A review of Mexico's participation in global value chains

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Abstract

A review of Mexico's participation in Global Value Chains.

Mexico is well integrated into global value chains (GVCs). Its exports as a share of GDP have tripled since 1988. Mexico's participation in GVCs is mainly driven by backward linkages, i.e., the share of foreign value added in Mexico's total exports is large, which reflects Mexico's importance in assembling processes in some manufacturing sectors. Conversely, forward participation, i.e., to what extent trading partners exports incorporate Mexico's value added, remains low. Ongoing nearshoring trends provide opportunities to strengthen and improve Mexico's participation in GVCs, and to move up in the value chain and develop stronger forward linkages, which are associated to higher productivity growth. This paper zooms into the most recent developments in Mexico to assess whether Mexico is already benefiting from these trends. The empirical analysis suggests that Mexico's wide trade agreements and low tariffs, will help, but improving the business environment and the rule of law, a better educated workforce, or increasing female labour participation would also facilitate deepening forward GVCs linkages.

JEL codes: F14, F43, F62, 054

Keywords: Global value chains, Trade, Nearshoring, Gravity models

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Résumé

Un examen de la participation du Mexique aux chaînes de valeur mondiales.

Le Mexique est bien intégré dans les chaînes de valeur mondiales (CVM). La part des exportations dans le PIB a triplé depuis 1988. Le Mexique se situe plutôt en amont dans les CVM, étant donné que la part de la valeur ajoutée étrangère dans les exportations totales du Mexique est élevée, ce qui souligne le rôle majeur du Mexique dans les processus d'assemblage dans certains secteurs manufacturiers. En revanche, la participation en aval, c'est-à-dire la valeur ajoutée du Mexique exportée par des pays tiers, reste faible. Les tendances actuelles de nearshoring offrent des opportunités pour renforcer et améliorer la participation du Mexique aux CVM, et pour monter dans la chaîne de valeur ainsi que développer des liens en aval plus forts, qui sont associés à une croissance plus élevée de la productivité. Ce document se penche sur les développements les plus récents au Mexique pour évaluer si le Mexique bénéficie déjà de ces tendances. L'analyse empirique suggère que les accords commerciaux du Mexique et les faibles tarifs douaniers aideront, mais l'amélioration de l'environnement du climat des affaires et de l'état de droit, une main-d'œuvre mieux qualifiée, ou l'augmentation de la participation des femmes au travail pourront renforcer également l'intensité de ses liens en aval dans les CVM.

Codes JEL : F14, F43, F62, 054

Mot Clés : Chaînes de valeur mondiales, Commerce, Nearshoring, Modèles de gravité

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A review of Mexico's participation in Global Value Chains

By Elena Vidal[1] and Alberto González Pandiella

Introduction

United States-China trade tensions, the Covid-19 pandemic, and geopolitical shocks have triggered a redrawing of global supply chains. Available data reveal that a "great reallocation", by which US sourcing from China is decreasing, is gradually taking place (Alfaro and Davin, 2023[1]). Low-wage manufacturing countries (such as Vietnam) and countries located closer to the United States (such as Mexico and Canada) are instead gaining market share. References to nearshoring in the Mexican and international press have intensified sharply since 2022 (Banco de España. Departamento de Economía Internacional y Área del Euro, 2024[2]). Mexico is indeed well placed to benefit from the so-called nearshoring trends, by which companies are seeking to reduce supply risks and costs by locating closer to their final markets. Estimates suggest that nearshoring could add an annual $78 billion in additional exports of goods and services in Latin America and the Caribbean in the near and medium term, with Mexico being the main potential beneficiary, capturing 40% of that amount (IDB, 2022[3]).

This paper reviews recent developments in Mexico's participation in global value chains (GVCs) in section 2, drawing from different datasets to provide the most up to date picture of GVCs linkages. Section 3 reviews the literature on the drivers of countries' participation in GVCs and assesses empirically potential ways to reinforce and improve GVCs linkages and section 4 offers some conclusions.

Recent developments in Mexico's participation in global value chains

The 1994 North American Free Trade Agreement (NAFTA) triggered a transformation of the Mexican economy, which became deeply integrated into global value chains (GVCs) in manufacturing sectors such as auto or electronics, with exports as a share of GDP tripling since 1988. Since then, Mexico has become a prime supplier of intermediate goods and assembler for the US manufacturing sector (OECD, 2017[4]).

The 2020 modernised trade agreement in North America (USMCA), which increased local content requirements for the auto industry, introduced stronger labour and environmental standards and improved dispute settlement mechanisms. The ongoing nearshoring trends provide Mexico with opportunities to improve existing supply chain linkages and further benefit from the productivity and growth advantages of deeper integration. Trade flows data shows that Mexico, together with Canada and Vietnam, are already benefiting from these developments. Mexico has recently become the main supplier to the United States market (Figure 1), overtaking China. Firms survey information collected by the Central Bank of Mexico

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confirms that the nearshoring process has been benefiting Mexico since 2022. Around 10% of companies reported increases in production, sales or investment due to nearshoring ((Banxico, 2023[5])). This process is expected to continue and gradually strengthen. More than 40% of firms believe that the greatest impact on the Mexican economy will happen in 2024 and 2025, while 23% believe the effects will not materialize until 2026 (Banxico, 2023[5]).

Figure 1. Mexico is benefiting from ongoing changes in global value chains

US gross imports from 5 partners, 12-month moving average, % of total imports
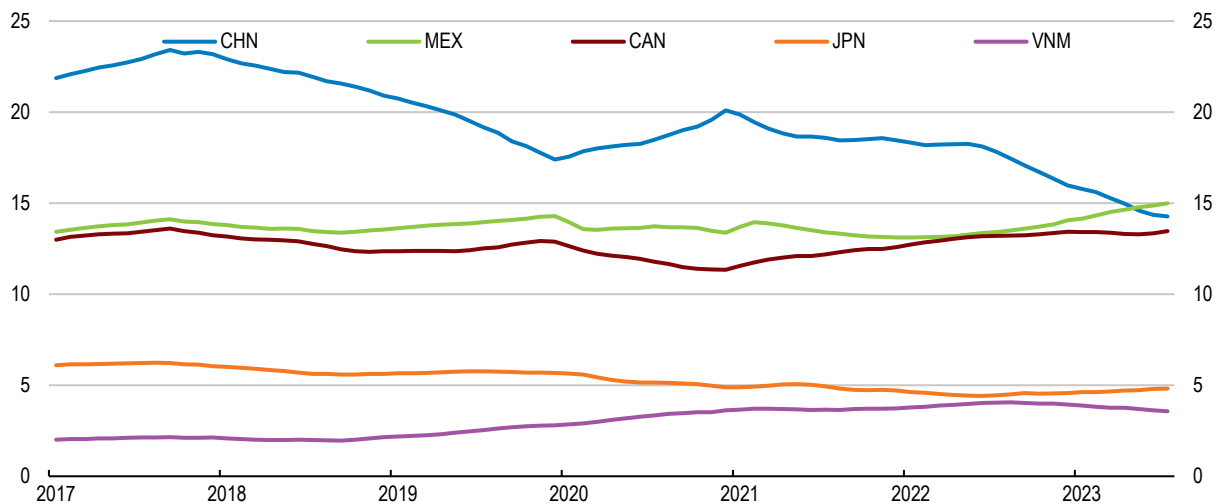
Note: All data are reported in current US dollars
Source: UN Comtrade

Zooming in on the most recent developments in Mexico's participation in GVCs becomes therefore valuable at the current juncture and it can inform public policies decisions. Gross trade flows data provide valuable insights about ongoing changes in global trade but analysing GVC data can provide a more nuanced and detailed understanding of international trade and economic interdependencies. GVC data allows for measuring the value added by each country in the production of goods and services that are traded internationally. This can reveal how much value a country contributes to the final product, differentiating between low-value-added (e.g., raw materials) and high-value-added activities (e.g., design and innovation). GVC data also highlights the interconnectedness of economies and how they depend on each other for inputs, intermediate goods, and services. While being very comprehensive, GVC data come often with a delay. This paper attempts to combine different datasets to provide the most recent evolution of GVCs linkages.

GVCs Data

Production and international trade are increasingly organised in GVCs, where the set of activities or production stages required for the production and sale of final goods and services, from the initial production phases of basic components through to the delivery of after-sales service, is spread across different countries. Firms have always sought to optimise their processes by locating in different countries the various stages of production to specialise in areas of comparative advantage and enhancing productivity growth (ECB, 2022[6]).

Conventional measures of international trade record several times the value of intermediate inputs traded along the value chain. The joint OECD – WTO Trade in Value-Added (TiVA) initiative addressed this issue by considering the value added by each country in the production of goods and services that are consumed worldwide. The TIVA database can be used to calculate indicators of each country's participation and position in GVCs. Gross exports are broken down into the contribution of domestic value-added and the

contribution of foreign value-added to exports (Annex A). First, the backward linkages indicator measures the import content embedded in a country's exports and is proxied by the ratio of foreign value added to the gross value of those exports. Second, the forward linkages indicator measures the domestic value added of goods and services that, after being exported, are subsequently re-exported to a third country (OECD, 2013[7]). The 2023 edition of OECD-TIVA database covers 76 countries and time series from 1995 to 2020.

Trade in value added data are from the UNCTAD-EORA Global Supply Chain Database, involving 189 countries and time series from 1990 to 2022 of the key GVC indicators: foreign value added, and domestic value added embodied in exports. While the derivation of value-added trade from Input-Output tables follows the same approach as the OECD TIVA database, the EORA database offers more recent data and global coverage, including a nowcasting procedure to extend the time horizon covered by the GVC indicator. The nowcasting is based on estimates of exports, imports, and GDP from the IMF's World Economic Outlook (WEO). The UNCTAD-Eora nowcasting of GVC indicators is performed in two stages. First, the value-added contribution from each origin country is adjusted according to their change in GDP. Second, for each exporting country, resulting value added contributions are then rescaled and normalized to sum the IMF WEO database nowcasted values for gross exports (Casella et al., 2019[8]).

Main features of Mexico's GVC participation and recent trends

Mexico's high participation in GVCs has been extensively documented (IMF, 2023[9]). Total GVC participation peaked at almost 56% of total exports in 2022 (Figure 2). Disentangling backward and forward linkages offers a more nuanced picture. Mexico's GVC participation is mainly driven by backward linkages to GVCs, i.e., the share of foreign value added in Mexico's total exports is large. In fact, Mexico's backward participation is one of the highest in the OECD and it has been rising over the last decade (Figure 3). This reflects a strong specialisation in assembling processes, which has served as a strong engine of exports and jobs. Conversely, Mexico's forward participation, i.e., the share of Mexican value added embodied in foreign countries' exports, is relatively low, well below the OECD average (Figure 4) and shows little progress overtime, recently stagnating at 11%.

Mexico's backward participation is concentrated in manufacturing industries (chemical raw materials, electronics, semiconductors, motor vehicle parts), while services, chemicals, mining and petroleum show a higher share of forward participation (Figure 5).Recent changes in services forward participation have been positive but small (Figure 6). Mexico's low forward participation is directly linked to the fact that the country's exports are mostly final goods shipped to NAFTA member countries (OECD, 2017[4]).

Figure 2. Mexican total participation in GVC is high and increasing

% of total exports
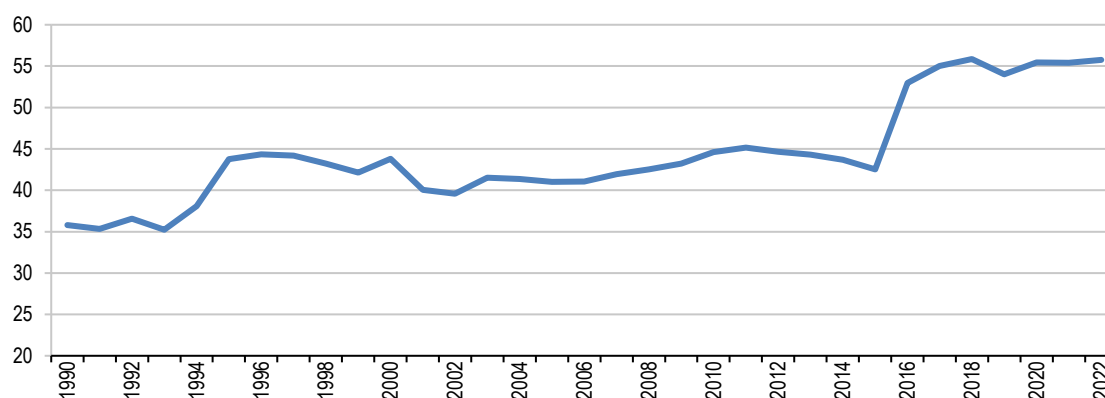
Note: Total participation is computed as the sum of backward linkages and forward linkages.
Source: EORA UNCTAD.

Figure 3 Mexican backward participation in GVCs is high and increasing

Mexican backward participation in GVCs is among the highest in the OECD
% of total exports, 2022

Mexican backward participation in GVCs has increased
Foreign value-added embodied in Mexican exports, % of total exports
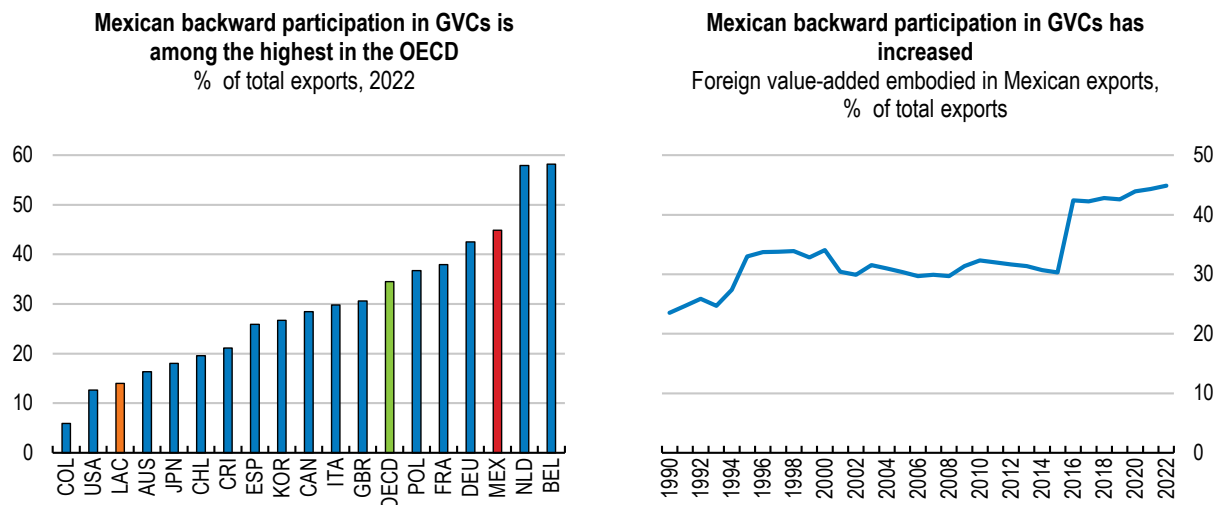
Note: LAC is an unweighted average of Chile, Colombia, Costa Rica, Argentina, Brazil, and Peru. Backward GVC participation corresponds to the foreign value added which is embodied in a country's exports as a share of this country' s total exports.
Source: UNCTAD-Eora Multi-Region Input-Output tables (MRIO) (1990-2017); and estimations (2018-2022).

Figure 4. Forward participation in global value chain remains low

Mexico's forward participation in GVCs remains very below the OECD average
%, 2022

Mexican forward participation in GVCs shows limited progress
Mexican value-added in other countries' exports, %
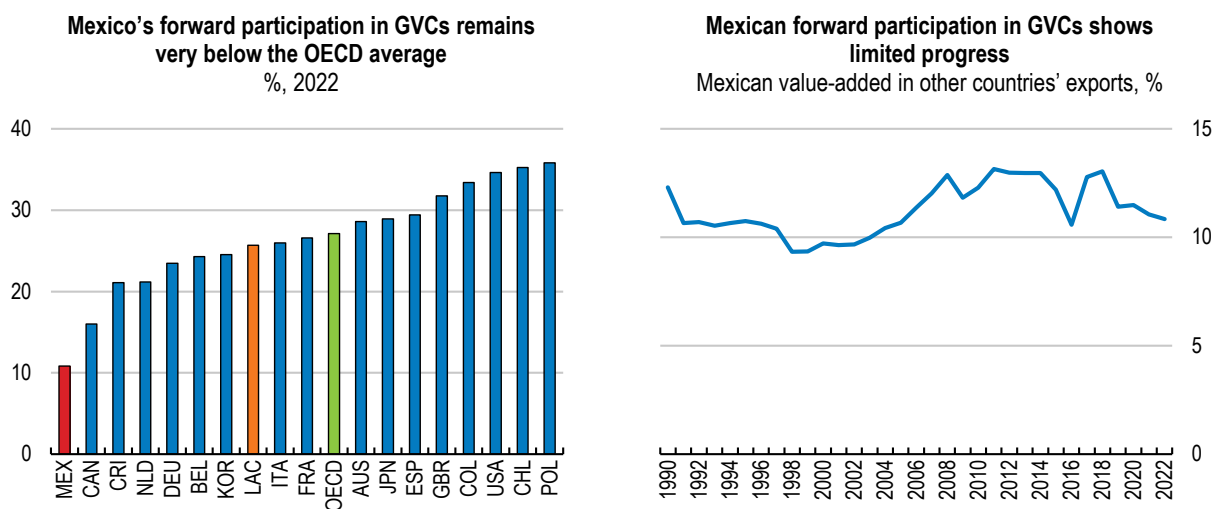
Note: LAC is an unweighted average of Chile, Colombia, Costa Rica, Argentina, Brazil, and Peru. Forward GVC participation corresponds to domestic value added of a country which is embodied in the exports of third countries as a share of this country's total exports.
Source: UNCTAD-Eora Multi-Region Input-Output tables (MRIO) (1990-2017); and estimations (2018-2022).

Data up to 2022 suggest that Mexico is benefiting from United States reallocation away from China more clearly in consumption goods, where China's share went down from 29% in 2017 to 23% in 2022, rather than across intermediate goods (Figure 7). Conversely, Vietnam is clearly gaining market share in both consumption and intermediate goods. Canada has mainly gained in the intermediate goods shares. This seems to suggest that the ongoing reshaping of GVCs can help Mexico to increase further its backward linkages, but there is less evidence so far that it would help automatically to increase forward linkages.

Figure 5. Mexico's GVC participation is concentrated in manufacturing

Backward participation by sectors

Petroleum and gas 2%
Construction 1%
Other 10%
Wholesale trade 9%
Services 22%
Mining 3%
Retail trade 2%
Manufacturing 51%

Forward participation by sectors

Transport 1%
Agriculture 1%
Other 2%
Services 16%
Mining 3%
Wholesale and retail 29%
Petroleum and gas 19%
Manufacturing 29%
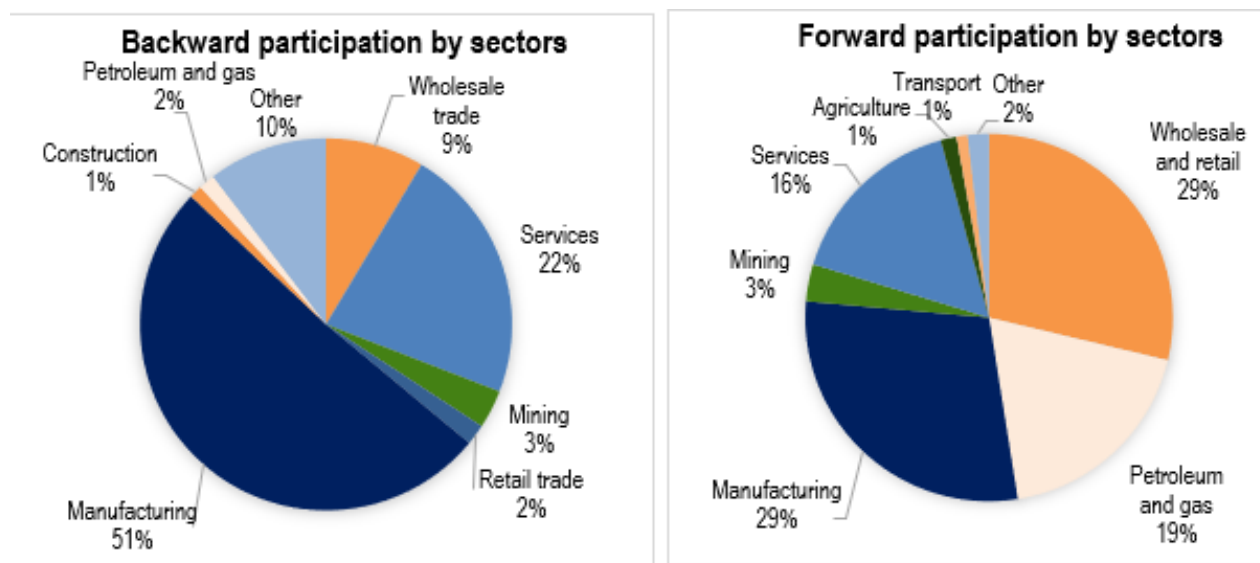
Note: Other sectors in backward participation correspond to communication, agriculture, forestry, financial sector. Backward participation by sectors is the share of foreign value-added of each sector embodied in Mexican exports in the total foreign value-added embodied in Mexican exports.
Source: EORA UNCTAD database, 2022.

Figure 6. Recent changes in services forward participation tend to be small

Forward GVC participation, sector share changes p.p, 2017-2022
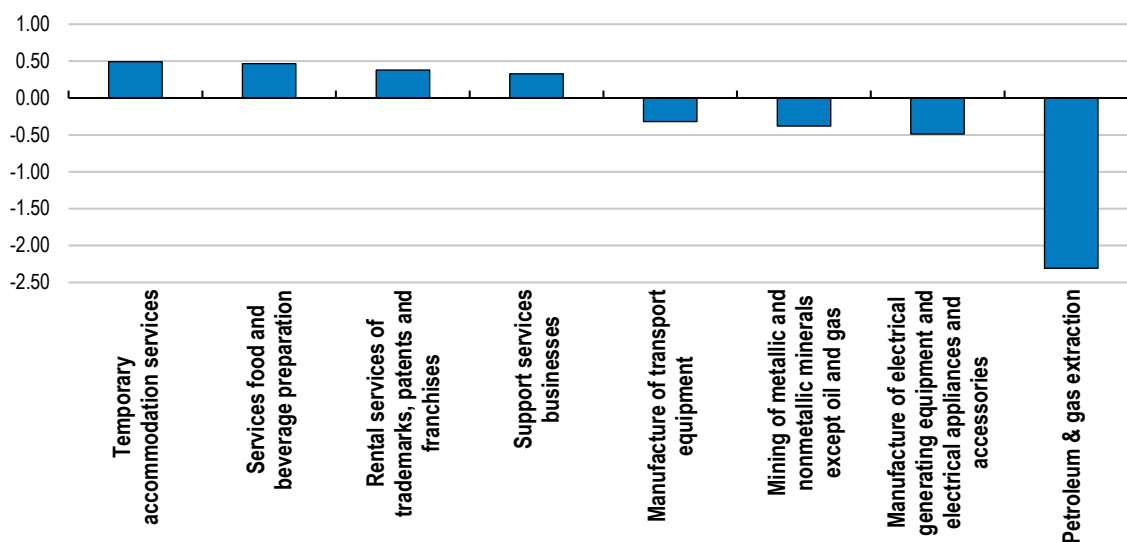
Note: Disaggregated sectors, each country uses its own classification system. These sector names are provided as metadata with all full Eora downloads.Source: Eora UNCTAD

Figure 7. The US import share moves from China to alternative source countries

US import share change (2017-2022), p.p
consumption goods

US import share change (2017-2022), p.p
intermediate goods
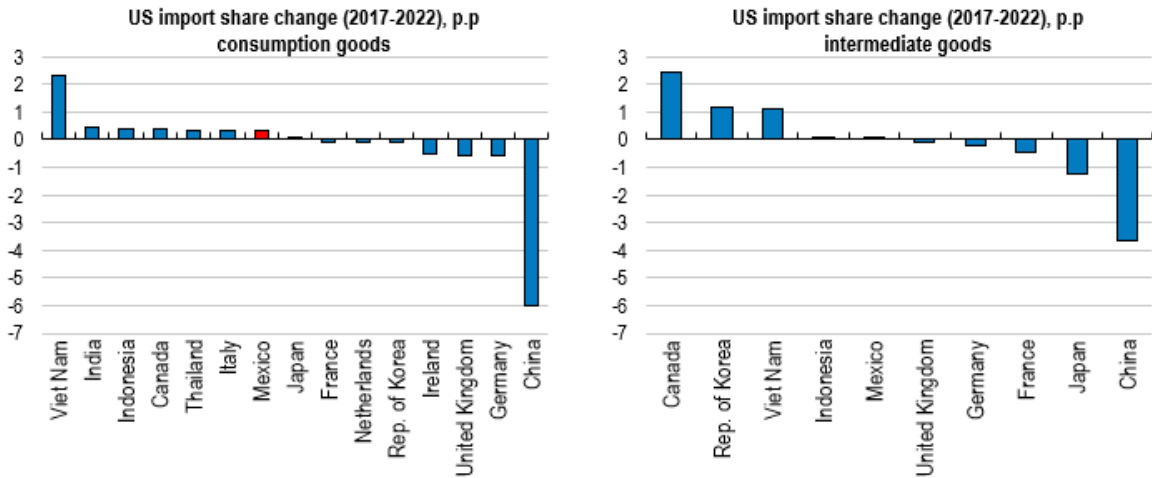
Source: COMTRADE

Another interesting recent change in Mexico's participation in GVCs is that while the United States and Canada remain the main sources of value added for Mexican exports, China has gradually accounted for a larger share of value added in Mexican exports (Figure 9). Mexico's GVC participation with other countries in Latin America is limited, both backward and forward types (Figure 10). This contrasts with other countries in the region such as Argentina, Chile and Costa Rica. Another interesting feature is that while the Mexican backward linkages with the Euro Area are also limited, the share of forward linkages are as important as for other Latin American countries (Figure 8 and Figure 9). Overtime the dependence of exports on inputs from China and United States has increased (Figure 10).

The ongoing reallocation of trade flows implies a slight increase in the upstreamness of US imports, meaning that US is importing fewer final goods. This may suggest increasingly reshoring of production stages performed instead in the US (Alfaro and Davin, 2023[1]). Mexico could take advantage of this trend by increasing its exports of intermediate goods and services to the US, climbing up the GVC and bolstering forward participation. However, so far, nearshoring seems to have increased Mexico's exports to the US particularly in relatively less upstream products (such as vehicles and auto parts), for which the proximity to the US, makes Mexico a natural location for the final stages of assembly of goods, such as motor vehicles, destined for the US market (Alfaro and Davin, 2023[1]). A challenge ahead is to supplement the ongoing specialisation on assembling processes with higher value-added functions being carried out in Mexico.

Figure 8. Mexico's GVCs linkages with China have gradually increased
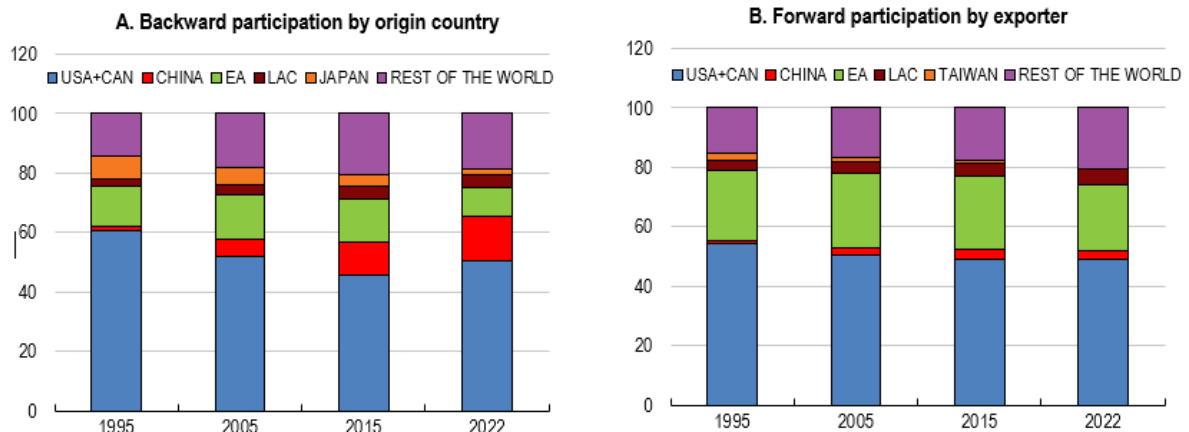
A. Backward participation by origin country

B. Forward participation by exporter

Note: LAC is an unweighted average of Chile, Colombia, Costa Rica, Argentina, Brazil, Peru and Costa Rica.
Source: EORA UNCTAD database, 2022.

Figure 9. Mexico's GVC participation is more skewed towards North America
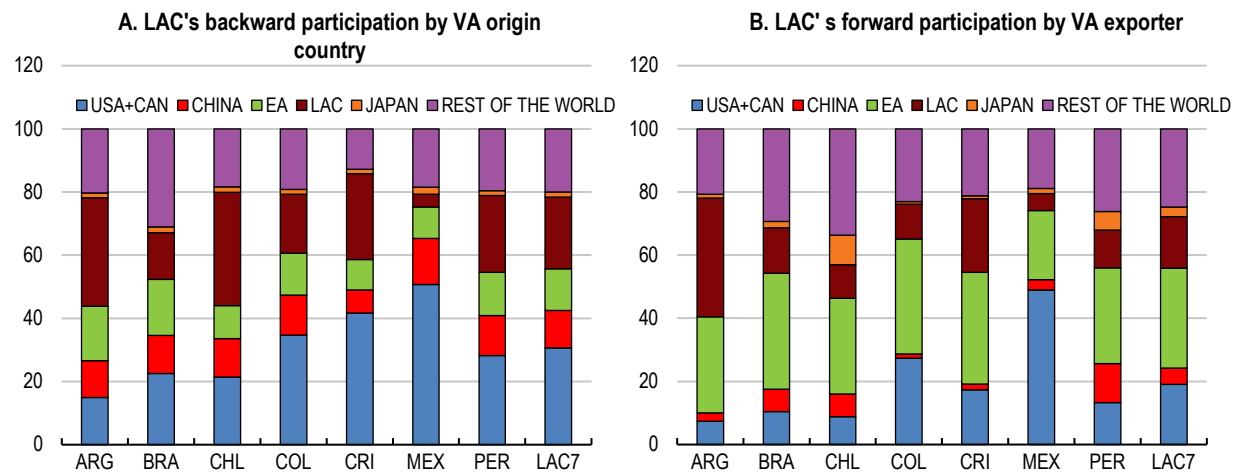
A. LAC's backward participation by VA origin country

B. LAC' s forward participation by VA exporter

Note: LAC is an unweighted average of Chile, Colombia, Costa Rica, Argentina, Brazil, Peru and Costa Rica.
Source: EORA UNCTAD database, 2022.

Figure 10. The dependence of Mexico's exports on inputs from China and the United States has increased
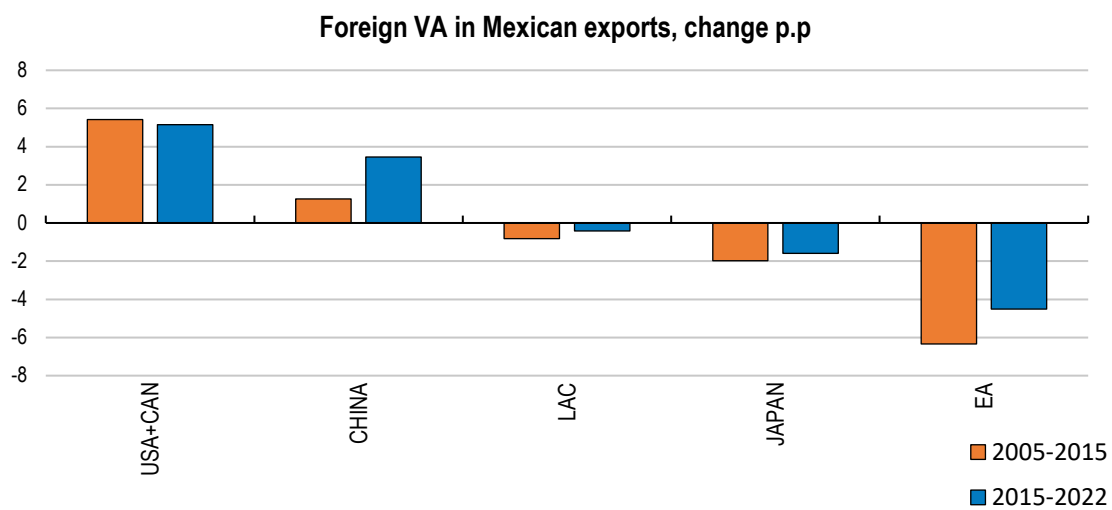
Foreign VA in Mexican exports, change p.p

Source: UNCTAD-Eora Multi-Region Input-Output tables (MRIO) (1990-2017); and estimations (2018-2022).

Drivers of forward participation in GVCs

Participation in GVCs increases productivity through transfers of technology and knowledge and creates jobs, although such increases are more related to forward participation (World Bank, 2022[10]) and (Figure 11). Forward linkages imply sales of local intermediate goods to international buyers, spurring production and productivity in upstream sectors, where higher product value added is concentrated (Baldwin and Ito, 2021[11]). Moreover, technology spillovers help local firms to improve productivity in the upstream sectors and benefit labour markets through demand for skilled workers (Kummritz, Taglioni and Winkler, 2017[12]). By boosting productivity, forward GVCs linkages can promote better remunerated formal jobs. The analysis of drivers of forward GVCs participation is therefore crucial to the economic development of Mexico and its trade competitiveness.

Figure 11. Forward participation is positively related to productivity growth
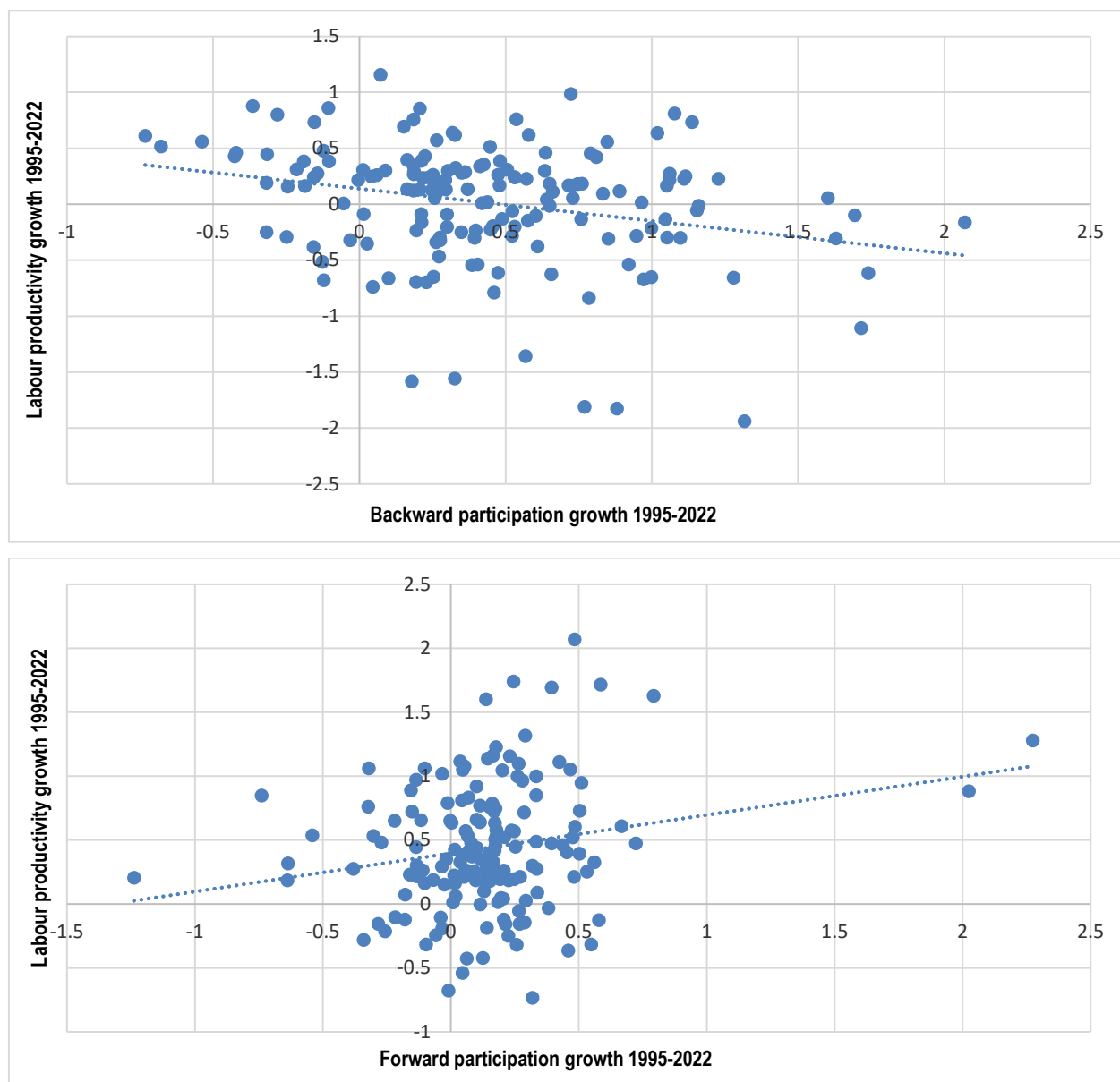
Note: Dots represent countries
Source: Eora-UNCTAD and ILO

Literature review

Empirical studies on the determinants of GVC participation in Latin America and emerging economies find that geographical location, political stability, preferential trade agreements, low import tariffs, FDI inflows, and domestic industrial capacity are the main determinants of GVC participation (Fernandes, Kee and Winkler, 2020[13]). In the case of Mexico, they found that its GVC participation is mainly facilitated by its proximity to the United States with trade policy also playing an important role (Cadestin, Gourdon and Kowalski, 2016[14]). Several studies that quantify the importance of some other GVC participation determinants across a larger number of developed and developing economies found that trade facilitation and logistics performance, quality of infrastructure and intellectual property protection and electricity supply are particularly important (Kowalski et al., 2015[15]). More recent papers show that

similar drivers, such as labour endowment, market size, geography, and the quality of institutions matter at the state level in Mexico (World Bank, 2022[10]).

Several studies provide evidence that GVC participation is associated to labour productivity growth (Constantinescu, Mattoo and Ruta., 2019[16]), differentiating between backward and forward participation effects. A 1% increase in backward GVC participation is found to lead to 0.06% higher labour productivity (although this estimate is not statistically significant), while a 1% increase in forward GVC participation leads to 0.33% higher labour productivity (Kummritz, 2017[17]). Countries with relatively high backward engagement tend to have lower forward participation, suggesting that determinants of participation, and thus policy recommendations, could be quite different for the two types of integration (Kowalski et al., 2015[15]).

A large stream of work focuses on how an economy could create larger value in GVCs by increasing domestic value-added embodied in its exports (P, Ashraf and Umar, 2022[18]; Fernandes, Kee and Winkler, 2021[19]; Kummritz, Taglioni and Winkler, 2017[12]). Investment in knowledge-based capital is an important driver for upgrading in GVCs as it encourages productivity growth by accelerating learning and innovation and by broadening and deepening the skill set in a country. The highest level of value creation in a GVC is often found in certain upstream activities, such as new concept development, design, R&D, or the manufacturing of key parts and components, as well as in certain downstream activities, such as marketing, branding, or customer service (OECD, 2017[4]). This paper attempts to contribute to this stream of literature, expanding country, time and variables coverages.

Methodology

Most empirical analyses on this matter use the gravity model approach to estimate the impact of policies and country-specific factors on GVC participation to benefit from its bilateral perspective (Kowalski et al., 2015[15]; Raei, Ignatenko and Mircheva, 2019[20]; ECB, 2022[6]). Gravity models are widely used to analyse the determinants of bilateral trade and the impact of trade policy. The gravity specification allows to estimate the characteristics of the source and destination countries and to control endogeneity between trade flows and explanatory variables (Yotov et al., 2016[21]).

This paper applies a panel analysis based on a structural gravity equation using data from Eora UNCTAD. Following ECB (2022[15]) and Head and Mayer (2014[17]), a two-step gravity model is estimated using cross-country data from the UNCTAD-Eora database for a sample of 189 countries over the period from 1990 to 2017 to identify the socioeconomic characteristics that affect forward participation in GVCs. We take the perspective of the supplier, that is a country that export value added to the importer, who uses inputs in production and exports the processed product to a third destination. Thus, the dependent variable is defined as the domestic value added of country i embodied in intermediate inputs exported to j, which is processed by j and re-exported to a third country in the form of intermediate or final goods. First, we estimate the impact of a set of explanatory variables such as preferential trade agreements and average tariffs, on the GVC participation. We add country pair fixed effects and origin country time-fixed and destination country time-fixed effects to control for all origin and destination specific characteristics. Second, we estimate which economic and institutional characteristics (such as the rule of law, degree of industrialisation, business regulations, educational attainment, financial development or female labour participation rate) the supplier should have to be upstream in GVCs. All these variables are also interacted with a dummy for Mexico. The coefficient of this interaction is not statistically significant for most variables, meaning that the effect for Mexico is the same as the one for the average country. The regression is estimated using a Poisson pseudo-maximum likelihood (PPML) estimator, which allows to properly cope with zero trade values and heteroskedasticity (Santos Silva and Tenreyro, 2006[22]). We also include intra-national trade flows to identify the impact of borders on value added trade flows.

We use two main data sources for trade policy variables: we retrieve trade agreements from the 2021 version of the Baier-Bergstrand EIA database, whereas tariff levels are from the World Bank. We take the

cultural and geographical distance variables from the CEPII database. The socio-economic characteristics of the countries that are used as independent variables in the analysis are from the World Bank and are listed in the Annex (Table A A.1.).

The specification results in an equation of the form:

$$VA_{ijt}= \exp (\delta_{jt} + \gamma_{it} + b_{ijt} + G_t + \beta_1 TA_{ijt} + \beta2\ Tariffs_{jt}) + \varepsilon_{ijt}\ (1)$$

$$\gamma_{it}= \alpha + \beta_{it}\ X_{it} + \varepsilon_{it}\ (2)$$

Where VA_{ijt} defines the domestic value added embedded in the exports of country i to country j, which are then processed by j and further re-exported to a third country. The set of bilateral determinants over time include different levels of trade agreement depth (TA_{ijt}), and country pair fixed effects (b_{ijt}). Additionally, the terms δ_{jt} and γ_{it} are exporter-time and importer-time fixed effects. They represent the theory-consistent way to control for multilateral trade resistances[2] and for all features that vary at the country-year level, such as GDP, GDP per capita, population, etc. It is also a standard practice to include a time-varying dummy variable that distinguishes international trade flows from domestic trade flows. It is interpreted as a proxy for trade globalisation, as they measure the ease of trading internationally relative to domestically (Bergstrand, Larch and Yotov, 2015[23]). We construct the variable of Most Favoured Nation (MFN) tariffs as ln (1 + T_{ijt}), where $T_{ijt} \geq 0$ is the tariff rate paid by imports to country j (exported from any country i) in year t. Tariffs for domestic trade flows are zero and for international trade flows vary only by country j and year. X_{it} defines a set of variables specific to country i, assessing the extent to which specific economic, policy and institutional characteristics determine its forward participation within the GVC.

Results

Table 1. displays the results of the estimated gravity equation (1). Using exporter and importer fixed effects in the gravity equation, economic characteristics and institutional and policy variables of the origin and destinations countries cannot be correctly identified. Therefore, following ECB, 2022[2] we regress first estimates of supplier country fixed effects on a set of variables specific to source country. Results from equation (2) can be found on Table 2. Detailed information on dependent and independent variables are shown in Table A A.1. in the Annex. As mentioned above, we use the Eora database as it offers more global coverage. There are differences between GVC indicators estimated by the UNCTAD Eora and the OECD TiVA databases, mostly related to the treatment of re-exports particularly in countries such as Belgium and the Netherlands (Casella et al., 2019[8]). As robustness check the gravity equation is also estimated using the TIVA-OECD database (see Table A A.2 and Table A A.3). Results are broadly aligned.

Another robustness exercise is performed in Table 3 and Table A A.4, following Larch et al., 2019[19]. The inclusion of intra-national trade flows allows for identification of the country-specific determinants of GVCs participation. So, in the experiment, we introduce the country-specific covariates that control for institutional quality and economic development in the gravity equation (1) by interacting these variables with a dummy BRDR (Border), which takes a value of one for international trade, and zero otherwise. In this way we can also include importer and exporter time fixed effects and avoid collinearity. Results reveal that most country-specific covariates are statistically significant and consistent with other specifications. We also interact these specific-country variables with an indicator of whether a certain country is either the supplier country or the destination country. In this case, we choose to identify the supplier country and then, Mexico

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[22] The multilateral resistances terms are aggregates of bilateral trade costs. The inward multilateral resistances δ_{jt} measure the incidence of trade costs on each country's consumers as if these consumers buy from a unified market. The outward multilateral resistances γ_{it} are trade costs on country's producers as if they ship to a unified market. The multilateral resistances show that, all else equal, two countries will trade more with each other the more remote they are from the rest of the world (Yotov et al., 2016[21]).

as the reference. The coefficient tracks the relative impact of Mexican characteristics with respect to the rest of the world (relative to domestic value-added trade) (Campos, Pienknagura and Timini, 2023[24]).

Table 1. Determinants of GVC participation: a gravity estimation

	(1) GVC	(2) GVC	(3) GVC	(4) GVC	(5) GVC	(6) GVC
MFN tariffs	-5.871*** (1.157)	-4.273*** (1.164)	-4.277*** (1.263)	-10.87*** (0.449)	-12.82*** (4.347)	-5.684*** (1.168)
GSP	0.0426 (0.0505)	0.0345 (0.0557)				
PTA	0.115*** (0.0292)	0.0996*** (0.0353)				
FTA	0.0531* (0.0320)	0.0377 (0.0254)				
CM	0.240*** (0.0405)	0.158*** (0.0333)				
CU	0.182*** (0.0381)	0.155*** (0.0359)				
ECU	0.233*** (0.0461)	0.0960** (0.0399)				
NAFTA						0.114*** (0.0243)
Mexico				0.228*** (0.0326)		
Fta_			0.0235 (0.0228)	0.560*** (0.0274)	0.324** (0.157)	
Common language				0.345*** (0.0235)	0.115 (0.134)	
Contiguity				0.743*** (0.0433)	0.488*** (0.0729)	
Distance				-0.386*** (0.0193)	-0.519*** (0.0739)	
Observations	555850	555850	555850	558232	520040	674696
Globalization trend	No	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	Yes	Yes	No	No	No
Pseudo R²	0.99	0.99	0.99	0.96	0.98	0.99

Note: Statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors reported in parentheses are clustered by exporter, importer and year. The regression is estimated using annual data for a panel of 189 countries over the period from 1990 to 2017. Exporter time and importer time (annual) fixed effects are included in the panel regression except in column 4 where Population and GDP of the importer and exporter are included. Explanatory variables are the logarithm of distance, dummy variables for using the same language and being contiguous, and whether value added trade flows over an international border. This last variable is also interacted with time. The variable globalization indicates this interaction with a year dummy. The excluded category is the interaction with the year 2017. Fta_ is a dummy variable for any kind of trade agreement, including FTA, CM, CU and ECU. GSP: Generalised System of Preference; PTA: Preferential Trade Arrangement; FTA: Free trade Agreement; CM: Common Market ; CU: Customs Union; ECU: Economic Union. Mexico can be either a dummy that take value one if the exporter or the importer are in Mexico.
Source: Authors' calculations.

According to the empirical analysis, Mexico trades 25% more on average than the rest of the world. Besides, trade agreements and standard gravity variables (common language, contiguity and distance) are all positively associated with GVC participation. This suggests that the North American Free Trade Agreement (NAFTA) has facilitated Mexico's engagement in GVCs, and that USCMA, the new trade agreement, is an opportunity to bolster GVC participation further. Common border and language are also

found to enhance bilateral GVC linkages. Conversely, the tariff rate variable is also statistically significant and represents the greatest barrier to GVC trade, which suggest that Mexico's current trade policy stance of maintaining wide trade agreements and low trade tariffs is conducive to GVC participation. Distance represents also a significant barrier to be integrated into GVCs, as a 1% increase in distance between countries implies 0.6% decrease in GVC participation. This suggests that improving infrastructure, logistic performance and the connectivity of remoted regions, as discussed in the 2024 survey of Mexico (OECD, 2024[25]), can facilitate GVC participation and forward linkages.

Results from the second equation indicate that economic characteristics, institutional and policy factors are important determinants of a country's forward position within the value chain. Economic development and the degree of industrialisation are significant and positively associated with forward participation. Additionally, the share of services value added in GDP is also associated with higher GVC forward participation. Services are upstream activities as they are not input-dependent. A large part of the value of manufactured goods comes from inputs of services industries such as management, financial services, telecommunications, auditors, and lawyers, which tend to be more skill intensive (Word Bank; OECD; WTO; IDE-JETRO; UIBE, 2019[26]). With services rising in GVC trade, stepping up efforts to lift barriers to services trade is warranted (Raei, Ignatenko and Mircheva, 2019[20]). In the case of Mexico, barriers to trade in services are particularly large in logistics and transportation sectors (OECD, 2024[25]). The contribution of SMEs to value added of the services sector within the GVCs is higher than that of larger firms (World Bank, 2022[10]). Hence, high trade in services would facilitate more SMEs participating in GVCs and doing so in building forward linkages.

Estimates show that reliance on research and development (R&D) can also raise forward participation by boosting firms' local innovation activities. Results also indicate high-skilled labour is positively associated with forward participation. This can reflect that upstream activities within the GVCs are more skill intensive. Results in Table 3 and Table A A.4 imply that education outcomes are particularly relevant for Mexico GVC participation, as the average effect of tertiary education on forward GVC participation is larger in Mexico than in other countries. Higher female labour market participation also fosters forward participation in global value chains, according to the empirical analysis. Again, the effect is particularly large in the case of Mexico. Higher female labour market participation increases the pool of available talent and skills, allowing business to tap into a more diverse workforce. This diversity can lead to a wider range of perspective and ideas, boosting firms' innovation and adaptability and their ability to move to more sophisticated sectors and activities. Greater labour market participation can also enhance the resilience of supply chains. By having a larger and more diverse workforce, companies can better manage risks associated with labour shortages or disruptions.

Financial inclusion and development, measured by the variable market capitalisation as a percentage of GDP, is also a significant determinant of a country 's position within the GVC according to the empirical exercise undertaken in this paper, and in line with other analysis (OECD, 2019[27]). Financial inclusion means that more people have access to basic financial services, leading to increased entrepreneurship and investment, essential for participating in GVCs. Financial inclusion has recently increased in Mexico, but a significant financial inclusion gap remains, as analysed in Maravalle and Gonzalez-Pandiella (2022).

Results also signal that the quality of institutions matters for upgrading within GVC trade. Improving the rule of law implies a higher degree of contracts enforceability, which boosts legal certainty, essential for attracting foreign investment and encourage domestic entrepreneurship, as it reduces risks and uncertainties associated with cross-border transactions. Similarly, the ease of doing business, proxied by the number of procedures needed to set up a business, as well as the overall quality of infrastructure, play a role as determinants of GVC forward participation. Results are in line with similar analysis performed in (ECB, 2022[15]; Raei, Ignatenko and Mircheva, 2019[14]).

These econometric results are consistent with survey information collected by the Central Bank of Mexico, which highlights that, beyond a favourable business climate, elements such as the rule of law or human

capital are key factors to attract foreign direct investment and build new global value chains (Banxico, 2022[28]).

Table 2. Determinants of forward GVC participation

	(1) Forward	(2) Forward	(3) Forward	(4) Forward	(5) Forward	(6) Forward	(7) Forward
GDP	0.0759***	0.0910	0.0498**	0.0123	0.104***	0.539***	0.430***
	(0.0234)	(0.0591)	(0.0227)	(0.0208)	(0.0114)	(0.0492)	(0.0408)
Population		-0.0164				0.177***	0.283***
		(0.0557)				(0.0477)	(0.0405)
Days to start a business	-0.152***	-0.149***	-0.162***	-0.139***		0.0389	0.0157
	(0.0283)	(0.0295)	(0.0310)	(0.0285)		(0.0259)	(0.0241)
R&D (%GDP)	-0.0518	-0.0580	0.127**	0.113**		0.0177	
	(0.0536)	(0.0574)	(0.0510)	(0.0469)		(0.0452)	
Rule of Law	0.924***	0.907***	1.110***	1.153***		0.236**	0.429***
	(0.113)	(0.138)	(0.118)	(0.0856)		(0.115)	(0.102)
Manufacturing output	0.674***	0.681***	0.314***	0.337***		-0.115	-0.0748
	(0.0890)	(0.0967)	(0.0772)	(0.0717)		(0.0781)	(0.0734)
Services output	2.356***	2.342***					
	(0.326)	(0.319)					
Educational attainment, tertiary education					0.165***	0.143**	0.0874
					(0.0464)	(0.0724)	(0.0710)
Market capitalization	0.0739**	0.0760**	0.114***	0.122***		-0.00693	0.0165
	(0.0289)	(0.0299)	(0.0369)	(0.0291)		(0.0353)	(0.0242)
Female labour force	0.402**	0.399**		0.865***			0.711**
	(0.172)	(0.175)		(0.132)			(0.313)
GDP*MEX				0.492***			
				(0.0811)			
Business*MEX				-0.0842			
				(0.0693)			
Market capitalization*MEX				-0.464***			
				(0.147)			
R&D*MEX				-0.478*			
				(0.264)			
Manufacturing*MEX				-2.542***			
				(0.911)			
Rule of Law*MEX				-0.419			
				(0.272)			
Educational attainment, tertiary*MEX					0.364***		
					(0.0163)		
Female participation*MEX				3.356***			
				(0.646)			
Observations	704	704	708	712	738	420	514
R²	0.55	0.54	0.45	0.57	0.19	0.84	0.84

Note: p<0.01 ***; p<0.05 **; p<0.10 *; robust standard errors in brackets. The regression is estimated using annual data for a panel of 189 countries over the period from 1990 to 2017. In specification 1-5, the dependent variable is a set of country i (origin) fixed effects from equation 1 (specification 2 featuring GVC trade) which are regressed on a series of source country's economic, policy and institutional variables. In specification 6-7, country i (origin) fixed effects from equation 1 (specification 5 featuring GVC trade) are regressed on the source country's economic, policy and institutional variables in logarithms. A robustness check is performed in the Annex using the TIVA database.
Source: Authors' calculations

Table 3. Determinants of GVCs participation: interactions with country-specific variables

	(1) GVC	(2) GVC	(3) GVC	(4) GVC	(5) GVC	(6) GVC-MEX	(7) GVC-MEX
MFN tariffs	-2.559*** (0.944)	-2.653 (1.810)					
GSP	-0.0126 (0.0275)						
PTA	0.0626 (0.0439)						
FTA	-0.0718* (0.0367)						
CM	-0.0385 (0.0609)						
CU	-0.140 (0.107)						
ECU	0.00199 (0.0691)						
Fta_		-0.0143 (0.0359)				0.100 (0.0761)	0.0626* (0.0335)
BRDR_tertiary education_VA_origin	0.445*** (0.153)	0.444** (0.182)			-0.204 (0.197)	1.432*** (0.387)	0.802*** (0.292)
BRDR_services_VA_origin	0.367 (0.328)		1.313*** (0.421)				
BRDR_R&D_VA_origin	0.0200 (0.114)			0.248** (0.121)	-0.00327 (0.184)	-1.018*** (0.146)	-0.682*** (0.216)
BRDR_rule of law_VA_origin	-0.854** (0.389)					-0.732*** (0.157)	-0.679*** (0.152)
BRDR_female_participation VA_origin	-0.0936 (0.513)	-0.602 (0.690)			-0.463 (1.182)	2.547 (2.692)	-1.406 (1.838)
BRDR_businness_VA_origin	0.0393* (0.0204)				0.0635 (0.0438)	-0.162 (0.143)	-0.140 (0.101)
BRDR_manufacturing_VA_origin	0.537** (0.235)	0.621*** (0.148)			0.601*** (0.167)		0.374 (0.695)
BRDR_GDP VA_origin	0.444** (0.189)	0.527*** (0.126)			0.483*** (0.130)	-0.761** (0.323)	-0.00312 (0.135)
Observations	73985	114591	987550	398362	114563	114563	114563
Globalization Trend	Yes	Yes	Yes	Yes	No	Yes	No
R²	0.99	0.99	0.99	0.99	0.99	0.99	0.99

Note: The dependent variable is bilateral value-added trade in levels in all columns and all estimates are obtained in panel settings with the PPML estimators. Regressions are estimated using annual data from Eora-UNCTAD for a panel of 189 countries over the period from 1995 to 2017. Explanatory variables are all in logarithms and interacted with BRDR correspond to characteristics of the countries exporting their value added (forward linkages). For specification from 6 to 7 all explanatory variables are interacted with BRDR and a dummy equal to 1 when Mexico is the supplier of value added. Exporter time, importer time (annual) and country-pair fixed effects are included in the panel regression. The variable globalization indicates the interaction of an international border with a year dummy. Fta_ is a dummy variable for any kind of trade agreement, including FTA, CM, CU and ECU. GSP: Generalised System of Preference; PTA: Preferential Trade Arrangement; FTA: Free trade Agreement; CM: Common Market; CU: Customs Union; ECU: Economic Union. For presentation purposes, we omit the estimates of all fixed effects, including the constant. See text for further details. Statistical significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors reported in parentheses are clustered by exporter, importer and year.
Source: Authors' calculations.

Conclusions

Mexico benefits from a deep integration in global value chains. Backward linkages, i.e., the share of foreign value added in Mexico's exports, are particularly strong. This reflects a specialization in assembling activities in some manufacturing sectors, such as auto and electronics, which has helped many Mexicans to get formal jobs, particularly in Northern states. Nearshoring trends provide an opportunity to strengthen and improve value chain linkages. Particularly it is an opportunity to develop stronger forward linkages, i.e., the share of Mexico's value added in trade partners exports, which tends to be associated with higher levels of productivity.

The empirical analysis undertaken in this paper suggests that Mexico's current trade policy stance to keep free and deep trade agreements and low tariff helps to build forward GVC linkages. Seeking new trade agreements, especially in services, and enhancing trade integration with Latin America would also help to increase GVC participation. The analysis also shows that boosting research and development, strengthening the rule of law, increasing female participation or enhancing education outcomes and financial inclusion would also help to build forward linkages. These are areas where Mexico lags most OECD countries (OECD, 2024[25]). Policy options to close those gaps are discussed in the 2024 OECD Economic Survey of Mexico (OECD, 2024[25]). Reducing barriers to trade in services, particularly large in logistics and transportation sectors in Mexico, could also help to increase services trade and foster forward linkages.

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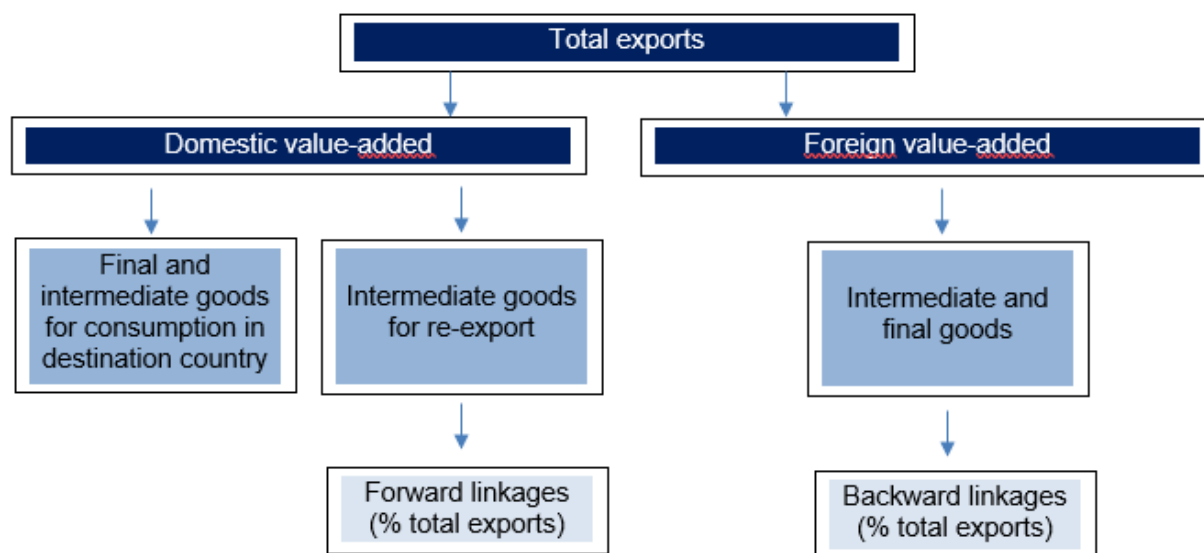
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Annex A.

Figure A A.1. Breakdown of exports in terms of value-added

Note: Simplified decomposition of gross exports, other sub-components (double counting) are not included in our calculations.
Source: Authors' elaboration

Table A A.1. Descriptive statistics of main variables

Variable	Obs	Mean	Std. Dev.	Min	Max
EORA Value added trade flows (thousand US dollars)	1178793	344454.3	1.20e+07	0	2.23e+09
TIVA Value added trade flows (millions US dollars)	150176	2316.5	33931.07	.003	2187088
GSP	888405	.1073497	.3095575	0	1
PTA	888405	.0408192	.1978713	0	1
FTA	888405	.043936	.204953	0	1
CU	888405	.0063169	.0792278	0	1
CM	888405	.0117559	.1077855	0	1
ECU	888405	.0055515	.0743015	0	1
Distance	1058880	7606.777	4432.766	0	19930
Contiguity	1058880	0.018	0.133	0	1
Common language	1035712	0.135	0.342	0	1
Tariff rate, most favored nation, simple mean, all products (%)	675108	9.690817	6.339867	0	84.11
GDP (current thousands US$)	1000912	2.92e+08	1.32e+09	43040	2.30e+10
GDP cap (current thousands US$)	1000912	12.58545	20.60571	.065	193.892
Business (days required to start a business)	499140	32.25213	48.17333	.5	697.5
R&D (% of GDP)	401058	.9489187	.9525632	.00544	5.43562
Population (in thousands)	1059912	33593.9	133401.8	15.691	1412360
Rule of Law: Percentile rank	782838	48.39645	29.25099	0	100

Manufacturing, value added (% of GDP)	952182	12.97591	6.77819	0	49.87942
Services, value added (% of GDP)	988848	53.03491	13.05237	6.448068	96.20488
Educational attainment, at least completed tertiary, population 25+, total (%) (cumulative)	187110	29.30177	11.96213	5.444125	62.74394
Market capitalization of listed domestic companies (% of GDP)	375921	63.96212	110.265	.0092022	1777.226
Female labour force (% of total labor force)	1084104	40.32708	9.619178	7.786072	54.10043

Table A A.2. Robustness analysis with TIVA dataset

	(1) GVC	(2) GVC	(3) GVC	(4) GVC	(5) GVC	(6) GVC
MFN tariffs	-5.138***	-4.390***	-4.524***	-2.930***	-6.783	-7.152*
	(1.570)	(1.421)	(1.386)	(0.342)	(4.160)	(4.148)
GSP	-0.0477	-0.0456				
	(0.0348)	(0.0349)				
PTA	-0.00227	-0.00818				
	(0.0550))	(0.0560))				
FTA	0.0611**	0.0489**				
	(0.0263)	(0.0206)				
CM	0.404***	0.385***				
	(0.0539)	(0.0621)				
CU	0.320***	0.292***				
	(0.106))	(0.112)				
ECU	0.395***	0.339***				
	(0.0572)	(0.0852)				
Fta_			0.0463**	0.185***		0.118
			(0.0196)	(0.0251)		(0.142)
NAFTA			0.160***			
			(0.0276)			
Mexico				0.224***		
				(0.0357)		
Common language				0.418***	0.228*	0.196
				(0.0295)	(0.133)	(0.130)
Contiguity				0.908***	0.408**	0.432**
				(0.0412)	(0.187)	(0.178)
Distance				-0.257***	-0.540***	-0.520***
				(0.0170)	(0.0831)	(0.0907)
Observations	117800	117800	132468	115134	119016	105840
Globalization trend	No	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	Yes	Yes	No	No	No
Country-time fixed effects	Yes	Yes	Yes	No	Yes	Yes
R²	0.99	0.99	0.99	0.97	0.98	0.98

Note: The dependent variable is bilateral value-added trade in levels in all columns and all estimates are obtained in panel settings with the PPML estimators. The regression is estimated using annual data from TIVA-OECD for a panel of 76 countries over the period from 1995 to 2020. Exporter time and importer time (annual) fixed effects are included in the panel regression except in column 4 where Population and GDP of the importer and exporter are included. Explanatory variables are the logarithm of distance, dummy variables for using the same language, being contiguous, and whether value added trade flows over an international border. This last variable is also interacted with time in the last three columns. The variable globalization indicates the interaction with a year dummy. The excluded category is the interaction with the year 2020. Fta_ is a dummy variable for any kind of trade agreement, including FTA, CM, CU and ECU. GSP: Generalised System of Preference; PTA: Preferential Trade Arrangement; FTA: Free trade Agreement; CM: Common Market; CU: Customs Union; ECU: Economic Union. Mexico can be either a dummy that take value one if the exporter or the importer are in Mexico. For presentation purposes, we omit the estimates of all fixed effects, including the constant. See text for further details. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors reported in parentheses are clustered by exporter, importer and year.
Source: Authors' calculations>

Table A A.3. Robustness analysis with TIVA dataset

	(1) Forward	(2) Forward	(3) Forward	(4) Forward	(5) Forward	(6) Forward
Business	-0.0754***	-0.0201	-0.0105	0.0155		-0.120***
	(0.0251)	(0.0238)	(0.0220)	(0.0233)		(0.0428)
DP	0.0371***	-0.0121	-0.0196			
	(0.0139)	(0.0163)	(0.0153)			
R&D		0.142***	0.0638	0.0894*		
		(0.0447)	(0.0394)	(0.0467)		
Rule of Law	0.681***	0.633***	0.410***	1.005***		
	(0.0402)	(0.0639)	(0.0704)	(0.0789)		
Manufacturing	0.345***	0.226***	0.537***	0.205***		
	(0.0521)	(0.0725)	(0.0730)	(0.0696)		
Market capitalization				-0.00588	0.455***	0.516***
				(0.0258)	(0.0755)	(0.0434)
Manufacturing*MEX				-0.960		
				(1.000)		
Business*MEX				-0.229**		
				(0.111)		
Rule of Law*MEX				-1.022***		
				(0.302)		
R&D*MEX				-0.283		
				(0.386)		
Female*MEX				2.301***		
				(0.698)		
Market capitalization*MEX				0.0402		
				(0.153)		
Female labour participation		0.177				
		(0.126)		(0.147)		
Services output			2.006***		-0.510	-0.790
			(0.205)		(0.451)	(0.494)
Tertiary Education					0.200**	0.158
					(0.0840)	(0.107)
Observations	1002	808	808	642	601	444
R2	0.34	0.29	0.37	0.41	0.24	0.27

Note: The dependent variable is the supplier country's fixed effects from estimations in Table A A.2. All estimates are obtained in panel settings with OLS estimators. The regression is estimated using annual data for a panel of 76 countries over the period from 1990 to 2020. In specification 1-4, country i (origin) fixed effects from equation 1 (specification 2 featuring GVC trade) are regressed on a series of country's economic, policy and institutional variables. In specification 5-6, country i (origin) fixed effects from equation 1 (specification 6 featuring GVC trade) are regressed on the source country's economic, policy and institutional variables in logarithms. $p<0.01$ ***; $p<0.05$ **; $p<0.10$ *; robust standard errors in brackets.
Source: Authors 'calculations

Table A A.4. Robustness analysis – Gravity estimations with interactions between country-specific variables and international border

	(1) GVC	(2) GVC	(3) GVC	(4) GVC	(5) GVC	(6) GVC	(7) GVC
MFN tariffs	-1.635* (0.849)	-2.663***	-1.205**				
GSP	-0.106** (0.0423)						
PTA	-0.187* (0.0965)						
FTA	-0.0196 (0.0230)						
CM	0.0986 (0.0609)						
ECU	0.162** (0.0733)						
Fta_			0.0121 (0.0147))	0.0349* (0.0198)	0.0429 (0.0284)	0.185*** (0.0682)	0.0528* (0.0300)
BRDR_tertiary education_VA_origin	0.119 (0.153)	0.356*** (0.136)	0.0339 (0.104)			0.209** (0.106)	
BRDR_services_VA_origin	0.202 (0.443)			1.117* (0.656)			3.108*** (0.00185)
BRDR_R&D_VA_origin	0.144* (0.0792)	0.0438 (0.0837)	0.132* (0.0708)			-0.0630 (0.128)	
BRDR_rule of law_VA_origin	0.235** (0.110)	0.165 (0.125)			-0.0796*** (0.0301)	0.0971** (0.0394)	
BRDR_female_participation VA_origin	0.656* (0.358)	0.672* (0.363)		0.0883 (0.614)		1.443*** (0.542)	
BRDR_businness_VA_origin	0.0178 (0.0166)		0.0176 (0.0173)			0.0227 (0.0250)	
BRDR_manufacturing_VA_origin	0.658*** (0.172)	0.805*** (0.115)	0.751*** (0.0766)			0.296** (0.125)	
BRDR_GDP VA_origin	0.276*** (0.0895)	0.406*** (0.0768)	0.324*** (0.0613)			0.248*** (0.0559)	
Observations	37330	49233	42125	146376	125400	46208	146376
Globalization Trend	Yes	Yes	No	No	Yes	Yes	Yes
R²	0.99	0.99	0.99	0.99	0.99	0.99	0.99

Note: The dependent variable is bilateral value-added trade in levels in all columns and all estimates are obtained in panel settings with the PPML estimators. Regressions are estimated using annual data from TIVA-OECD for a panel of 76 countries over the period from 1995 to 2020. Explanatory variables are all in logarithms and interacted with BRDR correspond to characteristics of the countries exporting their value added (forward linkages). For specification from 5 to 7 all explanatory variables are interacted with BRDR and a dummy equal to 1 when Mexico is the supplier of value added. Exporter time, importer time (annual) and country-pair fixed effects are included in the panel regression. The variable globalization indicates the interaction of an international border with a year dummy. Fta_ is a dummy variable for any kind of trade agreement, including FTA, CM, CU and ECU. GSP: Generalised System of Preference; PTA: Preferential Trade Arrangement; FTA: Free trade Agreement; CM: Common Market; CU: Customs Union; ECU: Economic Union. For presentation purposes, we omit the estimates of all fixed effects, including the constant. See text for further details. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors reported in parentheses are clustered by exporter, importer and year.
Source: Authors' calculations.

Figure A A.2. Mexico's gap to the predicted GVC forward participation shows untapped potential

Mexican value-added embodied in Canada and the United States' exports, US dollars millions
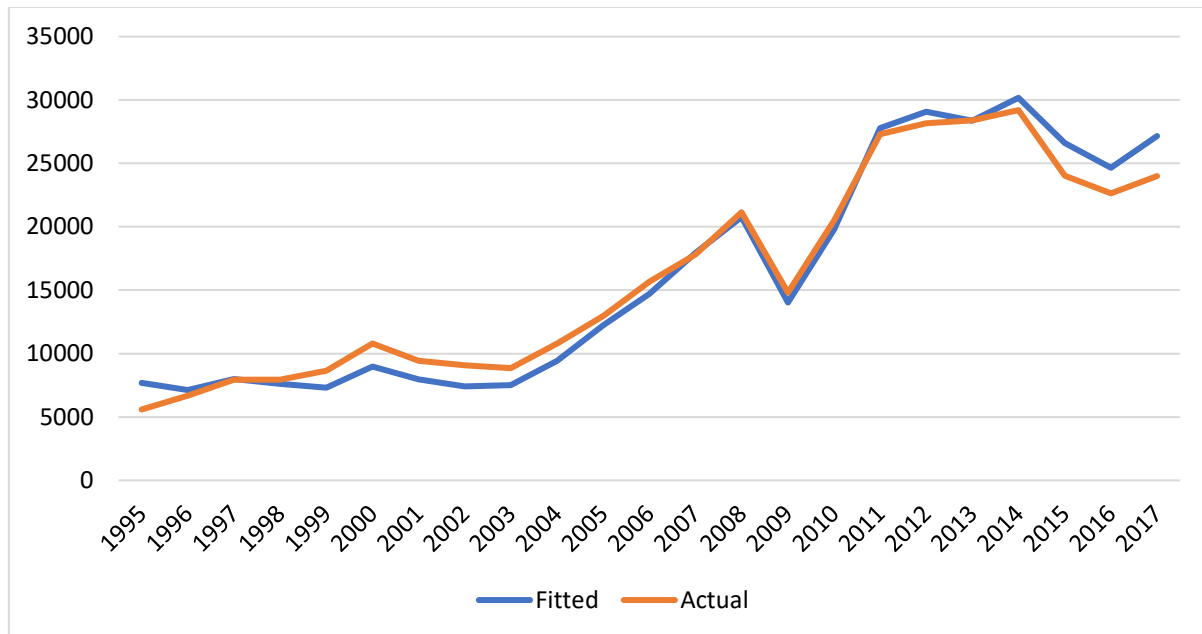
Note: Fitted VA trade flows correspond to estimations in Table A A.2.
Source: Authors" calculation based on TIVA-OECD database.