of World.

[16] This tendency is also observed at the industry level: those domestic industries that rely more on sourcing from abroad and on foreign final demand, such as for example food or motor vehicles, tend to shrink more as a result of a shift to the localised regime.

mechanism has been well known for natural resource rich countries for a long time, sometimes frustrating their efforts to diversify the economy into more downstream processing.

Figure 4.1. Efficiency and stability effects of shifting to the localised GVC regime



Source: Arriola et al. (2020[102]).

4.1.2. Exposure to trade cost shocks

Besides the losses in output, the extent of exposure to economic shocks, measured by the variability of GDPs due to these shocks, in the localised regime is also found to be higher in most countries. For 16 out of 22 countries included in the model, real GDP variability actually increases in the localised regime instead of decreasing (Figure 4.1, horizontal axis). In other words, the localised regime does not necessarily insulate a country from shocks. This occurs because domestic markets need to shoulder more of the adjustment pressure in this regime. For Mexico, real GDP variability, or stability, is similar across both regimes, In contrast, Argentina and Brazil, as well as the composite region of the Rest of Latin America, belong to the group of economies located upstream in GVCs which tend to be affected negatively in terms of stability of GDP in the face of shocks in the localised economies regime. These regions tend to provide inputs into production of other countries. Moreover, the concentration of their economies and trade patterns centre around natural resources and agriculture. As a result, these regions have less ability to cushion the shocks because of a less diversified economy that relies on factors of production such as land and natural resources that have limited mobility.

While highly stylized and limited to the analysis of trade cost shocks, this analysis shows that policies that result in more localised and less flexible value chains, may be costly in terms of efficiency and do not necessarily offer more stability in the face of shocks. More broadly, this research suggests also that transmission of trade shocks through value chains is not straightforward. How exactly domestic industries located in specific countries may be affected by shocks transmitted through GVCs depends on the nature and location of shocks considered as well as on several structural characteristics relevant to these industries which are only captured at a very general level in broad GVC participation indicators, such as the backward and forward GVC participation indices. The relevant structural characteristics which affect transmission of shocks in GVCs include: the factors of production used by these industries (and the extent to which these can be substituted and are mobile across the economy); the extent to which the industries

draw on intermediate inputs and whether these inputs are sourced domestically or imported (and where from); as well as the extent to which sales of these industries are oriented towards domestic or foreign markets (and which foreign markets).

4.2. Exposure to production shocks: A case study of mining and steel

To deepen the understanding of how the different aspects of GVC participation might influence transmission of shocks, an approach similar to Arriola et al. (2020[102]) based on the OECD global trade model METRO has been used in a pilot study to investigate in more detail the transmission mechanisms of *production shocks* originating in mining and steel industries and their transmission to downstream and upstream industries through global supply chains. The two sectors were selected for the analysis because of their importance for the Latin American region (especially mining due to the region's natural endowments and strong position as suppliers in world markets) and in order to compare the impact of a shock at different locations of the global value chain (vertical links between mining and steel). Both mining and steel sectors also the sector influenced significantly by Russia's aggression against Ukraine due to these two countries' large shares in world production of some of the products of these sectors. The effects of the shocks were assessed on the mining and steel sectors themselves as well as on other downstream industries ('focus sectors' thereafter), in particular the motor vehicles sectors. In addition, to assess the macroeconomic significance of shocks, impacts on countries' real GDPs were also compared (for more details of methodology, see also Box 2).

Box 2. Assessing the transmission of production shock in the OECD global trade model Metro

Similarly to (Arriola et al., 2020[102]), the analysis also used the OECD CGE METRO model but with a more recent baseline, reference year 2017, and with an aggregation that separates for analysis the five individual Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico and Peru). The remaining Latin American and Caribbean countries available in the METRO model database are aggregated into the rest of LAC region (Costa Rica, Bolivia, Ecuador, Paraguay, Uruguay, Venezuela, Rest of South America, Guatemala, Honduras, Nicaragua, Panama, El Salvador, Rest of Central America, Dominican Republic, Jamaica, Puerto Rico, and Trinidad and Tobago). The database also separates out the mining sector as well as its important downstream and upstream industries.

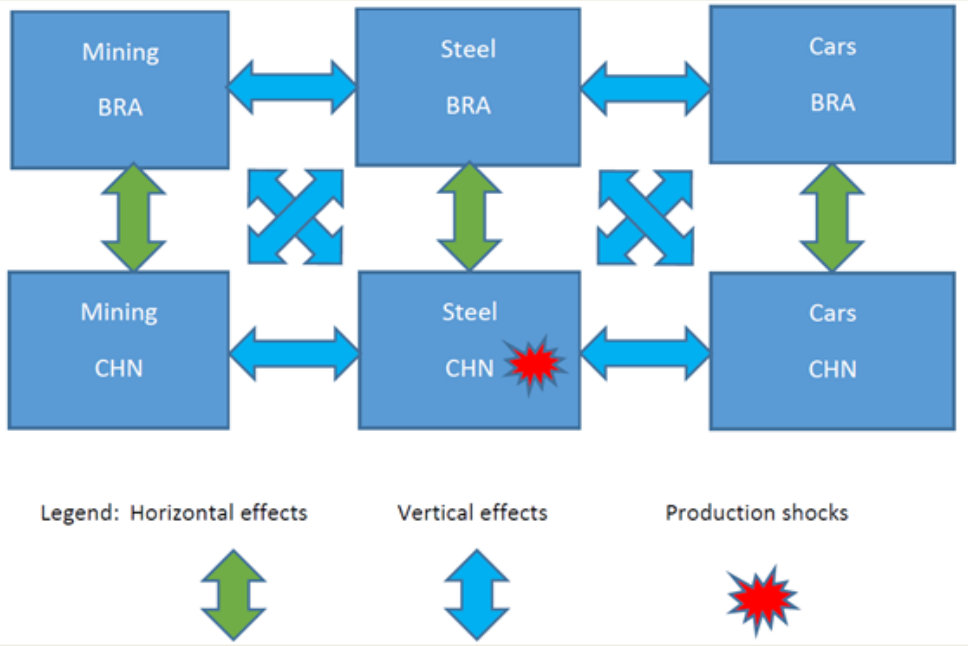
The analysis used the model's conventional baseline, which accounts for most of the characteristics of GVC participation as reflected in the OECD's Trade in Value Added database, as well as a suite of standard demand and trade elasticities and conventional modelling assumptions. The latter include: full employment (and thus flexible adjustment of wages); flexible trade balance (and thus fixed exchange rate); flexible government balance (and thus fixed government expenditure volumes) and flexible saving rates (and thus fixed investment as share of final domestic demand). In addition, factor endowments such as land, natural resources, labour and capital stocks are assumed fixed at the country level but are mobile across sectors (land and natural resources are specific to agriculture and mining).

Channels through which production shocks influence the performance of sectors are complex (Figure 4.2). The effects which have been dubbed as 'horizontal' are those associated with international competition between producers located in different countries. For example, a decline in steel production in one country (China as an example in Figure 4.2) will open additional sale opportunities to foreign competitors operating in the same markets (e.g. Brazilian steel producers). 'Vertical effects' along the supply chain occur both in the upstream and downstream direction. The upstream effects, for example on suppliers of inputs into steel production from the mining sectors, are mixed and will depend on whether the mining sectors in question supply their products mainly to the regions with the declining steel industry (i.e. the extent to which Brazil's or China's mining sector supplies inputs to China's steel production in Figure 4.2) or to the expanding ones (Brazil's or China's mining sector supplies inputs to Brazil's steel production in Figure 4.2). Downstream, in industries such as automobiles, which use steel as an input for production, a negative steel production shock will tend to create an upward pressure on input cost triggering a reduction in automobile production worldwide. The size of this effect in individual national automobile industries, however, will again depend on from where they source their intermediate inputs and with whom they compete in terms of car sales. It is possible that some national downstream

industries which are less exposed to the negative upstream shocks than their international competitors may experience a production increase. Note also in a general equilibrium setting, the steel industry and its upstream (mining) and downstream (automobiles) partners all compete for land, labour, capital and other scarce resources (even if they may use these resources with different intensities). This creates potentially significant additional cross effects which are difficult to gauge *a priori*.

In this analysis, a set of marginal shocks was applied which impact production levels in one of the 'shock' sectors in one region at a time (for example, the steel sector in China in Figure 4.2) for each of the 22 regions in the analysis database. The shocks are therefore country and sector-specific. Moreover, since production shocks can be both positive and negative, production shocks in both direction are simulated. This means that for each 'shock' sector, 44 simulation results are produced that are distinguishable by the direction of the shock and by which region experienced the shock.

Figure 4.2. 'Horizontal' and 'vertical' effects of shocks in GVCs



Source: Authors' own elaboration.

Technically, the instrument used to alter production is a production tax. To assure that the analysis is not conflated with secondary demand effects through changed government tax revenues, government expenditures are assumed fixed so that the collected additional tax only impacts the government budget. Both positive and negative shocks are applied. One set of shocks increases the production tax by 10 percentage points and the other set decreases the production tax by 10 percentage points. To be able to compare impacts across shocks originating in different locations and to calculate their relative contributions to the overall exposure of a given focus industry, all the resulting changes in economic variables are scaled by the size of the output change in the industry which experiences the tax change in a given simulation. A 10% production tax reduction or increase is applied in to elicit a production change- the size of which vary by region. The results are scaled by the size of the output change in the industry-region that experiences the tax change in a given simulation so that the shocks can all be interpreted as 'marginal' output shocks of 1%.

Depending on the structure of GVC links, production shocks in either positive or negative directions in specific national mining and steel sectors will thus have either positive or negative impact on output in mining, steel and motor vehicles (as well as other upstream and downstream) industries across the world. Such shocks can in principle occur in any country-sector (e.g. China's steel production as in Figure 4.2), and they can occur separately or concurrently (e.g. China's steel production declines alone or in conjunction with a decline in Brazil's steel production). Consequently, the number of all possible

shock combinations is too large to analyse in its entirety and the analysis focused on certain relevant constellations of global shocks, namely on what was called the 'maximum negative exposure measure'. This measure, akin to the minimax decision criterion, is a decision rule for minimising the possible loss for a worst case (maximum loss) scenario. It has been applied in artificial intelligence, decision theory, game theory, statistics, and philosophy captures the extent of the 'worst-case scenario', where all the possible marginal regional shocks in the sectors where shocks can originate align so that output in the focus sector is affected the most negatively.

The analysis is constrained to shocks in one source industry at a time. In reality, shocks in different source industries can occur concurrently and add to the maximum negative exposure. For example, if a positive output shock in the steel sector of Country A results in a decline of Country B's steel industry output, then the decline of Country B's steel output is included in Country B's maximum negative exposure indicator for the steel sector. Adding all the negative steel output losses in Country B among the 44 simulations that shock production in the steel sector is the maximum negative exposure of Country B's steel sector to a global steel production shock. Moreover, this method allows the identification of the regions that produces the decline in output of Country B's steel sector and the extent to which each region's production shock contributes to the decline in Country B's steel sector output.

Source: OECD (2022[120]).

4.2.1. Domestic and international linkages of LAC mining and steel sectors

In spite of significant differences across the region, the mining sector is a relatively important contributor to Latin America and Caribbean (LAC) economies, for example when compared to the advanced economies in Asia, Europe and North America or the People's Republic of China (hereafter "China") (Table 4.1). The contribution of mining to GDP is particularly high in Chile and Peru, 3.3 and 4.9% of GDP respectively. In Brazil, Chile and Peru, the sector also accounts for more than 13% of national exports and these countries account for respectively 11%, 6% and 6% of global mining exports, making them relatively important global players. Mining is also one of the sectors which relies the most on foreign markets and it is an important provider of intermediate inputs used by the steel sector (Table 4.3).

Table 4.1. Contributions of mining and steel sectors to LAC economies

	mining				steel			
	%GDP	%GDP non services	% of country's exports	% of global mining exports	%GDP	%GDP non services	% of country's exports	% of global steel exports
Latin America								
Argentina	0.4%	1.6%	1.0%	0.2%	0.3%	1.3%	0.9%	0.2%
Brazil	1.4%	5.2%	12.5%	11.3%	0.9%	3.5%	4.0%	2.4%
Chile	3.3%	13.8%	23.2%	6.3%	0.1%	0.5%	0.3%	0.1%
Colombia	0.5%	1.7%	0.2%	0.0%	0.4%	1.4%	1.3%	0.1%
Mexico	1.3%	4.5%	1.3%	1.9%	0.8%	3.0%	1.0%	1.0%
Peru	4.9%	10.0%	33.1%	5.8%	0.0%	0.0%	0.3%	0.0%
Rest of Latin America and Caribbean	0.8%	2.6%	1.6%	1.1%	0.3%	1.2%	1.4%	0.7%
Other select countries								
China	1.0%	2.6%	0.1%	1.0%	1.8%	4.7%	2.4%	13.3%
European Union (27)	0.4%	1.6%	0.4%	9.1%	0.5%	2.2%	2.4%	34.2%
Japan	0.1%	0.6%	0.1%	0.2%	1.6%	8.4%	4.0%	7.8%
United States	0.2%	1.1%	0.5%	3.2%	0.5%	2.5%	1.1%	4.6%
Australia and New Zealand	3.8%	20.4%	17.7%	20.1%	0.3%	1.4%	0.6%	0.5%

Source: OECD Metro model database reference year 2017.

With the exceptions of Brazil and Mexico, the steel sector does not generally contribute a lot to Latin American countries' GDPs or exports, and only Brazil and Mexico are somewhat important players in global steel markets (2% and 1% of global steel exports respectively). This contrasts with China and advanced economies in Asia, Europe and North America where the steel sector is a relatively prominent contributor to GDPs and exports (Table 4.1).

There are also differences with respect to what inputs the two LAC sectors use for production and how they are connected with regional and global value chains. Mining relies less on intermediate inputs (both domestic and imported) than steel, and more on domestic value added, particularly capital and immobile natural resources (Table 4.2).

Table 4.2. Key inputs into mining and steel production

	Mining							Steel						
		Domestic value added							Domestic value added					
	Intermediate inputs	Natural resources	Unskilled labour	Skilled labour	Capital	Taxes and transport margins		Intermediate inputs	Natural resources	Unskilled labour	Skilled labour	Capital	Taxes and transport margins
Argentina	32%	7%	8%	17%	30%	6%	Argentina	60%	0%	10%	8%	17%	8%
Brazil	52%	7%	3%	4%	26%	8%	Brazil	66%	0%	2%	5%	20%	11%
Chile	54%	7%	3%	4%	30%	3%	Chile	79%	0%	3%	5%	8%	7%
Colombia	49%	6%	2%	6%	28%	9%	Columbia	68%	0%	3%	4%	20%	8%
Mexico	34%	7%	5%	3%	48%	3%	Mexico	66%	0%	4%	1%	27%	3%
Peru	56%	7%	11%	6%	18%	3%	Peru	95%	0%	0%	0%	1%	4%
China	54%	7%	16%	2%	17%	5%	China	71%	0%	7%	1%	16%	7%
European Union (27)	53%	7%	5%	5%	23%	8%	European Union (27)	78%	0%	4%	4%	7%	9%
Japan	39%	7%	1%	10%	35%	8%	Japan	78%	0%	2%	1%	14%	5%
United States	58%	6%	6%	4%	16%	10%	United States	63%	0%	16%	10%	8%	6%

Source: OECD Metro model database, reference year 2017.

While both mining and steel sectors source the bulk of intermediate inputs domestically, this is again more pronounced for mining than for steel, which suggests that mining may have more spillovers to the local economy than sometimes portrayed. The main inputs to the mining sector are business and communication services, electricity, transport services and machinery and equipment (Table 4.3, Panel A). Only Peru and Mexico source significant shares of intermediate inputs into mining from abroad, respectively 15% and 20% of total intermediate input use. In the case of Peru, these intermediates are mainly sourced from other LAC countries as well as North America, the European Union and China, and in the case of Mexico mainly from North America, China and the European Union.

In the steel sector, there is more sourcing from abroad, with the most dependent on foreign intermediates steel sectors of Mexico and Chile sourcing respectively 28% and 26% of their inputs from abroad. In the case of Mexico, these inputs come mainly from North America and the Rest of Asia region, and in the case of Chile from China and the Rest of Asia region but also from other LAC countries. The steel sector also relies a lot on inputs coming from other firms within the sector (hence the high shares of inputs sourced from steel itself (Table 4.3, Panel B), but also electricity (i.e. in electric arc furnaces, which also use ferrous scrap) and indeed the inputs from the mining industry.

The higher reliance of the LAC mining sectors on domestic value added and domestic intermediates means that adjustments to shocks fall more on the domestic economy (also through other domestic sectors that supply the intermediate inputs into mining). This illustrates the point that in the face of shocks countries which rely on primary industries and less mobile domestic inputs may face more challenges when it comes to adjustment to shocks.

Table 4.3. Sourcing of intermediate inputs by LAC mining and steel sectors

Panel A. Mining

	source region						
	own	other LAC	North America	EU(27)	China	Rest of Asia	Rest of the World
Argentina	88%	4%	2%	3%	2%	1%	1%
Brazil	92%	0%	2%	2%	1%	1%	1%
Chile	90%	1%	4%	2%	1%	1%	1%
Colombia	95%	1%	2%	1%	1%	0%	1%
Mexico	80%	0%	11%	2%	3%	2%	1%
Peru	85%	4%	3%	3%	3%	1%	2%

	source sector						
	Business & communication	Chemicals	Electricity	Steel	Machinery and equipment nec	Transport services	Other sectors
Argentina	14%	2%	0%	1%	4%	20%	58%
Brazil	11%	7%	8%	2%	5%	16%	52%
Chile	14%	4%	38%	0%	2%	13%	28%
Columbia	4%	3%	40%	1%	1%	7%	43%
Mexico	20%	11%	20%	1%	4%	2%	43%
Peru	10%	8%	1%	5%	19%	4%	54%

Panel B. Steel

	source region						
	own	other LAC	North America	EU(27)	China	Rest of Asia	Rest of the World
Argentina	86%	6%	1%	2%	1%	1%	2%
Brazil	87%	1%	4%	3%	1%	1%	3%
Chile	74%	4%	2%	3%	13%	3%	1%
Colombia	85%	4%	3%	2%	3%	3%	2%
Mexico	72%	1%	16%	2%	2%	5%	2%
Peru	98%	0%	1%	0%	0%	0%	0%

	source sector						
	Electricity	Steel	Metals and metals	Mining	Trade	Transport services	Others
Argentina	10%	39%	5%	2%	8%	6%	30%
Brazil	12%	20%	8%	14%	5%	7%	34%
Chile	17%	35%	7%	5%	9%	2%	25%
Columbia	13%	20%	11%	15%	7%	4%	29%
Mexico	8%	34%	10%	6%	15%	2%	23%
Peru	92%	2%	0%	0%	0%	0%	6%

Note: shares calculated from baseline values of inputs by source country and source sector.
Source: OECD Metro model database.

The two industries also provide inputs into production of other sectors in the domestic economy and in GVCs. In Argentina, Colombia and Mexico, between 74% and 97% of intermediate inputs sourced from these countries' mining industries are destined for domestic downstream sectors (mainly construction, steel, metals and minerals production) while in Chile, Peru and Brazil they are destined for the foreign downstream sectors, mainly in China and other Asian counties but also the European Union (Table 4.4, Panel A). This means that that mining sectors in the former group are exposed relatively more to domestic shocks in downstream industries (e.g. domestic steel shocks) while the latter group is exposed relatively more to foreign shocks.

Intermediate inputs provided by LAC steel firms are used mainly domestically (between 82% and 93%) although, particularly for Mexico and Brazil, the North American users are also significant destinations (11% and 6% respectively). Intermediate inputs originating in LAC steel industries are used mainly by other steel and other metal products producers but also by the electronics and motor vehicles industries (Table 4.4, Panel B).

Table 4.4. LAC mining and steel sectors as providers of intermediate inputs

Panel A. Mining

	destination country							destination sector							
	own	other LAC	North America	EU(27)	China	Rest of Asia	Rest of the World		Chemicals	Construction	Steel	Metals and metals	Mineral products n	Mining	Others
Argentina	79%	1.8%	1%	13%	0%	5%	0%	Argentina	6%	29%	7%	12%	7%	4%	35%
Brazil	37%	1.0%	1%	10%	34%	11%	5%	Brazil	9%	10%	30%	19%	11%	12%	10%
Chile	7%	4.4%	2%	10%	37%	38%	2%	Chile	6%	9%	30%	28%	13%	5%	8%
Colombia	97%	0.1%	0%	2%	1%	0%	0%	Columbia	4%	30%	15%	31%	10%	1%	9%
Mexico	74%	0.5%	4%	4%	9%	7%	2%	Mexico	5%	11%	12%	50%	16%	3%	4%
Peru	27%	4.0%	3%	8%	38%	18%	2%	Peru	6%	7%	24%	36%	10%	12%	6%

Panel B. Steel

	destination country							destination sector							
	own	other LAC	North America	EU(27)	China	Rest of Asia	Rest of the World		Computers, electr	Steel	Machinery and eq	Metals and metals	Motor vehicles, pa	Other manufactur	Others
Argentina	87%	2%	5%	1%	0%	1%	5%	Argentina	3%	21%	9%	16%	7%	5%	38%
Brazil	82%	3%	6%	3%	1%	3%	3%	Brazil	9%	16%	14%	19%	21%	4%	17%
Chile	87%	4%	3%	0%	0%	2%	3%	Chile	2%	13%	8%	15%	2%	9%	51%
Colombia	85%	1%	2%	1%	6%	3%	2%	Columbia	4%	13%	11%	15%	4%	3%	50%
Mexico	85%	1%	11%	0%	0%	0%	1%	Mexico	10%	18%	9%	15%	23%	5%	21%
Peru	93%	1%	1%	0%	0%	0%	5%	Peru	2%	2%	7%	27%	4%	5%	52%

Note: shares calculated from baseline values of inputs by source country and source sector. Destination sector includes domestic industries.
Source: OECD Metro model database.

4.2.2. Exposure to production shocks

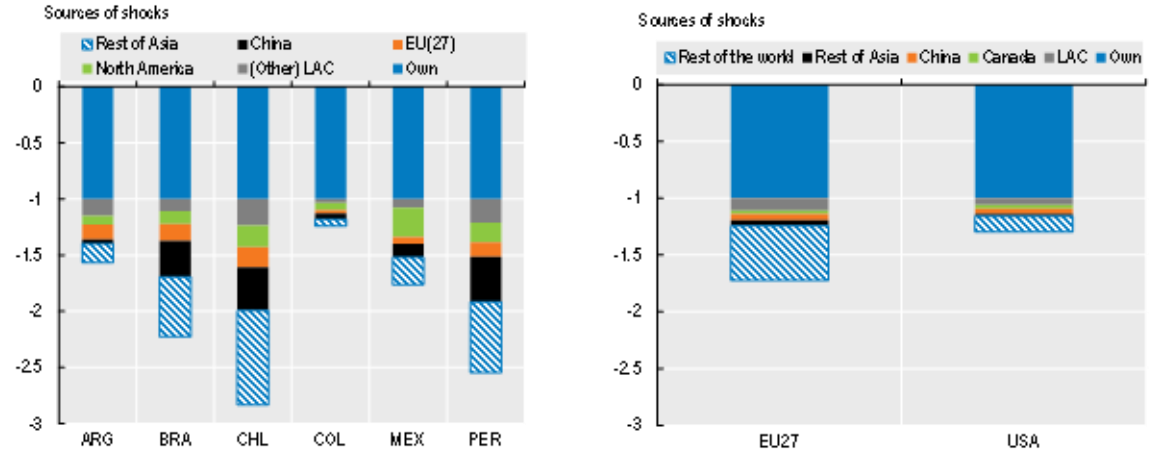
Sectoral impacts

The results from the simulations generally show that horizontal effects foreign sectors producing the same products (recall Figure 4.2) outweigh vertical impacts along the supply chain. In most LAC countries, as well as in the European Union and the United States, mining and steel output tends to be exposed the most to shocks occurring within these global industries not in industries that are located upstream or downstream from them. The maximum combined declines in output in the face of the worst case constellation of marginal output shocks occurring within these industries reach up to 3% (see Box 2 and compare Figure 4.3 and Figure 4.6), while the maximum combined declines due to vertical impacts are below 1.5% (compare Figure 4.4, Figure 4.5, Figure 4.7 and Figure 4.8).

This relatively smaller size of vertical impacts illustrates an inherent stabilizing feature of GVCs — in an event of location-specific negative output shocks suppliers of intermediate inputs with diversified customer bases are naturally 'hedged' as declines in demand for intermediate inputs by some downstream customers tend to be counterbalanced by increases in demand for intermediates by their competitors who fill in the shortage of supply of final products. Similarly, users of intermediate inputs with diversified supplier base are also hedged against declines in intermediates' output (and therefore increasing prices) from specific suppliers.

Figure 4.3. Horizontal effects in the mining sector: Maximum negative exposure of the mining sectors to global mining shocks

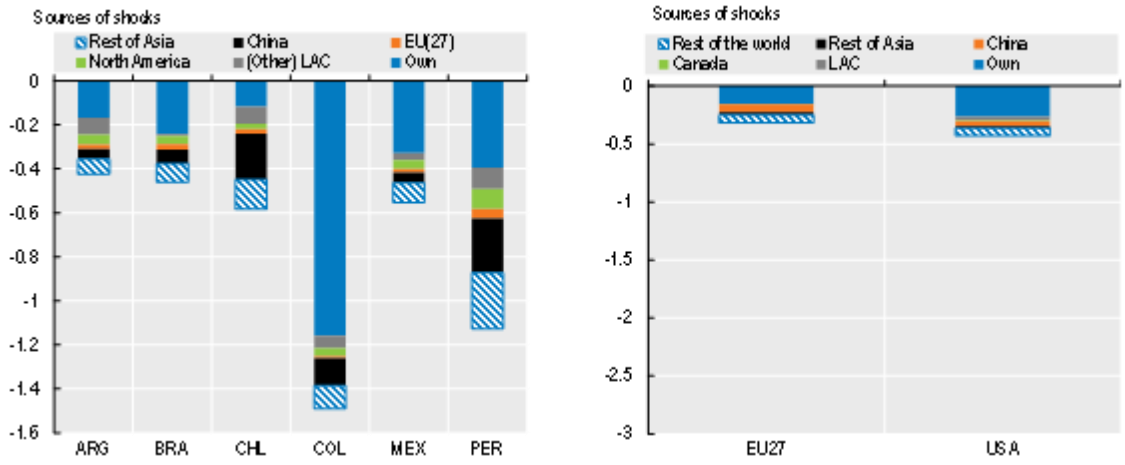
Maximum combined % decline in output by source and focus economy



Source: OECD METRO model simulations.

Figure 4.4. Downstream effects in the mining sector: Maximum negative exposure of the steel sectors to global mining shocks

Maximum combined % decline in output by source and focus economy



Source: OECD METRO model simulations.

In the face of horizontal shocks in the mining industry, LAC countries' mining sectors are exposed more up to 3% of output decline in the worst case constellation of marginal output shocks in this industry across the world) than the EU and US mining sectors (around 1.5%, compare the right and left hand panel of Figure 4.3). This is due to higher exposure to foreign shocks as the mining sectors in LAC are more outward oriented both in terms of reliance on foreign inputs and in terms of sales to foreign markets. Particularly, in the case of the most internationally integrated mining LAC sectors in Chile, Peru, and Brazil, the combined exposure to foreign shocks can be larger than exposure to domestic shocks in this industry. In Peru and Chile, for example, a combination of foreign shocks can have a close to two times larger negative impact on mining output than comparable own shocks (Figure 4.3). In spite of some heterogeneity across LAC, exposure to foreign shocks is mainly concentrated in China (up to 0.4%), other LAC countries (up to 0.2%), the European Union (0.2%) and the United States (0.3%), and the rest of Asia (0.2). This

contrasts with results for the European Union and the United States, whose mining industries are mainly exposed to mining shocks in LAC countries (up to 0.1%) and the Rest of the World (0.5%, Figure 4.3).

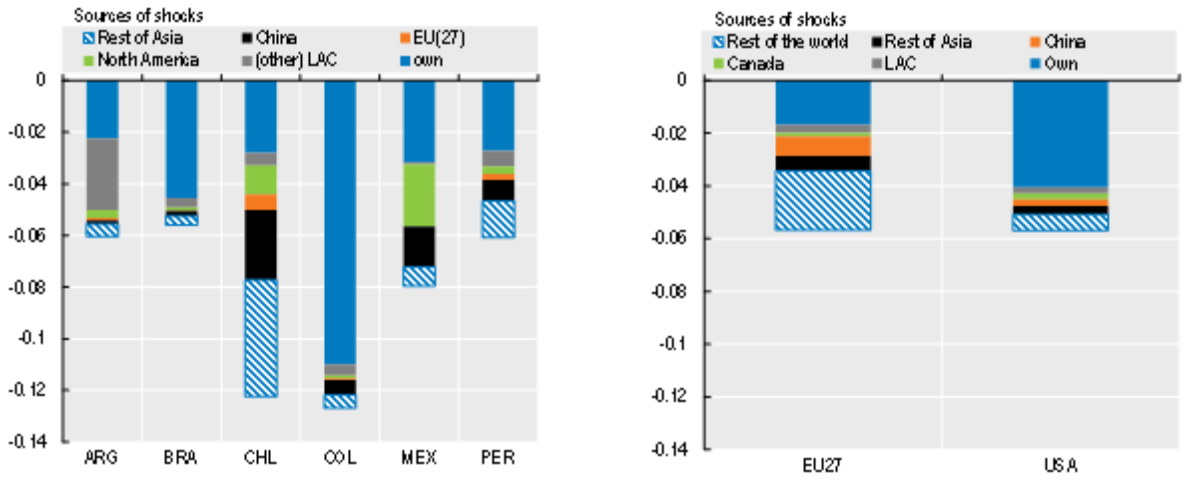
The exposure to foreign horizontal shocks is even more pronounced in the case of the steel sector, where only in Brazil the combined exposure to foreign shocks is lower than the exposure to own shocks (Figure 4.6). In this sector, LAC countries as well as the European Union and the United States are exposed mainly to shocks originating in China's steel production (up to 1.1%), and to a lesser extent to shocks originating in other Asian economies (up to 0.3%). In Chile, Colombia and Peru, exposures to China and other Asian countries are similar in magnitude or larger than exposures to their own steel sector shocks.

Concerning vertical transmission of shocks between mining and steel sectors, the exposure of the steel sector to upstream mining shocks is still relatively large in Colombia (1.4%) and Peru (1.1%). In Colombia, this is due to the exposure of the sector to own mining shocks while in Peru it is mainly the exposure to foreign mining shocks. In other LAC countries, the steel sector is exposed moderately to mining shocks (Figure 4.4). Conversely, the mining sector in LAC is exposed to downstream shocks in the steel industry and shocks originating in the steel industry in China (up to 0.2%) and other Asian countries (up to 0.2%) are particularly important for Brazil, Chile and Peru (Figure 4.7).

Motor vehicles production in LAC is not greatly exposed to global shocks originating in the mining sector, and not more so than in the European Union and the United States (Figure 4.5) but it is moderately exposed to shocks in the steel industry, including the shocks originating in other LAC steel producers for Argentina and Chile (up to 0.1%).

Figure 4.5. Downstream effects in the mining sector: Maximum negative exposure of the motor vehicles sectors to global mining shocks

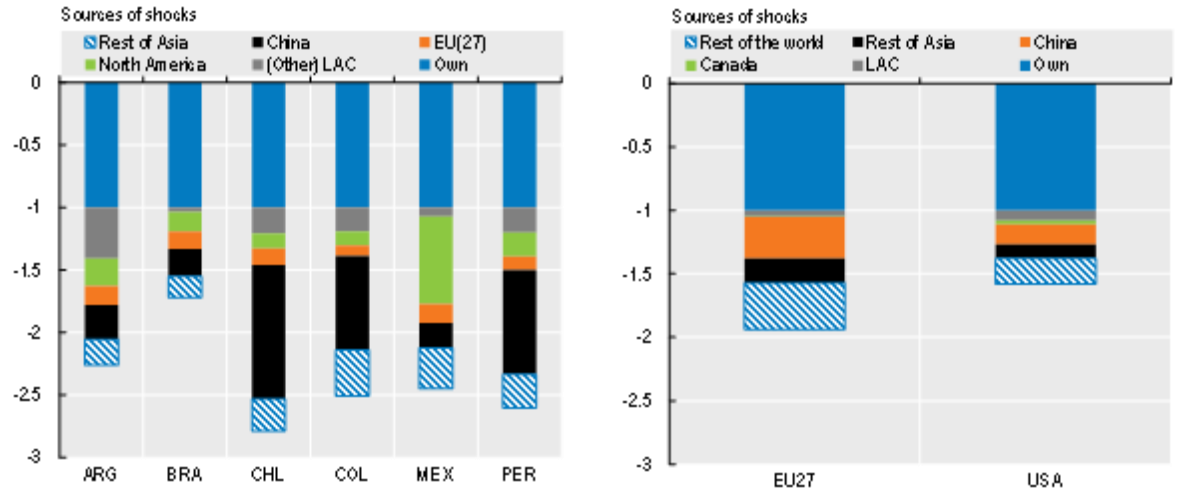
Maximum combined % decline in output by source and focus economy



Source: OECD METRO model simulations.

Figure 4.6. Horizontal effects in the steel sector: Maximum negative exposure of the steel sectors to global steel shocks

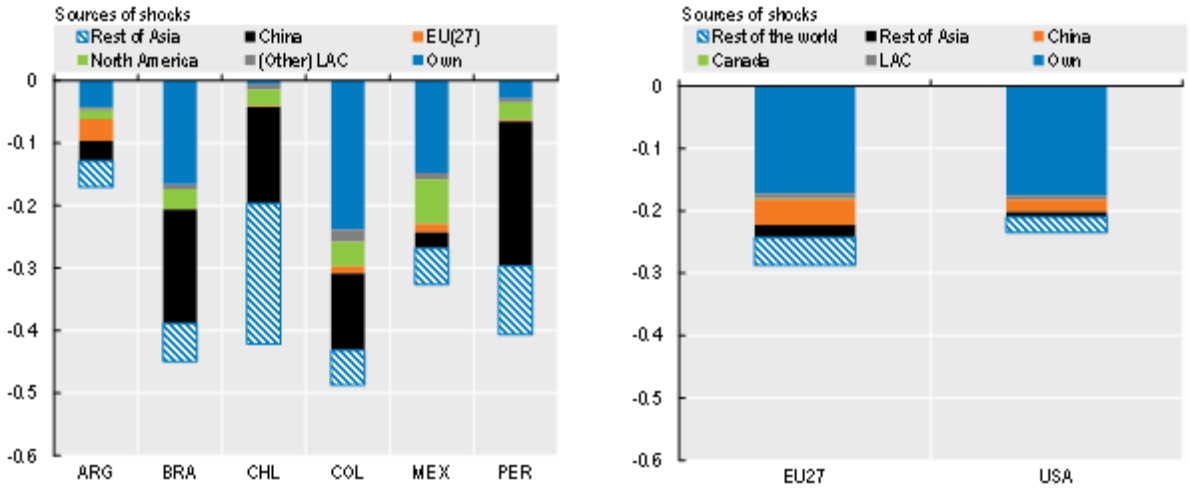
Maximum combined % decline in output by source and focus economy



Source: OECD METRO model simulations.

Figure 4.7. Upstream effects in the steel sector: Maximum negative exposure of the mining sectors to global steel shocks

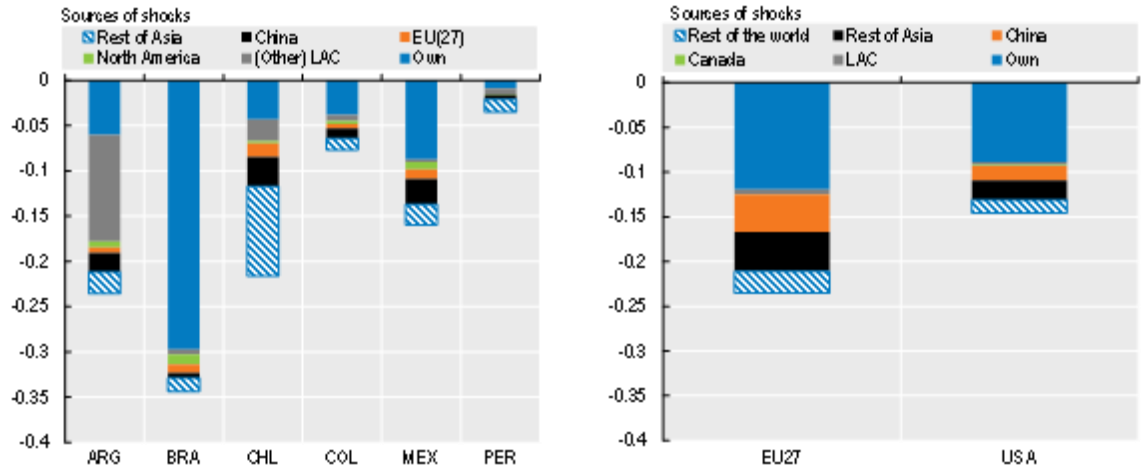
Maximum combined % decline in output by source and focus economy



Source: OECD METRO model simulations.

Figure 4.8. Downstream effects in the steel sector: Maximum negative exposure of the motor vehicle sectors to global steel shocks

Maximum combined % decline in output by source and focus economy



Source: OECD METRO model simulations.

Economy-wide impacts

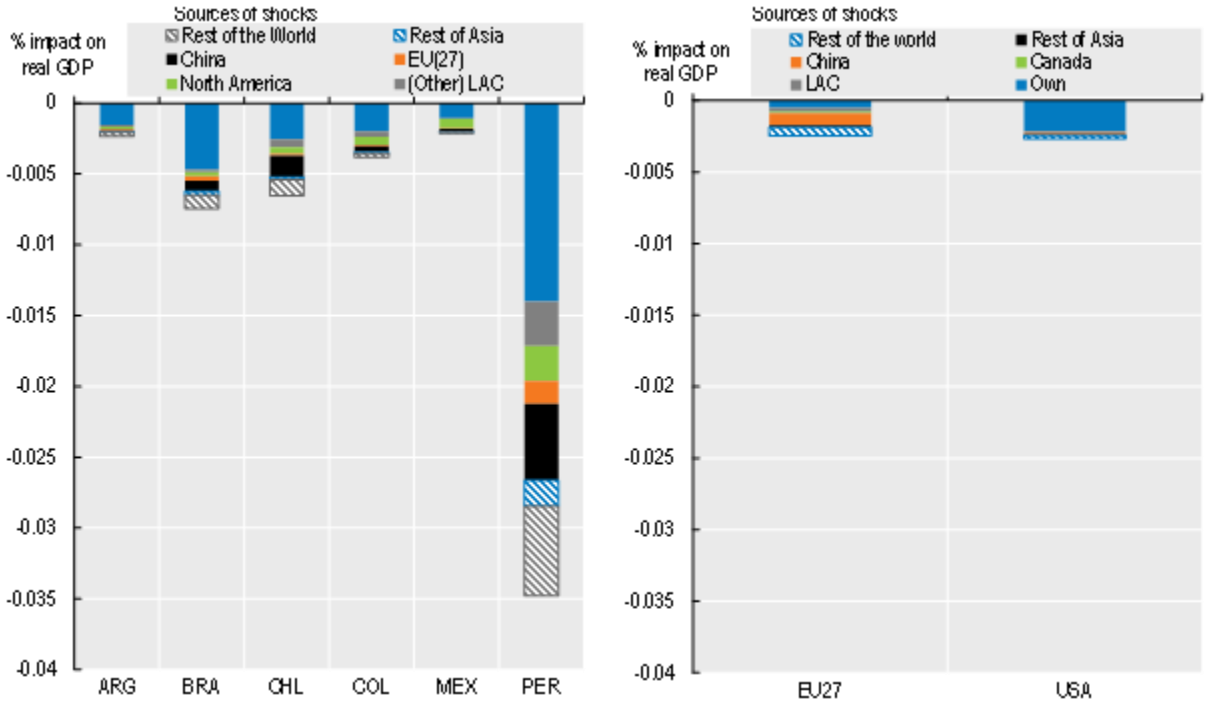
Measured by the impacts on real GDP, the broader economic exposure to mining shocks is relatively low overall. In a worst case constellation of marginal mining (steel) output shocks around the world, the corresponding real GDP declines do not exceed 0.04% (0.01%) in LAC countries and they are yet lower in the European Union and the United States (Figure 4.9 and Figure 4.10). Alternatively in a hypothetical worst case shock constellation where mining (steel) shocks are one magnitude larger (each country specific mining and steel output shock is 10% instead of 1%), the GDP declines would still not exceed 0.4% (0.1%).

Brazil, Chile, Colombia and Peru's real GDPs are exposed a bit more to mining shocks than those of Argentina, Mexico, or the European Union and the United States (8). Peru is exposed the most (0.035%) which can be explained by the fact that it is a country with the largest share of mining in GDP and that almost three-quarters of its mining sectors output is destined for foreign markets. However, even in Peru the bulk of the real GDP exposure to mining shocks stems from Peru's own shocks. It is interesting that Chile's exposure to mining shocks is not as elevated as Peru's but mining accounts for a lesser share in Chile's GDP's and the sales of Chile's mining industry are more outward oriented and diversified (Table 4.4).

Real GDP exposure to steel shocks of LAC countries is about half of that of mining shocks and it is more similar to those of the European Union and the United States. Brazil's real GDP is the most exposed to global steel shocks in the group of countries considered here and this is a consequence of a relatively high contribution of steel to its GDP as well as of a limited diversification of intermediate inputs and sales. Indeed, in Mexico, where the contribution of steel to GDP is comparable – but where the steel sector sources more intermediates from, and sells more of its output to, foreign markets – the exposure to its domestic shock is lower, and the decline in real GDP is associated mostly with foreign shocks, particularly those originating from North America (Figure 4.9).

Figure 4.9. Maximum negative exposure of real GDP to global mining shocks

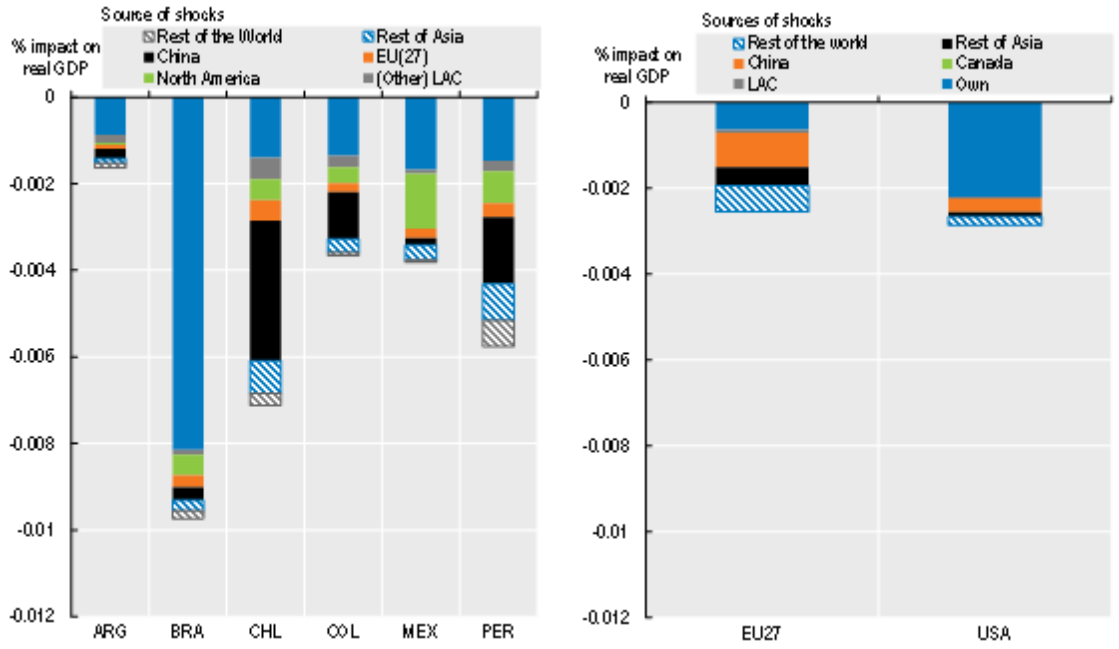
Maximum combined % decline in real GDP by source and focus economy



Source: OECD METRO model simulations.

Figure 4.10. Maximum negative exposure of real GDP to global steel shocks

Maximum combined % decline in real GDP by source and focus economy



Source: OECD METRO model simulations.

Overall, the results of this analysis suggest, for example, that LAC countries tend to be exposed more than the European Union and the United States to shocks occurring in the global mining and steel sectors. These shocks do not seem overly systemically important as the impacts on real GDP, which reflect all the horizontal, vertical and general equilibrium adjustment mechanisms accounted for the in the model, tend to be two magnitudes smaller than the original shocks (i.e. up to 0.04% of real GDP change in the case of worst constellation of marginal global mining shocks). But they are more important at the level of the sector, where the combined magnitude of effects can be larger than the magnitude of original shocks (up to 3%). Mining and steel in LAC countries are mainly exposed to own shocks and external shocks coming from outside the LAC region, mainly China and other Asian countries, but also the European Union and the United States.

The European Union and the United States are also somewhat exposed to mining shocks originating in LAC countries, but shocks originating in China and other Asian countries may be of greater importance. On the one hand, this suggests that the current structure of GVC integration of the European Union and the United States with the LAC region carries less risk in terms exposure to shocks in the mining sector as compared to China. On the other hand, further broadening and diversification of GVC links between Latin America and these two major developed economic regions, for example to other manufacturing and services sectors, is of mutual interest as it would likely stabilise bilateral trade relations and minimise the transmission of idiosyncratic shocks across these regions.

5. Summary

There are policy and non-policy factors that play a role in shaping the form and extent of GVC participation as seen at the level of countries. The assessment of GVC participation of LAC countries carried out in this report suggests that, prior to the COVID-19 pandemic, some LAC countries have not yet been able to take a full advantage of GVC participation and that some of the unrealised potential can be addressed by trade and domestic policy reforms. Most LAC countries' engagement in GVCs is through forward participation based on natural endowments, with a few notable exceptions such as Mexico and Costa Rica. Regional integration is generally less pronounced than in other regions of the world. A growing importance of China in both exports and imports has been a key feature of changing trade patterns over the last two decades, while traditionally significant trade links with the United States and the European Union have diminished to some extent.

A number of domestic reforms can improve the quality of GVC participation for LAC countries, make them more resilient to shocks and at the same time help them be reliable supply chain partners for North America, Europe and Asia. Reforms that can improve the business climate and facilitate market entry, for example, can raise productivity and competitiveness, which in turn amplifies the economic opportunities resulting from GVC participation for LAC countries. Closing infrastructure bottlenecks is key for lowering trade costs and raising export competitiveness. At the same time, well-functioning labour markets and social safety nets play a role in facilitating the adjustment process towards stronger engagement in international trade and the associated reallocation of jobs across firms and sectors. Other policies can also lead a long way to limit the adjustment costs. Enhanced professional training opportunities, for example, can provide the skills needed in newly emerging sectors and allow workers to move into new jobs more swiftly. Finally, social protection has an important role to play in cushioning temporary income losses for workers during the transition.

To some extent, existing patterns in the GVC engagement of LAC economies may reflect geography and distance from key markets. But trade policies are also playing a role and are one factor behind the rather low levels of participation in intra-regional value chains. Several LAC economies maintain trade barriers that raise the costs of imports and exports alike, limit the access of domestic producers to competitive inputs and shield them from the competitive pressures that are so vital for a flourishing and dynamic business sector. LAC is among regions with one of the highest numbers of preferential agreements but these are relatively shallow and can be further streamlined and simplified. Room for further policy reform remains with respect to tariffs, non-tariff barriers and rules of origin, which tend to be particularly important for GVC participation, although the scope and priorities obviously differ across economies in the region.

Participation in GVCs is economically beneficial, but it also carries some risks. The finer fragmentation of production in GVCs has been a source of significant productivity gains and it has allowed many smaller

actors from less economically advanced regions, including Latin America and Caribbean to participate in production of globally competitive goods and services they would not be able to produce on their own. GVCs are also about connecting unique capabilities and therefore act as strong channels of knowledge and technology transfer. The economic interdependence that is inherent in GVCs means that these production structures can sometimes be exposed to economic shocks originating in remote geographical regions, such as some of those seen during the COVID-19 pandemic. But production in GVCs can also support resilience, as in the face of some shocks it may be easier to reconfigure or relocate just a segment of a supply chain, or switch to another supplier, rather than overhaul a whole production process.

The economic shocks of the COVID-19 pandemic and, most recently, Russia's invasion of Ukraine and the associated economic sanctions concerning Russia, have reinvigorated the debate on whether the benefits of production in GVCs outweigh the associated risks and what might the best ways of tackling these risks. These new realities added to the more conventional calls for making supply chains more domestic or regional, including in LAC's important trading partners in Europe and North America, but also in LAC countries themselves.

Empirical evidence and policy analysis of relocalisation of GVCs have been emerging rapidly in the context of this recent debate. For now, an economic case for relocalisation seems underwhelming. While relocalisation might shelter some economies or sectors from some shocks, GVCs can also enable better adjustment to disruptions. Given their high levels of GVC integration, for LAC's GVC partners in Europe and North America relocalisation may generate relatively large efficiency costs and limited stability gains. LAC countries, given their participation in GVCs mostly as upstream providers of agricultural products and natural resources, which rely on relatively immobile factors of production, encounter more adjustment challenges in the face of shocks, including those which originate in their own economies. For them, being able to switch between different foreign suppliers or customers in flexibly functioning GVCs may be more of a stabilising factor.

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