Trade and decent work in Mexico's automobile sector:

The road travelled and the uncharted territory ahead

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▶ Introduction

Given the globalized market system, the creation of decent jobs depends on the vitality of international trade, in particular, the extent to which productive activities participate in GVCs with robust forward and backward linkages, and generate competitive advantages grounded in innovation rather than low wages. The present case study focuses on Mexico, a country highly integrated into international trade and GVCs. The objective of the study is to analyse the links between the country's export success and its employment performance, specifically in the automotive industry. To carry out the analysis, this study differentiates exports associated with GVCs and more traditional exports not associated with GVCs, with a specific emphasis on gender and skills.

The analysis sheds light on the quantitative as well as qualitative aspects of employment, such as wages and security, that are used to measure the evolution of decent work as highlighted in ILO (2013, 2021a, 2021b). It is based on a previous study of Mexico's textile and automotive industries (Moreno-Brid et al. 2021).

This article considers some possible implications of the USMCA. In addition, it reviews the lessons learned in terms of the necessary data collection requirements for a more detailed and comprehensive picture of the evolution of the indicators of quantitative and qualitative aspects of employment under the trade agreement.

The chapter is organized as follows. Section 4.1 discusses the anticipated transformations and challenges of Mexico's automobile sector, particularly in relation to the USMCA. For this section exclusively, the automobile industry is understood to comprise four economic activities, according to the North American Industry Classification System (NAICS): 3361 "Motor Vehicle Manufacturing"; 3362 "Motor Body and Trailer Manufacturing"; 3363 "Motor Vehicle Parts Manufacturing"; and 3369 "Other Transportation Equipment Manufacturing". It also describes trends in decent work in the sector based on data especially constructed by the authors using the National Survey of Occupation and Employment (ENOE) of the Mexican National Institute for Statistics and Geography (INEGI), and data from the Mexican Institute for Social Security (IMSS). Section 4.2 discusses the main results of the analysis of trade and decent work in Mexico's transport equipment industry (which includes the automotive sector) using input–output methodologies centred on specific characteristics of exports, as mentioned above. In section 4.3, the GVC analysis further examines employment and its dynamics by

gender, status and years of schooling. Transport equipment data are used in sections 4.2 and 4.3 because available input–output tables do not include finer disaggregation to analyse the automotive industry separately. Finally, section 4.4 presents conclusions from the study, including the lessons learned to overcome data limitations.

4.1 Mexico's automotive industry: labour market reforms and trends

The automotive industry is, by far, Mexico's most successful industry and it plays an important role in GVCs.[1] Its success is the result of two factors. On the one hand, an active industrial policy in the late 1970s brought a profound structural transformation that overhauled and modernized all the automotive manufacturing plants. On the other hand, the shift towards trade liberalization with NAFTA in the 1990s pushed the industry to adopt a more outward-oriented strategy. Indeed, the Mexican automotive industry is a unique platform for exports to North America, especially to the United States.

From a macro perspective, the industry holds an important position as a source of foreign exchange, given its spectacular performance in generating net exports and in attracting foreign direct investment. For example, in its reports on economic perspectives, the Bank of Mexico's assessment of the balance of payments has included, since 2018, a special table on Mexico's trade balance both with and without the automotive industry. However, as concluded in Moreno-Brid et al. (2021), the automotive industry's performance in terms of employment and other aspects of decent work falls short. It has major limitations, rooted in its weak domestic (internal) backward and forward linkages to other industries. Its activity primarily involves assembling value-added generated abroad. Consequently, the multiplier effect of the sector on domestic output and employment is low, compared with its impact on the country's balance of payments and commercial accounts. Thus, it is necessary to rebalance and strengthen the industry's impact on economic activity and the labour market through

1 The detailed list of indicators utilized to define the sector can be found in Appendix II.

a combination of active industrial and labour market policies, framed in a new agenda for inclusive and sustainable development.[2]

The objective of this section is to identify the opportunities that can lead the Mexican automotive industry towards a robust, sustainable development path, considering the USMCA. The challenges are also identified through an overview of the trends in the labour market.

4.1.1 Mexico's automotive industry and changes under the USMCA

The ratification of the USMCA trade agreement, the successor to NAFTA, in December 2019 removed the uncertainty that clouded the investment climate during the two years of negotiations, and which threatened to end Mexico's special commercial relations with the United States and Canada.

This relationship, granted by NAFTA, had been the lynchpin of Mexico's market reforms and development agenda for close to three decades. To boost the renegotiations, Mexico's Congress accelerated the approval and enactment of a new federal labour law on 20 April 2021, published in the Federation Official Diary on 23 April, which drastically changed the role of the State in the labour market, and brought about a fairer, more levelled field in negotiations between workers and employers. This new legal framework was fully consistent with the conditions set by the United States and Canada for Mexico's labour regulations during the trade renegotiations.[3] The framework now welcomed workers' freedom of association, with room to create new independent trade unions and labour organizations. It also introduced elements to warrant the election of union leaders via universal, confidential and direct voting, and transformed legal processes to solve labour disputes, moving all of them to the judiciary (USTR 2020, Annex 31-A). Additionally, in 2021, an important modification to the labour law was approved, which limited subcontracting in Mexico, forcefully arguing that it was traditionally used to "dispossess workers of their legal entitlements and defund the IMSS" (González Jiménez 2021).

2 See, for instance, the numerous contributions of Universidad Nacional Autónoma de México's Grupo Nuevo Curso de Desarrollo for forceful arguments to rebuild the social pact and centre it on a new agenda for development in Mexico.

3 For a detailed account of the swift and major changes in Mexico's labour legislation, the modification of Article 123 of the Federal Constitution, and their links to the negotiation of the Transpacific Partnership and of NAFTA/USMCA, see Moreno-Brid et al. (2021), Bensusán and Briseño (2022) and Bensusán in Volume 2.

Thus, the USMCA has had some positive effects for strengthening the automotive sector's continued development and growth.[4] Consolidating Mexico's unique position as a production site to manufacture exports to North America, with the benefit of lower tariffs and trade restrictions, is a strong incentive to attract foreign direct investment to Mexico's automotive industry, and manufacturing in general. Such an incentive has special significance in the current post-pandemic international context, where solid and persistent recovery of the Mexican economy is still more a hope than a reality. Although the Mexican economy grew by 5 per cent in 2021, this was far from compensating for the 8 per cent collapse in 2020. According to the most recent survey of experts' opinions (Banxico 2022), the annual average growth for the next ten years will not exceed 2 per cent. Added to this are long-term issues, such as the possible structural transformation of the automotive industry itself, owing to increased regionalization of supply chains and the increased production of electric and autonomously driven vehicles, led by "regions and players outside the traditional automotive clusters" (Simonazzi, Sanginés and Russo 2020).[5]

There are certainly also challenges presented by the renegotiated trade agreement. Most notably, these are the explicit new rule on value-added that 40 to 45 per cent of an automobile's content must be manufactured in a plant physically located in North America (rule of origin), and the requirement that workers in the industry can earn on average no less than US$16 per hour by July 2023 (USTR 2020). These two conditions are substantial challenges for the Mexican automotive industry if they are not to become major trade restrictions.[6]

The rule on specific percentages of regionally generated value-added is an important issue. Over a three-year period, the USMCA raises the threshold required for passenger vehicles and trucks to be granted tariff-free trade

4 There is no official study published by the Mexican Government on the expected impacts of the USMCA, either on the Mexican economy as a whole, or specifically on the automotive industry. This is in contrast to the United States, where the USTR published a full study on its estimated impacts on the automotive sector in the country; see USTR (2019).

5 Mexico has complained that a recent initiative by the United States, which includes an incentive of between US$7,500 and US$12,500 for buyers of an electric car with 50 per cent of components manufactured in the United States violates the rules agreed in the USMCA.

6 In addition, it should be stressed that, in case the vehicles produced in Mexico do not comply with the USMCA rules and thus are not granted the benefit of tariff-free exports to the rest of North America, manufacturers will have to pay a tariff of 2.5 per cent, that of the WTO's "most favoured nation" (see Serrano 2020; Rosenzweig, Spak and Bond 2021).

from NAFTA's 62.5 per cent of net cost to 75 per cent by 1 July 2023.[7] However, the effects of the COVID-19 pandemic may help to stimulate "US, Canadian, and Mexican trade and investment ... within North America in the future and reduce the region's imports from elsewhere" (Gantz 2020).

Additionally, the wage the USMCA aims to implement is well above the US$6.65 per hour average for auto manufacturing workers, and US$3.98 average in the automobile parts manufacturing sector, in Mexico (García, Carrillo and Bensusán 2021). It is unlikely that such a large wage gap can be closed in the foreseeable future, given the production and employment structure of the sector. Moreover, the target wage rate is set in US dollars, so the gap is affected by the exchange rate and will automatically widen with any depreciation of the Mexican peso vis-à-vis the US dollar.[8]

Nevertheless, the two recent policy changes in Mexico's labour market could support a move in the direction of complying with wage increases. First, the new federal labour law, coupled with the threat of USMCA sanctions, may lead to the emergence of new independent trade unions in the industry. Second, the López Obrador administration authorized in 2018 an annual increase in the federal minimum wage well above inflation (as measured by the variation of the consumer price index).[9]

However, it should be noted that the extent to which a rise in the federal minimum wage induces a significant rise in average wages in the automotive sector could be limited, given the large difference between them.[10] Yet, this may change in the future as the difference between the minimum wage and the median wage in the industry is narrowing. In 1994 the average wage of the automobile sector was US$1.90 per hour; between 2016 and 2018 it increased to US$2.30, and in 2019 it reached US$4.00 per hour (Covarrubias 2020; Bensusán and Briseño 2022). Thus, the wages of the automobile industry have increased by around 50 per cent in more than 20 years, while the national minimum wage has doubled in less than a decade.

The next section provides an analysis of labour conditions in the automotive sector. It provides more details on employment, wages and other labour

7 Under the transaction value method, the percentage lies between 75 and 85 per cent. The discussions on the RVC were perhaps the most contentious ones in the USMCA negotiations. (For a detailed analysis, see Rosenzweig, Spak and Bond (2021) and Nuñez (2021)).

8 However, on this matter Jesús Seade – once Chief Negotiator of the USMCA – stated that this requirement "can be met in Mexico through the salaries of engineers and administrative staff" with no need for shop floor wages to rise (González Jiménez 2021).

9 The increase was formally approved by Congress in 2020.

10 For an empirical analysis of the impact of the minimum wage on median and average wages in the case of Mexico, see Mexico, Comisión Nacional de los Salarios Mínimos (2016).

market trends, taking into account disaggregated information by key variables like gender. Together, these variables help to provide a picture of decent work in the industry.

4.1.2 Decent work in Mexico's automotive industry: 2005–19

The Mexican automotive industry has created formal jobs in a country where nearly half of the employed population works in informal conditions. In 2019 employment in the automotive industry increased to reach almost 1.4 million, up from about 636,800 in 2011, and 540,800 in 2009 (table 4.1).[11] During the same period (2009 to 2019), informality in the industry fell from an already low percentage of 4.0 per cent to 2.1 per cent.[12] Furthermore, the automotive industry has a much lower level of informality compared with the national average (the national informality rate was 56.5 per cent in 2019 compared with 2.1 per cent in the automotive sector), according to INEGI (2019a).

Along with the increase in employment, the percentage of women employed in the industry also increased: from 34.8 per cent in 2005 to 36.9 per cent in 2019. This figure is low, however, compared with the national increase of over 15 percentage points in women's employment in the last 10 years (INEGI 2019a). In addition, about one out of five positions in senior and middle management is held by a woman, a share that has remained consistent over the past decade.[13]

▶ **Table 4.1 Employment in Mexico's automotive industry, selected indicators (2005, 2011 and 2019)**

Indicator		2005	2011	2019
Employment	Total (persons)	540 762	636 788	1 333 970
	Informal employment rate	4.0	3.4	2.1
	Percentage of women among total employed population	34.8	32.5	36.9

11 A substantial part of employment in 2019 was associated with the BMW automobile company beginning operations in San Luis Potosí, generating about 3,000 direct jobs and close to 30,000 indirect jobs.

12 **Source:** INEGI, ENOE.

13 According to the 2011 SINCO (INEGI 2011), "senior" and "middle" refer to persons that carry out managerial, administrative, regulatory, planning and coordination activities in private companies and organizations.

Indicator		2005	2011	2019
Female share of employment in senior and middle management	Percentage[1]	n/a	21.5	21.3
Permanent workers as a percentage of total employed population	Total	74.0	71.7	65.9
	Men	74.6	70.3	64.3
	Women	72.8	74.6	68.8

Note: n/a = not available.
[1] Female share of employment in senior and middle management indicator for 2011 corresponds to 2012, year in which INEGI incorporated more variables into the National Employment and Occupation Survey.
Source: INEGI, ENOE and IMSS.

The percentage of permanent workers in the automotive industry fell from 74 per cent of the total employed population in the automotive industry in 2005 to 65.9 per cent by 2019. There was a similar decline in the share of both men and women with permanent contracts, even though the decline in the case of women was noticeably less steep. Besides, by 2019, the share of women with permanent contracts was higher than that of men. This drop in permanent contracts may stem from a combination of several factors. It may reflect a change in the composition of firms in the industry, such as an increase in SMEs, which tend to hire fewer workers on permanent contracts. It may indicate changes in the industry's outsourcing patterns to incorporate more workers in scantly qualified tasks which, from the firm's viewpoint, need not be covered by a permanent contract. But it may also illustrate, as the ILO has stressed, the tendency towards increased flexibility and reduced protection that has marked the evolution of labour markets across many countries in recent years (ILO 2022).

Nonetheless, it is important to underline that the automotive industry has one of the highest rates of permanent workers in the Mexican industrial complex due to the more specialized nature of work in the industry, the presence of large multinational companies and the positive correlation between formality and open-ended contracts. Indeed, at the national level, the rate of permanent workers is around 30 per cent, which is less than half of that in the automotive industry (IMSS 2019).

Employees in the automotive industry are also characterized by higher wages compared with the rest of the manufacturing sector, and considerably higher wages than the national average (US$3.50 per hour in the manufacturing sector and US$2.00 at the national level, compared with US$6.00 in the automotive industry). It means that, on average, the automotive industry offers substantially better wages than other manufacturing industries (almost twice as high), and over three times as high as the average of the

rest of the economy. However, an analysis of data disaggregated by sex is important to take into account the large and persistent gaps in terms of female labour force participation, as well as income.

The ratio of the gender pay scale, which measures the proportion of women earning more than three times the minimum wage compared with the number of men in the same category,[14] increased from 0.15 in 2005 to 0.26 in 2019 (table 4.2). It means that, in 2019, for every 100 men earning three times the minimum wage, so did 26 women; while in 2005, it was only 15 women. However, additional data reveal that the improvement in the gap is accompanied by a deterioration of the wage scale composition of employment for both men and women. Thus, there are increasing proportions of both men and women in jobs paid at relatively low scales in terms of multiples of the minimum wage.

Between 2005 and 2019, indicators showed a deterioration in wages most probably associated with a series of global challenges to the automotive industry. Indeed, in 2019, prior to the COVID-19 outbreak, global demand for automobiles had already fallen and overall production contracted by 5.2 per cent. In the case of Mexico, production fell by 2.8 per cent in the context of the beginning of an economic recession. Yet employment remained stable, perhaps due to a reduction in wages and working hours instead of job cuts. Indeed, the percentage of workers who worked more than 40 hours a week plummeted from 94.4 per cent in 2005 to 68.3 in 2019, while the percentage of workers with incomes equal to or below the minimum wage increased from 0.9 per cent of workers in the industry in 2011 to 7.3 per cent in 2019. It is necessary to emphasise that, prior to 2019, the minimum wage in Mexico was below the poverty line. This implies that, prior to the increase decreed by the López Obrador administration, a small share of workers in the automotive industry received insufficient income to meet their basic needs. Additionally, the share of workers earning less than two thirds of the median wage increased from 64.2 to 74.8 per cent over the same period.

14 In Mexico's official statistical information, workers' and employees' earnings are usually reported in multiples of the minimum wage. See INEGI's ENOE.

▶ **Table 4.2 Wages and working poverty rates in Mexico's automotive industry, selected indicators (2005, 2011 and 2019)**

Indicator		2005	2011	2019
Gender pay scale	Ratio (wages of women/ wages of men)	0.15	0.18	0.26
Working poverty rate	Percentage of workers earning the minimum wage	1.7	0.9	7.3
Employees with low pay rate	Percentage of workers' wages less than two thirds of median wage	64.2	64.1	74.8

Source: INEGI, ENOE and the National Council for the Evaluation of Social Development Policy (CONEVAL).

▶ 4.2 Mexico's transport equipment integration in global value chains

This study relies on the information from the ADB-MRIO to calculate – for any given country – the value-added incorporated in its exports for the transport equipment industry, which includes the automotive industry. As the most recent input–output database released, the multi-regional input–output tables cross-analyse the information from 62 countries in 35 sectors (following the International Standard Industrial Classification of all Economic Activities Revision 3 (ISIC Rev.3)) from 2000 to 2020.[15] Of these 35 sectors, 14 belong to manufacturing.

Compared with an earlier study (Moreno-Brid et al. 2021), which also included the textile industry, the focus of this study is solely on the transport equipment sector as defined in ISIC Rev.3 and the analysis is extended to 2019 (as opposed to 2011 in the previous study). In the ISIC Rev.3 statistical classification, transport equipment covers other industries besides the automotive industry, including other types of transport vehicles (see Appendix I). While this study focuses on the automotive industry, the input–output tables available do not present data disaggregated for this

15 We used annual input–output tables for the year 2000 and from 2007 to 2019.

industry. However, the sheer weight of the automotive industry in the transport equipment sector makes it safe to use the data for the former as a proxy. Indeed, the automotive sector represents, on average, 93 per cent of the total GDP of the transport equipment sector in the period of study. Moreover, according to data on firms that are mainly exporters, the value-added in the automotive industry represented, on average, 98 per cent of the total value-added in the transport equipment sector between 2005 and 2019 (INEGI 2019a). Our study also incorporates a gender and skills perspective in the employment analysis.

The input–output methodology decomposes the total value of gross exports into four categories: (i) domestic value-added (DVA); (ii) foreign value-added (FVA); (iii) value-added re-exported to the home country;[16] and (iv) pure double counting (Wang et al. 2017). DVA corresponds to the value generated in the country of analysis (in this case, Mexico), and it can refer to final or intermediate goods further processed in destination countries. It measures the country's participation as a "supplier" of value-added in international export markets. FVA captures the country's position as "user" of value-added incorporated by and from other countries. It captures the contribution of value-added originated in other countries, but used as inputs in the exports of the country of analysis. Similar to DVA, FVA can refer to final and intermediate goods. However, this study focuses on inputs contained in exports, so it is not necessary to make the distinction.

The last two categories account for less than 5 per cent of total exports, so we focus on the first two categories, DVA and FVA. The first empirical analysis is carried out from a global network perspective. This is done by examining the bilateral flows of value-added between a pair of countries as obtained by Wang et al.'s decomposition.

The network graph in figure 4.1 depicts the interchange of DVA among pairs of countries as well as the relative importance of individual countries in the global exchange of DVA in the transport equipment industry. Each country, or group of countries (EU-15 and EU-13), is represented as a node or circle in the graph. The DVA exported from country *i* to country *j* (w_{ij}) is shown by the line linking both countries. Note that if country B receives DVA from country A, from the perspective of country B this would be equivalent to FVA and vice versa. Thus, all DVA sent from a specific country can be analysed as FVA from the perspective of recipient countries.

16 In GVC accounting, intermediate goods may return to their country of origin for further manufacturing. For instance, in selected literature, we have found that automobiles and aerospace structures cross the border between Mexico and the United States more than once during the production process of cars and aircraft.

The resulting network is directionally marked and weighted to easily depict the direction and the intensity of commercial relations between countries. For the sake of simplicity, if w_{ij} is smaller than 0.01 per cent of the total DVA in exports, it is not shown in the graph. The size of the nodes represents the weighted so-called "out-degree"; that is, the sum of DVA that the country exports to other countries. The colour of the nodes shows the weighted "in-degree"; that is, the sum of DVA received from other countries, which can also be understood as FVA as explained before. Finally, the thickness of the lines captures the magnitude of DVA exchanged between two countries. In the case of Mexico, the outgoing lines are green, and the incoming lines are blue. For the sake of simplicity, the figure does not differentiate between incoming and outgoing lines for the other countries.

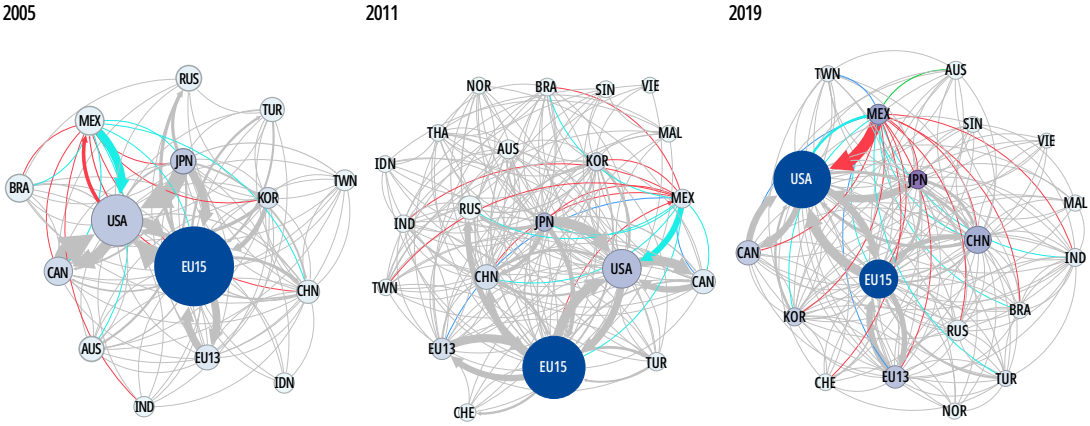
Figure 4.1 shows the global network for DVA in transport equipment for three years: 2005, 2011 and 2019. In 2005, the most significant node in the network in terms of incoming and outgoing value-added was the EU-15. The second most relevant was the United States, as it traded with all other countries in the graph, especially with Canada, Japan, the EU-15 and Mexico. In the case of Mexico, not surprisingly, its leading trade partner was the United States, as the thicker green and blue lines reveal. Mexico exports DVA to the EU-15 and Canada, and receives it through imports mainly from Brazil, Canada and Japan.

By 2011, the most relevant change in the network was that trade exchanges of the EU-15 and the United States were more diversified in terms of trade partners than in 2005. For example, the exchange of DVA between the EU-15 and China was more noticeable in 2011 than in 2005. In the case of Mexico, exchanges with the United States continued to be the most relevant. However, the addition of new green lines shows that Mexico started exporting to new countries, including China and Brazil. The links also indicate that Mexico began importing value-added from more countries (in particular, the Republic of Korea, Taiwan, China, the Russian Federation and China) along with its previous partners (Canada, Japan and Brazil).

Finally, the graph for 2019, the year before the COVID-19 pandemic, shows a few interesting changes. First, the United States consolidated its position as the leading exporter of DVA, dwarfing the EU-15 group. The greater relevance of the United States automatically increased Mexico's presence in the network. This is due to the trade agreements between Mexico and its northern neighbour, and more precisely the cross-border activities of American automotive firms with facilities in both countries. These changes are noticeable in the size and colour of the node, and the thickening of the lines indicating DVA exchanges with the United States and other countries. Another salient point is that, although Mexico exported more DVA to the United States than it received from it in the three years analysed, the exports

(green line) increased substantially in 2019. Finally, another important aspect is that Mexico continuously diversified its export destinations for DVA between 2005 and 2019, including to Australia, India, Switzerland and the EU-13. The country also began importing value-added from Thailand, India and Türkiye. In 2019, Mexico was importing value-added from a wider range of countries than in 2005.

▶ Figure 4.1 DVA in the global export network for transport equipment, 2005, 2011 and 2019



Note: AUS = Australia; BRA = Brazil; CAN = Canada; CHE = Switzerland; CHN = China; EU-13 = 13 countries joining the EU in 2004 and 2007 (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia); EU-15 = the first countries joining the EU (Belgium, Denmark, Germany, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Spain, United Kingdom and Sweden); IDN = Indonesia; IND = India; JPN = Japan; KOR = Republic of Korea; MAL = Malaysia; MEX = Mexico; NOR = Norway; RUS = Russian Federation; SIN = Singapore; THA = Thailand; TUR = Türkiye; TWN = Taiwan, China; USA = United States; VIE = Viet Nam.

The size of the nodes represents the weighted out-degree. The intensity of the purple colour in the nodes shows the weighted in-degree. In the case of Mexico, the lines of DVA sent (outgoing) are green, and the DVA lines from other countries (incoming or FVA from Mexico's perspective) are blue.

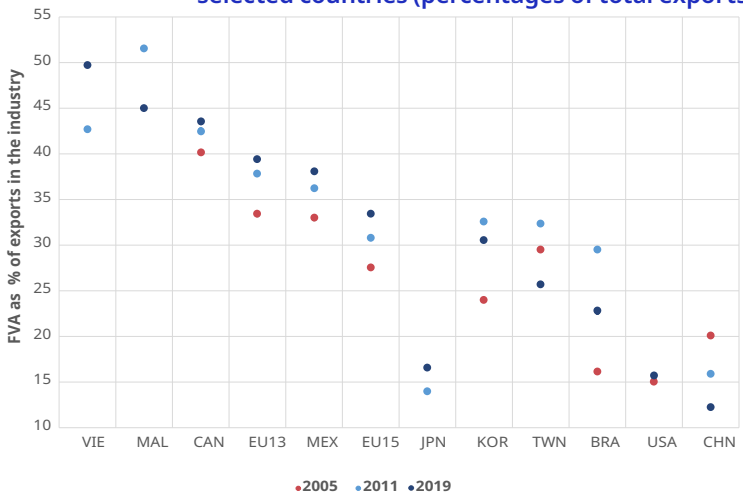
Source: Authors' elaboration based on the ADB-MRIO database.

However, trade diversification may not continue at this pace in the near future, considering the stricter regulations on rules of origin under the USMCA regarding the regional content of value-added required to benefit from tariff preferences in exports to North America. The USMCA tightened some regional value content rules, in particular for the automotive sector (Okabe 2019). The new measures imply that a certain percentage of the primary and complementary parts necessary to manufacture an automobile must be produced in the United States, Mexico or Canada. However, as explained above, Mexico's transport equipment industry incorporates imported value-added that originates in countries outside the region (such as Thailand, India and Türkiye).

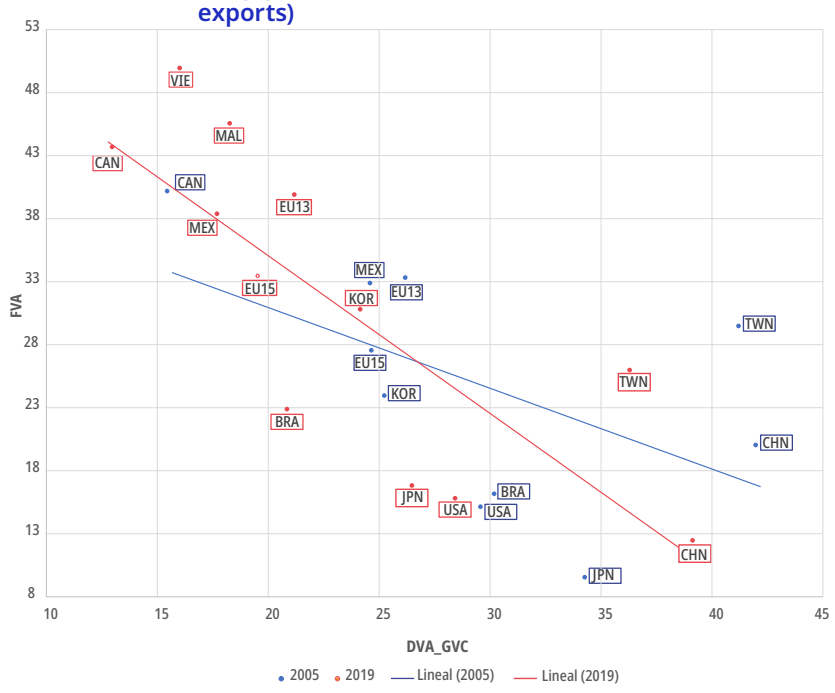
Thus, it is essential to analyse both the FVA and DVA trends as a percentage of total exports that account for Mexico's changing participation in the GVC of transport equipment. Such an analysis can provide insight into the quantity of value-added, on average, generated in the country, and the quantity that needs to be imported to allow exports. Plotting FVA as a proportion of each country's gross exports, as in figure 4.2.a, reveals interesting patterns. Mexico shows a high proportion of FVA in gross exports (almost 20 percentage points), almost twice as much as Brazil and 10 percentage points above the Republic of Korea. Nonetheless, Mexico's figures for the transport industry are around the mid-range of the economies shown in the figure.

The portion of DVA that corresponds to intermediate exports of country i used to produce exports in the importing country j (DVA_{GVC}) is of particular interest. In line with Wang et al. (2013), this concept can be used to measure precisely the participation of a country in a GVC characterized by the production of goods in several stages across several countries (since the added value crossed at least two borders: from country i to country j, and then from country j to country z). In general, however, it should be noted that the automotive industry is characterized by a higher level of FVA and a lower level of DVA_{GVC} compared with industries with less embedded technology or natural resource-based industries. Moreover, production involves multiple steps that include the manufacturing processes of intermediate inputs. Thus, in almost all countries, the proportion of FVA in gross exports increased between 2005 and 2019, except in Taiwan, China, the Republic of Korea, Brazil and Malaysia (which had higher values in 2011). China experienced a reduction in the ratio of FVA in gross exports over the period. Indeed, both China and Taiwan, China have made efforts to produce more intermediate goods domestically. This means that they include more DVA and consequently rely less on imported goods to produce exports.

▶ **Figure 4.2.a FVA in the transport equipment industries, 2005–19, selected countries (percentages of total exports)**



▶ **Figure 4.2.b Transport equipment: Participation in GVC by FVA and DVA_{GVC}, selected countries, 2005 and 19 (percentage of exports)**



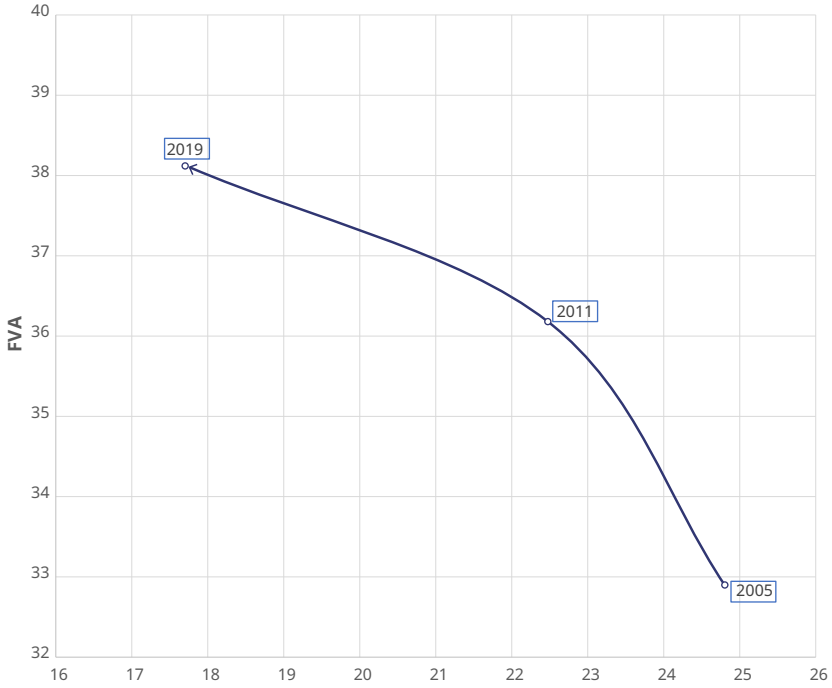
Source: Authors' elaboration based on ADB-MRIO data.

Figure 4.2.b reports on both FVA and DVA_{GVC} as a percentage of exports. Countries with high FVA tend to register a lower level of DVA_{GVC}, for example Viet Nam, Malaysia, Canada and Mexico. These countries participate mainly in the assembly portion of the transport equipment GVCs. By contrast, countries with lower FVA tend to register a higher level of DVA_{GVC}. Yet there are some exceptions. For example, Taiwan, China has a high level of DVA_{GVC} for the transport equipment industry, but its level of FVA is not significantly low. Conversely, Brazil has a low level of DVA_{GVC}, but also a relatively low FVA. It may be important to note that both countries have a relatively minor presence in the relevant network. Figure 4.2.b also indicates that the United States and Japan, countries with major global automotive manufacturers, register relatively low levels of FVA and, simultaneously, some of the highest levels of DVA_{GVC}. One reason behind this is that automobile companies in these countries own the intellectual property and brand names and, thus, can collect higher portions of DVA along with the GVC.

Finally, figure 4.2.b shows that the linear trend of 2019 has a steeper slope than the corresponding one of 2005. This suggests that the values of FVA were generally higher in 2019 than in 2005, and conversely, that the values of DVA_{GVC} were lower for all countries.

Figure 4.3 shows the evolution of Mexico's participation in GVCs, which has shifted to the upper left of the graph, indicating more reliance on foreign inputs. Thus, even though Mexico's participation in the automotive network has increased, as demonstrated previously, it has caused the country to reduce DVA and increase FVA. The DVA in exports decreased by seven percentage points (from 25 to 18 per cent) between 2005 and 2019, and the proportion of intermediates imported from other countries increased by five percentage points (from 33 to 38 per cent).

▶ **Figure 4.3 Mexico's participation in the transport equipment GVC, 2005–19 (percentage of exports)**



Source: Authors' elaboration based on ADB-MRIO data.

In conclusion, over the 15 years between 2005 and 2019, the role of Mexico as an essential link in the transport equipment GVC, particularly in relation to the United States, was consolidated.[17] In comparison, from 2011 onwards, the relative importance of the United States grew in the global automotive network, and so did Mexico's opportunity to increase its number of trade partners in this industry. However, this has meant an increasing proportion of foreign inputs in Mexico's exports (FVA), but not an increase in the value-added that Mexico incorporates in other countries' exports (DVA). Thus, Mexico has not yet taken the opportunity to incorporate more value-added into this GVC by taking advantage of the interconnection inherent to being one of the leading trading partners of the United States in the transport equipment industry. Moreover, as the USMCA has tightened the regional value content rules, the high reliance of Mexico's exports on imported

17 This trend was already identified in Moreno-Brid et al. (2021), although for a different period (1996–2011).

components might imply that many firms supplying Mexico from outside the region may cease to benefit from the USMCA in the not-too-distant future. This, in turn, may decrease Mexico's appeal as a destination for foreign investment.

▶ 4.3 Jobs in Mexico's automotive industry

One of the main objectives of the present study is to examine the relation between Mexico's improved export performance, increased participation in the automotive GVC, and decent job creation. The focus on jobs includes the qualitative aspects of employment, with an emphasis on characteristics such as gender and skills.

This section begins with a discussion about the evolution of employment in the transport equipment sector. After explaining the methodology, section 4.3.1 examines the jobs associated with activities for the domestic market, on the one hand, and on the other hand, the jobs producing the final and intermediate exports. Section 4.3.2 then analyses Mexico's employment statistics for the transport equipment sector, disaggregated by gender and skills (level of schooling). Lastly, section 4.3.3 studies the gender wage gap.

In the three selected years (2005, 2011 and 2019), employment in manufacturing represented, on average, 16.7 per cent of total employment in the Mexican economy. Nonetheless, in 2005, manufacturing represented 59 per cent of the DVA exported by Mexico. By 2019, this share had increased to 75 per cent, suggesting a higher labour productivity compared with the services and primary sectors.

Employment in the transport equipment industry represented less than 8 per cent of the total employment in manufacturing in 2005. However, by 2019, its share had almost doubled to 14.6 per cent, making it the second most important employer in manufacturing, just behind the food, beverages and tobacco industry (table 4.3). However, in terms of DVA generation, transport equipment remained the most important industry for the Mexican economy and its share increased by 13 percentage points, from 28.4 to 41.0 per cent, between 2005 and 2019. There is no other industry in the Mexican economy that experienced such a dynamic export performance during this period.

▶ **Table 4.3 Mexico: Employment and DVA by manufacturing industry, 2005, 2011 and 2019 (share of total percentage)**

Industry	Employment (%)			DVA[1] (%)		
	2005	2011	2019	2005	2011	2019
Food, beverages and tobacco	23.5	24.3	25.2	4.5	7.4	7.0
Transport equipment	7.7	7.8	14.6	28.4	21.3	41.0
Textiles and textile products	19.4	17.4	12.6	7.2	4.1	2.5
Manufacturing, n.e.c.; recycling	9.7	10.1	9.2	5.6	5.2	4.6
Basic metals and fabricated metal	9.1	9.1	9.1	9.4	14.3	7.0
Electrical and optical equipment	6.6	6.3	6.2	25.3	20.9	20.9
Rubber and plastics	3.4	3.8	4.8	3.5	2.5	1.9
Other non-metallic mineral	5.0	5.3	4.0	2.2	1.9	1.3
Other industries	15.6	15.9	14.2	13.8	22.5	13.8
Total manufacturing industries	100.0	100.0	100.0	100.0	100.0	100.0

Note: n.e.c. = not elsewhere classified.

[1] DVA: Domestic value-added incorporated in exports.

Source: Authors' elaboration based on ADB-MRIO data.

4.3.1 Jobs related to trade

In line with Moreno-Brid et al. (2021), the classification by Wang et al. (2017) of domestic productive activities is used to categorize employment activities related to: (i) domestic production, (ii) final (traditional) exports, and (iii) intermediate exports (GVC production). For methodological clarification, and following standard practice in the input–output analysis, the calculation of the number of jobs involved in selected activities from a source country

directly or indirectly involved in the final production in each sector is expressed as:

$$\hat{E}B\hat{Y} = \hat{E}L\hat{Y}^{D} + \hat{E}L\hat{Y}^{F} + \hat{E}LA^{F}B\hat{Y}.$$ [18]

The term $\hat{E}L\hat{Y}^{D}$ represents employment associated with domestic activities using the local Leontief inverse matrix and a vector of final domestic demand. $\hat{E}L\hat{Y}^{F}$ shows employment related to exports of final goods or "traditional" exports. The last term, $\hat{E}LA^{F}B\hat{Y}$, uses both inverse matrices, local and global, and a matrix of imported coefficients, which shows employment included in exports/imports of intermediate goods and services. These jobs are part of the exchange of production between countries or GVC activities. As in the previous section, the ADB-MRIO database is used to calculate the matrices B, L, $\hat{Y}$, $\hat{Y}^{D}$, $\hat{Y}^{F}$ and A^{F}, while $\hat{E}$ is obtained from data from INEGI and the Mexican Ministry of Labour (Mexico, STPS, n.d.). To account for the number of people engaged in each type of activity, the sum of each row of the resulting matrices is used. For the domestic and final exports activities, an assessment is made of whether those jobs correspond to the industry under analysis, or relate to inputs from other industries, making them indirect jobs. In the case of the third term, GVC trade, it is not possible to differentiate between jobs generated "inside" and "outside" each industry. The available data include jobs pertaining to inputs that originated in the country of analysis as well as jobs from other countries, embedded in intermediate imports.

Table 4.4 shows the results for the transport equipment industry and the manufacturing sector. In the case of the former, there was a stark increase in the number of jobs associated with traditional trade and GVC activities between 2005 and 2019. Conversely, over the same period, the share of employment related to domestic production in total employment decreased. The transport equipment industry employment shares in 2011 differed significantly from those presented for the same year in Moreno-Brid et al. (2021), where GVC activities in transport equipment accounted for only around 30 per cent of total employment. In Moreno-Brid et al. (2021), the corresponding share is significantly larger (by a margin of ten percentage points). The cause of this difference may be rooted in a revision of the statistics used. Indeed, the WIOD tables (used in our previous study) were released in 2013, while the ADB-MRIO tables were published in 2021. However, the trend is similar in

18 Where $\hat{E}$ is a diagonalized vector of employment coefficients, it can represent total employment or remunerations for different types of employees as, in the next section, B is the global inverse Leontief matrix, L is the local inverse Leontief matrix, $\hat{Y}^{D}$ represents a diagonal matrix with information on final production for domestic absorption, $\hat{Y}^{F}=\hat{Y}-\hat{Y}^{D}$ is the diagonal matrix of final product exports, and $A^{F}=A-A^{D}$ is an off-diagonal block matrix of imported input coefficients.

both studies, and points to a decline in employment related to production for the domestic market. In any case, GVC activities account for one third of the employment by transport equipment and a quarter of that of total manufacturing.

▶ Table 4.4 Mexico: Jobs associated with domestic production, traditional trade and GVC trade as a percentage of total jobs, 2005–19

Industry	Year	Domestic	Traditional trade	GVC trade	Total industry
Transport equipment	2005	37.8	36.6	25.6	100.0
	2011	32.5	27.0	40.5	100.0
	2019	11.0	60.5	28.5	100.0
Manufacturing	2005	59.6	21.6	18.8	100.0
	2011	33.8	22.1	44.1	100.0
	2019	40.7	33.5	25.8	100.0

Source: Authors' elaboration based on ADB-MRIO data.

Another major difference with our previous study is that, unlike WIOD, the ADB-MRIO database does not consider socio-economic accounts. Thus, we rely on official statistics from Mexico's INEGI, and from the databases of the ILO and the OECD (ILOSTAT and OECDSTAN) for the other countries included in the analysis. Table 4.5 shows the number of jobs, according to production destination, that are created directly within the transport equipment sector (inside jobs) and the number of jobs generated indirectly as a result of the demand of other inputs from the rest of the economy (outside jobs). It is evident that the linkages to outside jobs are almost nil in this industry in both domestic and export production. The data indicate a reduction in the number of jobs created within the sector and linked to domestic production, from 185,800 in 2005 to 128,300 in 2019. This reduction is, however, more than compensated for by the exponential rise in the number of jobs in traditional exports (quadruple) and GVC activities (tripling). Thus, in total there was a net creation of almost 800,000 jobs.

▶ **Table 4.5 Mexico: Number of jobs generated within or outside the transport equipment industry according to production destination, 2005, 2011 and 2019 (thousands)**

		2005	2011	2019	Difference 2019–05
Domestic	**Within**	185.8	163.0	128.3	–57.5
	Outside	18.1	22.6	18.9	0.8
	Total	204	185.6	147.3	–56.7
Traditional exports	**Within**	195	151.6	803.4	608.4
	Outside	2.8	2.7	3.0	0.3
	Total	197.8	154.3	806.5	608.6
GVC trade		137.8	231.1	380.2	242.4
Total industry		540.8	571.0	1 333.9	793.1

Source: Authors' elaboration based on ADB-MRIO data.

4.3.2 Jobs in Mexico's transport equipment sector: By gender and skill level

In recent years, Mexico has begun to enact policies aimed at empowering women. However, persistent gender gaps remain in the labour market, and it is generally more difficult for women to find a job than it is for men. Moreover, when women are employed, they tend to be concentrated in sectors with low-quality jobs, resulting in lower wages, less security and conditions of violence and harassment (ILO 2017). Thus, identifying gender gaps in Mexico's transport sector and their evolution may help to explain how broad-based employment growth related to exports and GVCs has affected women.

An analysis of the gaps in employment, hours worked and remuneration in the transport equipment industry by skill level was carried out to assess their evolution in relation to the manufacturing sector. In the case of Mexico, data on employment in manufacturing show a high

concentration of women compared with other economic activities, though they are concentrated in sectors of low technological intensity (ECLAC 2019), where they earn 89.5 Mexican pesos for every 100 earned by men. Nevertheless, it is a well-known fact that the gap between the wages of men and women also widens as the technological intensity of the industry increases. Thus, in high-tech sectors women earn 70.2 Mexican pesos for every 100 earned by men (ECLAC 2019, 59). More generally, however, lower gender wage gaps tend to exist at higher levels of education (Lugo, Reynoso and Otzuca 2015). In that sense, we would expect to confirm which tendency prevails when comparing the transport equipment remunerations gap (higher technology sector) with that of other manufacturing industries. Another important aspect of employment is the hours worked, given that in many jobs, the pay is non-linear in hours worked. This payment structure tends to affect women disproportionately and influence their occupational choices (Canon, Golan and Smith 2021). The difference in wages can therefore be partially explained by the number of hours worked.

Table 4.6 shows the female share of the total manufacturing and transport sector employment, disaggregated by level of schooling.[19] Mexico's manufacturing sector has a smaller share of female employment than the total economy: 37.3 per cent compared with 39.1 per cent in 2019, respectively. The share of female employment is even lower in the transport equipment industry at 36.9 per cent, but there was a slight increase of 2.1 percentage points between 2005 and 2019.

In the transport sector, the share of female employment was the highest for women with low and medium levels of schooling. Women with, at most, a "basic primary education" accounted for almost half of the total of women in the sector, 47.9 per cent in 2019, which was around 12 percentage points higher than the share in the total economy, and three points higher than in manufacturing. This figure could help to explain the persistent low wages of the industry, as women with low education tend to be hired because of their acceptance of low pay.

The female share of employment in the transport equipment sector increased for the three levels of schooling (low, medium and high) over the period, with the figure for the high level of schooling having increased the most. Women with a medium level of schooling in the transport sector had an employment share comparable to the total economy (38.1 per cent in 2019) and two percentage points higher than in manufacturing. The share of women

19 Given the limited official data in Mexico, we had to derive skills from the level of schooling. "Low level of schooling" considers employees with, at most, complete primary education. "Medium level" comprises employees with secondary education up to high school. "High level" includes employees with higher education degrees and postgraduate education.

with a high level of education (higher education degree and postgraduate education) was much higher in the total economy (45.0 per cent in 2019) than in the transport equipment industry (27.2 per cent).

To a certain extent, these differences in the transport equipment industry might be a reflection of patterns associated with the educational bias against women in science, technology, engineering and mathematics (STEM). Women still tend to be systematically interrupted in their STEM education, which limits their future training and job options in industries with higher skills requirements (Hill et al. 2010).

▶ Table 4.6 Mexico: Female share of employment by schooling, 2005, 2011 and 2019 (percentage of total labour force)

Level of schooling		2005	2011	2019	Change (percentage points)
All levels	**Total economy**	36.6	37.7	39.1	2.5
	Manufacturing	38.7	36.6	37.3	–1.4
	Transport equipment	34.8	32.5	36.9	2.1
Low	**Total economy**	33.9	34.5	35.4	1.5
	Manufacturing	45.1	43.1	44.1	–1.0
	Transport equipment	41.8	43.2	47.9	6.1
Medium	**Total economy**	38.8	38.6	38.6	–0.3
	Manufacturing	35.8	34.0	35.9	0.1
	Transport equipment	35.9	32.3	38.1	2.2
High	**Total economy**	38.5	41.7	45.0	6.5
	Manufacturing	25.9	30.7	33.1	7.2
	Transport equipment	18.3	24.3	27.2	8.9

Note: "Low level of schooling" considers employees with, at most, complete primary education. "Medium level" comprises employees with secondary education up to high school. "High level" includes employees with higher education degrees and postgraduate education.

Source: Authors' elaboration based on INEGI (2019a) and Mexico, STPS.

Table 4.7 presents the share of remunerations and hours worked by gender and level of schooling. The first salient feature is that the share of women in total remunerations was much larger in the transport equipment industry than in the manufacturing sector. By 2019, the gender wage gap in the manufacturing sector had shrunk from 44.5 to 38 percentage points. But, for the transport equipment industry, the trend went in the opposite direction. By 2019, the gap was slightly larger (27.8 percentage points) than in 2005 (25.5 percentage points). This confirms the idea found in the literature that wage gaps in Mexico are wider in high-tech sectors. The gender gap in hours worked measures the contributions by gender to the total amount of hours worked. In manufacturing, it is smaller than the gender gap in total remunerations, suggesting that the ratio of average remunerations per employed person is to the detriment of women.

In the case of the transport equipment industry, the share of hours worked was nearly the same for both men and women, which confirms again the substantial gap in average remunerations by gender, in favour of men. Some studies suggest that women's wages are largely penalized by their working fewer hours per week (Canon, Golan and Smith 2021; Goldin 2015). Reasons range from dedicating more time to unpaid domestic work (like childcare, other care responsibilities and housework) to working part-time and/or interrupting their career for domestic reasons, resulting in wider remuneration gaps. Furthermore, the gender wage gap may be a consequence of the high share of females with a low level of schooling in the sector, as discussed previously, or of their being contained in the lower-paid occupations in the manufacturing sector and transport equipment industry.

▶ **Table 4.7 Mexico: Share of remunerations, hours worked and gender gap by gender and level of schooling, 2005, 2011 and 2019 (percentages)**

	Total remunerations			Hours worked		
	2005	2011	2019	2005	2011	2019
Manufacturing						
Men's share	72.3	71.1	69.1	69.6	68.6	66.8
High	16.9	14.8	12.3	8.5	8.6	7.5
Medium	43.8	46.2	47.5	36.4	37.2	38.2
Low	11.6	10.1	9.4	24.6	22.8	21.1
Women's share	27.7	28.9	30.9	30.4	31.4	33.2

	Total remunerations			Hours worked		
	2005	2011	2019	2005	2011	2019
High	5.3	4.8	4.3	2.9	2.9	2.7
Medium	16.8	19.1	21.5	15.0	17.2	18.9
Low	5.6	5.0	5.0	12.6	11.3	11.6
Gender gap in percentage points	44.5	42.1	38.2	39.2	37.2	33.6
Transport equipment industry						
Men's share	62.8	64.1	63.9	60.4	51.4	50.8
High	7.2	7.1	7.1	4.9	35.5	35.6
Medium	48.8	51.8	51.7	41.9	35.5	35.6
Low	6.7	5.2	5.1	13.6	11.5	11.4
Women's share	37.2	35.9	36.1	39.6	48.6	49.2
High	4.4	4.3	3.8	3.0	3.2	2.8
Medium	26.5	26.9	27.6	23.0	30.6	31.4
Low	6.3	4.7	4.7	13.6	14.8	15.0
Gender gap in percentage points	25.5	28.2	27.8	20.8	2.9	1.7

Note: The gender gap is calculated by the difference between the respective shares of men and women.

Source: Authors' elaboration based on INEGI (2014 and 2021).

This argument is evidenced by an increasing share of men with medium-level education in remunerations and hours worked in the manufacturing and transport equipment sector, which grew faster than the reduction in the share of men with a low education level. Thus, even though the share of women with a medium level of education increased in the transport equipment sector, the gender remuneration gap widened much more for this group than for women with other levels of education.

These results confirm the hypothesis of a widening gender wage gap in the transport equipment industry. There is certainly more scope to incorporate women in the industrial labour force in terms of hours worked, as they now account for only 33 per cent of the total. But the pressing challenge is to include them in jobs in which their remunerations are on a par with the remunerations of men with similar skills and training. Certainly, more in-depth analysis is needed to understand better the determining factors of

the gender wage gap and of the impacts that trade may have on its evolution, per level of schooling, as well as on the status of employment in different industries. The vast amount of literature on this topic has not yet reached a consensus on the nature and significance of such effects, if any.[20]

4.3.3 Gender wage gap in export-oriented sectors and global supply chains

This section identifies differences in the gender wage gap in domestic production vis-à-vis traditional trade (final exports) and trade in GVCs. Our results are based on Wang et al.'s (2017) equation $\hat{E}B\hat{Y}=\hat{E}L\hat{Y}^{D}+\hat{E}L\hat{Y}^{F}+\hat{E}LA^{F}B\hat{Y}$, where $\hat{E}$ represents the total earnings for women and men for each level of schooling. Usually, the gender wage gap is calculated based on data on the average remunerations of permanent workers. Owing to lack of data, average hourly remunerations are used, and it is not possible to distinguish between full-time jobs, half-day jobs, and other part-time or hourly jobs. Besides, the calculations do not make any inference on the evolution or levels of remunerations in real terms.

Estimates (see table 4.8) find that the gender remuneration gap has widened in the transport equipment industry over the period. In 2005, on average women received 89 per cent of the remunerations of men, while this ratio fell to 65 per cent in 2019. This is the opposite of what happened in Mexico's manufacturing sector, where on average the gap narrowed considerably, from 88 to 95 per cent. Although the analysis does not address the composition effects, the data show that even though more women entered the transport equipment industry, and increased their hours worked, remunerations did not increase at the same pace to explain the strong change in the indicator.

20 Some of the studies in this area include Rocha and Winkler (2019), Sauré and Zoabi (2014), Juhn, Ujhelyi and Villegas-Sanchez (2014) and Oostendorp (2009). Rocha and Winkler (2019) used the Enterprise Surveys Global Database, covering information at firm level in 140 countries for the period 2006–17, to compare female labour share in trading (exporters, importers, GVC participants and foreign direct investment firms) and in non-trading firms. They found higher female labour shares in certain types of trading firms versus non-trading ones. Sauré and Zoabi (2014) focused on state-level variations in the manufacturing sector's "exposure" to NAFTA, and concluded that such trade has tended to reduce female participation in the labour force, as well as women's relative wages in the United States. Juhn, Ujhelyi and Villegas-Sanchez (2014), starting from a "female labour to capital" complementarity assumption, showed that the gender gap in the labour market has declined in Mexico since the introduction of NAFTA. The reason behind this effect, they concluded, is that firms' response to favourable demand shocks has been to invest more in technology; an investment that, in their perspective, tends to be associated with a higher proportion of female employment. By contrast, Oostendorp (2009) conducted a cross-country study of the impact of globalization on gender wage inequality. His findings suggest that the occupational gender wage gap declined with trade liberalization in high-income countries, but he found no such relation in low-income ones.

▶ Table 4.8 Women's remuneration as a proportion of men's remunerations in Mexico's manufacturing and transport equipment industries, by schooling levels, 2005, 2011 and 2019 (percentage)

Year	Production activities	Transport equipment industry				Manufacturing industry			
		Average (%)	High education level (%)	Medium education level (%)	Low education level (%)	Average (%)	High education level (%)	Medium education level (%)	Low education level (%)
2005	Domestic	90	100	99	93	93	96	96	107
	Traditional exports	88	92	99	84	84	79	93	99
	GVC trade	88	114	99	71	87	101	94	70
	Total	89	100	99	84	88	93	93	95
2011	Domestic	68	85	70	75	87	96	86	95
	Traditional exports	66	83	66	70	90	99	91	103
	GVC trade	65	83	67	68	91	98	90	106
	Total	67	83	67	71	89	97	90	100
2019	Domestic	64	75	65	70	96	98	93	100
	Traditional exports	69	77	69	75	92	95	87	94
	GVC trade	65	76	66	75	94	96	92	94
	Total	65	75	66	72	95	98	91	98

Note: The average hourly remuneration is used in each schooling category. 100% means the remunerations of women and men are equal.

Source: Authors' elaboration based on ADB-MRIO data and INEGI (2014 and 2021).

Another important finding is that the smallest remuneration gap (represented by the highest percentages in table 4.8) appears in the highest schooling level in each of the three years analysed, and increased in the period. Additionally, in both the transport equipment industry and in manufacturing as a whole, on average women with a medium level of schooling, which is the category with a more significant share of hours worked (according to table 4.7), registered the widest margins of gender gap in terms of remunerations. This goes against our initial assumption that the gender wage gap would be wider for women with low education. However,

this may indicate that the gap at lower levels of education is partly offset by the effects of minimum wage policies applying to both men and women. Yet this explanation may not apply for the transport equipment industry, to the extent that the industry tends to pay higher wages, on average, than the overall manufacturing sector.

While these results cannot be attributed to a specific cause (as we are not controlling for individual characteristics), they still suggest that, even though more women increased their hours of work, their remunerations did not grow at the same pace. As already noted, one factor may be that more women than men work part-time to balance domestic work with their employment. Another factor could be that the transport equipment industry may require workers with training or education in fields that women pursue less than men.

Comparing gender gaps by production activities (domestic production, traditional exports and GVC trade), the average remunerations in the domestic production activities of the transport equipment industry and manufacturing sector registered the smallest gap both in 2005 and in 2011. This does not, however, apply to women with the highest level of schooling, whose remunerations were higher than men's in GVC production activities. Given that a large proportion of the companies contributing to GVC trade are foreign or multinational firms with higher productivity and wages than national firms, offering women higher salaries would be a means to attract them to the industry and, thus, compensate for the gap in women's employment. However, the year 2019 presented a different panorama, and traditional exports' production registered the lowest gender remuneration gap for the transport equipment industry (showing an improvement compared with the other two years), while it remained the same as 2011 for GVC production activities. Moreover, contrary to the previous years, domestic activities showed the smallest gender remuneration gap in the manufacturing sector. The gender remuneration gap in the transport equipment industry was largest, on average, in GVC activities both in 2011 and in 2019. This supports literature positing that this type of production tends to be labour-intensive in developing and emerging economies, which compete internationally through their lower wages. Therefore, as Mexico's transport equipment industry increased its participation in GVCs, the remuneration gap widened.

▶ 4.4 Conclusions and suggestions for monitoring decent work

This analysis of Mexico's automotive sector has contributed to a better understanding of the relations between trade and decent work in a successful industry in GVCs in a semi-industrialized economy. The results, based on available data up to 2019, confirm some general conclusions argued in Moreno-Brid et al. (2021), in which we found that Mexico's automotive and transport equipment industry had not been especially relevant in generating jobs. By 2019, it had become the second main employer in manufacturing, but still generated few indirect jobs outside the industry. Another conclusion corroborated in this present work is the importance of GVC and final exports activities to generate employment in this industry, over domestic activities.

For a long time, trade liberalization in Mexico was dissociated from promoting decent work. Traditionally, before and after the country signed NAFTA, labour policy was aimed at maintaining low wages with the purpose of controlling inflation and competing globally. In fact, discussions on labour issues were almost non-existent during the NAFTA negotiations. The situation changed dramatically some years later. In 2016, with the USMCA negotiation, the labour chapter became the centre of the discussion. The ratification of the USCMA was conditioned to the approval of a new labour reform in Mexico which proposed, among other things, to strengthen social dialogue by guaranteeing free elections of union leaders through secret ballots, and implementing a new labour justice system. In particular, for the automotive industry, the USMCA established salary goals with the purpose of reducing regional gaps.

Such obligations are an opportunity to press partners to systematically collect data on relevant indicators for trade, wages and value-added, with the aim of building detailed indicators of decent work at the level of plants per industrial activity, and measuring progress in terms of the rules/conditions agreed by all parties in the USMCA. An indicator of the percentage of workers in the automotive industry that earn at least US$16 per hour is sorely missed. In this regard, in response to a petition by the United States Trade Commissioner, the Facility-Specific Rapid-Response Labor Mechanism (a mechanism in the agreement to address labour complaints between the United States and Mexico) was used for the first time against a facility in Silao, Mexico. In this case, the mechanism ruled in favour of the workers, who also obtained a wage increase of 8.5 per cent.

Although INEGI has made great efforts to consider data that serve as indicators of decent work in its employment and occupation surveys, much more information on the different aspects of decent work is needed. For example, there is considerable scope for progress in data collection that allows the building of decent work indicators with the same sectoral classification as in the input–output matrix. In addition, though the ILO's Manual on decent work indicators suggests measuring the gender wage gap based on differences in average earnings for women and men, data limitations impede such calculations.

An additional consideration would be to put more effort into collecting data linked to the heterogeneity of firms in the economy, a severe analytical limitation considering all the different characteristics. For example, improved data collection is needed on a regular basis on firms that engage in exports and imports versus firms dedicated more to domestic production. Such data should focus on their size and their capital's country of origin, as well as employees' remunerations (identifying age, sex and ethnic background), hours worked and access to social security, among other things. In Mexico, the data collected on ethnicity, trade and labour are scarce.

On policy matters, the promotion of decent work should be a key priority of the government, independently of USMCA pressure – current or future. This includes the strengthening of the institutional capacities of labour inspection of the Mexican Ministry of Labour (STPS) to enforce compliance with decent labour standards. At the same time, the STPS should have a major and more dynamic role in raising awareness in the business community, in workers' organizations and broader civil society of the enormous social, economic and political benefits of having sustainable working conditions, in the spirit of decent work, as defined by the ILO.

However, for this labour policy to carry weight and serve to move Mexico's international competitiveness away from low wages, the government needs to implement an ambitious industrial policy aimed at strengthening the Mexican economy's innovation and development capacities, compatible with the creation of decent jobs. Trade liberalization by itself is dramatically insufficient to shift a semi-industrialized economy's competitiveness away from cheap labour and scant value-added aggregation. As has happened in other countries, a key element would be a joint commitment of the government, the business community and workers to push for responsible business practices, in which decent jobs are a key pillar. The pressure of civil society to hold accountable companies that do not promote decent work and environmental sustainability would certainly be a powerful political and economic tool to begin closing the decent work gap in domestic production processes and in suppliers within GVCs.

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Appendix I

Correspondence in transport equipment sector and automotive industry

Section 1. Input–output methodology Transport equipment in ADB-MRIO	Section 2. Decent work indicators Automotive industry NAICS
3410 "Manufacture of motor vehicles"	3361 "Motor vehicle manufacturing"
3420 "Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers"	3362 "Motor body and trailer manufacturing"
3430 "Manufacture of parts and accessories for motor vehicles and their engines"	3363 "Motor vehicle parts manufacturing"
3511 "Building and repairing of ships"	
3512 "Building and repairing of pleasure and sporting boats"	
3520 "Manufacture of railway and tramway locomotives and rolling stock"	
3530 "Manufacture of aircraft and spacecraft"	
3591 "Manufacture of motorcycles"	
3592 "Manufacture of bicycles and invalid carriages"	
3599 "Manufacture of other transport equipment n.e.c."	3369 "Other transportation equipment manufacturing"

ADB-MRIO = Asian Development Bank multi-regional input–output; NAICS = North American Industry Classification System; n.e.c. = not elsewhere classified.

▶ Appendix II

Indicators: Mexico's automotive industry (2005–19)

Following Moreno-Brid et al. (2021), the automotive industry is defined as the set of economic activities dedicated to the manufacture of cars, buses, heavy and light trucks, and auto parts. In this set, the most relevant one, and the largest one in terms of output and total exports, is the final assembly of vehicles. Perhaps needless to say, such auto assembly is just the tip of the iceberg of a series of industries and activities that manufacture a vast amount of intermediate goods and services for car production. The indicators cover the manufacturing sector, the transport equipment subsector and its components (including motor vehicle manufacturing).[21]

The measurement and method of computation are extracted from *Decent Work Indicators: Guidelines for Producers and Users of Statistical and Legal Framework Indicators* (ILO 2013).

The data to construct these indicators were generously made available by Mexico's Secretary of Labour by granting virtually unrestricted access to the Labour Statistical Information System (LAIS). A time series of indicators was built based on LAIS and additional information systematically collected by INEGI in the ENOE. Data from the IMSS helped to construct indicators of employment security. The indicators cover the 2005 to 2019 period.[22] Many of the data series are collected and updated on a quarterly basis, but for consistency purposes, the research on the trends, structures and patterns revealed is by annual data.

21 The detailed list of indicators utilized for these axes can be found in Moreno-Brid et al. (2021). In terms of Mexico's formal statistical taxonomy, i.e. NAICS, all of them are grouped at the subsector level defined as "336 transportation equipment manufacturing". This subsector is, in turn, composed of "3361 motor vehicle manufacturing", "3362 motor body and trailer manufacturing", "3363 motor vehicle parts manufacturing" and "3369 other transportation equipment manufacturing".

22 Although data were available, the analysis was not extended to 2020 because of the "outlier" character of this year in terms of the labour market and foreign trade performance due to the pandemic and its devastating impact on commerce, productive activity and employment. However, an additional reason was that, due to the pandemic, the National Statistical Institute stopped its surveys; more precisely, it changed their data collection methodology. It ceased carrying out door-to-door, in-person interviews and moved to doing them by telephone and other electronic means of communication. This change affected a fortiori the comparability of the data series, as the pre-pandemic results are not necessarily consistent with those collected in more recent and troubled times.

Informal employment rate

Measurement objective: Informal employment is a job-based concept which encompasses those jobs that generally lack basic social or legal protections or employment benefits, and may be found in the formal sector, informal sector or households. The informal employment rate (IER) is defined as the percentage of persons in total employment who are in informal employment.

Data sources: INEGI (National Survey of Employment and ENOE).

Method of computation:

$$IER(\%) = \frac{Number\ of\ employed\ persons\ in\ informal\ employment}{Total\ number\ of\ employed\ persons} \times 100$$

Female share of employment

Measurement objective: This indicator provides information on the tendency for men and women to work in different occupations where an occupation refers to a set of jobs whose main tasks and duties are characterized by a high degree of similarity. In this way, the indicator sheds light on the extent to which women and men benefit from different opportunities and treatment in work life.

Data sources: INEGI (National Survey of Employment and ENOE).

Method of computation:

$$GWG = \frac{Women\ earning\ more\ than\ 3\ minimum\ wages}{Men\ earning\ more\ than\ 3\ minimum\ wages}$$

Permanent workers as a percentage of the employed population

Measurement objective: This indicator represents the percentage of permanent workers registered with the IMSS, with respect to the employed population.

Data sources: STPS and IMSS.

Method of computation:

$$PW(\%) = \frac{Number\ of\ permanent\ workers\ insured\ in\ IMSS}{Employed\ population} \times 100$$

Gender wage gap

Measurement objective: This indicator represents the percentage of employed women with three or more minimum wages, with respect to the number of employed men with three or more minimum wages.

Data sources: INEGI (National Survey of Employment and ENOE).

Method of computation:

$$GWG = \frac{Women\ earning\ more\ than\ 3\ minimum\ wages}{Men\ earning\ more\ than\ 3\ minimum\ wages}$$

Working poverty rate

Measurement objective: This indicator is to measure the proportion of workers with income equal to or less than the minimum wage in the automotive industry.

Data sources: INEGI (National Survey of Employment and ENOE).

$$PER = \frac{Number\ of\ workers\ earning\ the\ minimum\ wage\ or\ less}{Employed\ population} \times 100$$

Employees with low pay rate

Measurement objective: The employees with low pay rate (ELPR) indicator aims to capture the percentage of employees that are working for low wages. It is defined as the percentage of employees whose hourly earnings in all jobs equal less than two thirds of the median hourly earnings of all employees.

Data sources: INEGI (National Survey of Employment and ENOE).

Method of computation:

$$ELPR\ (\%) = \frac{Number\ of\ employees\ paid\ less\ than\ \frac{2}{3}\ of\ median\ earnings}{Total\ number\ of\ employees}$$