Impact of Nearshoring on Mexico's Economic Activity (2020-2023)

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Abstract

This paper assesses the impact of nearshoring on manufacturing, employment and foreign direct investment (FDI) in Mexico between 2020 and 2023. Nearshoring is attributed to factors such as the trade conflict between the United States and China, the disruption of supply chains due to the Covid-19 health crisis and the entry into force of the Mexico-United States-Canada Agreement (T-MEC). This last event is considered the beginning of nearshoring, and its impact is analyzed using the Generalized Synthetic Controls (GSC) methodology. The results show that the analyzed entities experience an increase of 5.2 percentage points (pp) in manufacturing production and 11.4 pp in FDI, while the effect on employment is positive but not statistically significant.

Keywords: macroeconomics; econometrics; estimation; trade and labor market interactions; regional economic activity.

INTRODUCTION[1]

This paper examines the impact of nearshoring on Mexico's economic activity between 2020 and 2023, particularly on state industrial manufacturing activity,[2] Foreign Direct Investment (FDI) and workers registered with the Mexican Social Security Institute (IMSS). In this regard, the growth of the previous variables has been greater in the states bordering the United States and in the Bajío region, which are more integrated into global value chains (GVCs), as suggested by Hanson (2001) and Campos and Campos (2023). From the second half of 2020, Mexico has experienced the impact of the trade conflict between China and the United States, the disruptions in supply chains due to the COVID-19 crisis, and the entry into force of the United States-Mexico-Canada Agreement (USMCA).

The theoretical basis of this study is GVCs, which indicate that production is diversified into several stages that add value to a product or service, i.e., when at least two stages are carried out in different countries, GVCs are formed (Antràs, 2020). Currently, the relocation of these stages is driven by the increase in production costs in China, which has generated a trend towards the return of processes to the countries of origin (Martínez-Mora and Merino, 2014). Furthermore, the global dependence on inputs produced in China, which, according to World Bank data (2024), ranked second among the countries exporting intermediate inputs in 2019,[3] negatively impacted the world due to the measures implemented to contain the health contingency. This led to the interruption of global supply chains and, together with the uncertainty derived from conflicts between major economic powers, they have reinforced the trend of GVC relocation. A concrete example is the case of Mexico and China, where labor costs in the Chinese manufacturing sector have increased to a greater extent compared to Mexico, i.e., between 2013 and 2023, China's labor costs increased on average 8.7% per year, while in Mexico they increased by 2.9%. In addition to this, the relocation of production processes is also justified by the intensification of geopolitical conflicts which, between 2013 and 2019, increased the number of trade disputes that requested the formation of a panel and the formation of compliance procedures by 84%, according to data from the World Trade Organization (WTO). Finally, following the outbreak of the conflict between Russia and Ukraine, trade blocs were created based on geography, reducing FDI between countries in different blocs (Gopinath *et al.*, 2024). This situation had positive consequences for Mexico. According to data from the United States Census Bureau, the share of Mexican imports into the United States increased from 13% of the total between 2013 and 2019 to 14.2% between 2020 and 2023. In short, from a GVC perspective, low relative wages, the USMCA and the formation of geographic blocs make Mexico an attractive country for the relocation of production processes.

To evaluate the impact of nearshoring on the Mexican economy, it was decided to use the entry into force of the USMCA (July 2020) as the start of the analysis period, a significant date as it represents a turning point by providing certainty in trade rules with its strategic partners in a context marked by the trade war between the United States and China, as well as the problems arising from the health contingency in global

supply chains due to the concentration of manufacturing production in China. Although Mexico already had a Free Trade Agreement (FTA) with the United States and Canada, signing the new agreement guaranteed trade rules for the three countries. Specialized literature shows that the finalization of bilateral treaties decreases the influx of FDI (Kotyrlo and Kalachyhin, 2023) while their enactment encourages its entry (Cavallo, 2019).

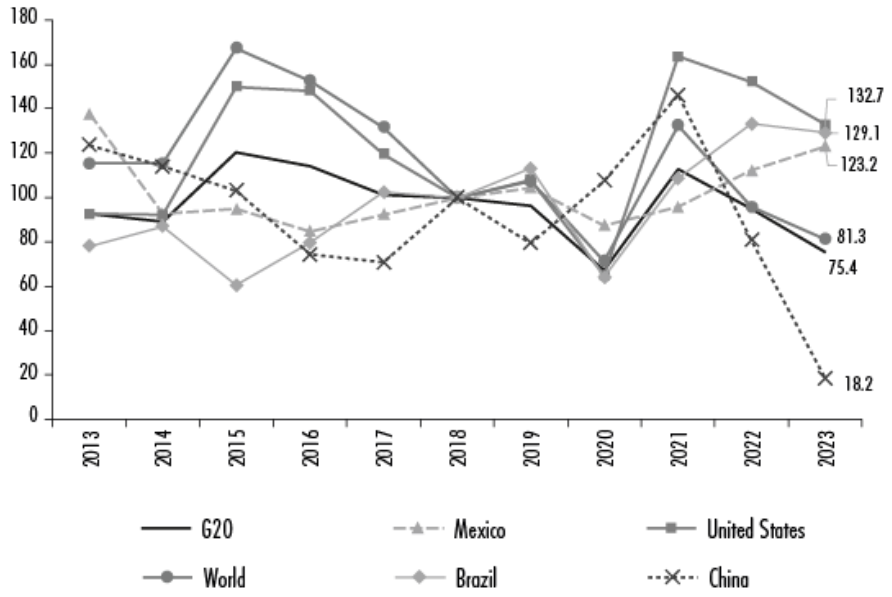
The Generalized Synthetic Control (GSC) methodology was used to measure the impact of nearshoring on the Mexican economy (Xu, 2017). The results showed that industrial activity and the FDI in the companies affected by nearshoring had a positive and statistically significant impact of 5.2 percentage points (pp) and 11.4 pp, respectively, compared to the synthetic control. In the case of employment, the effect was positive but insignificant, which may be due to hiring specialized workers in the manufacturing sector.

To develop this analysis, the first part dealt with the national and international context of the evolution of FDI, as well as the international trade of the United States. Next, the specialized literature on GVCs and how their reconfiguration favors relocation to Mexico was reviewed. The methodology section then describes the GSC approach used to evaluate the impact of nearshoring on a treatment and control group. The data section details the sources and characteristics of key indicators, such as manufacturing activity, FDI, and employment. The results section presents the findings of the empirical analysis, highlighting the positive and significant effects on industrial production and FDI. Finally, the conclusions examine the study's policy implications and methodological limitations and suggest directions for future research.

2. NATIONAL AND INTERNATIONAL CONTEXT

As noted above, nearshoring emerged from a series of international events that gave Mexico comparative advantages in trade with the United States. Figure 1 shows that starting in 2020, FDI in Mexico grew faster than in the rest of the world and the G-20 countries. In 2023, the annual variation of FDI in Mexico was 9.8%, while in the world, the G-20 and China, the trend was downward, with annual declines of 15.0%, 20.7% and 77.5%, respectively. This last fall in China reflects the impact of the trade war, as it went from third place as a recipient of FDI in 2013 to tenth place in 2023, a period in which investment fell by 85.3%. In 2013, Mexico ranked eighth as a recipient of FDI flows (among the countries that make up the G-20) and, in 2023, it moved up to seventh place. This means that in 2023, Mexico received 4.7% of the FDI destined for these countries. Although the flow of FDI to Mexico decreased by 10.5% in the same period, this was due to the stagnation observed between 2015 and 2019, as well as the effect caused by the health emergency in 2020. From 2021, however, the growth trend was positive.

Figure 1. Foreign Direct Investment (FDI). Index 100 = 2018

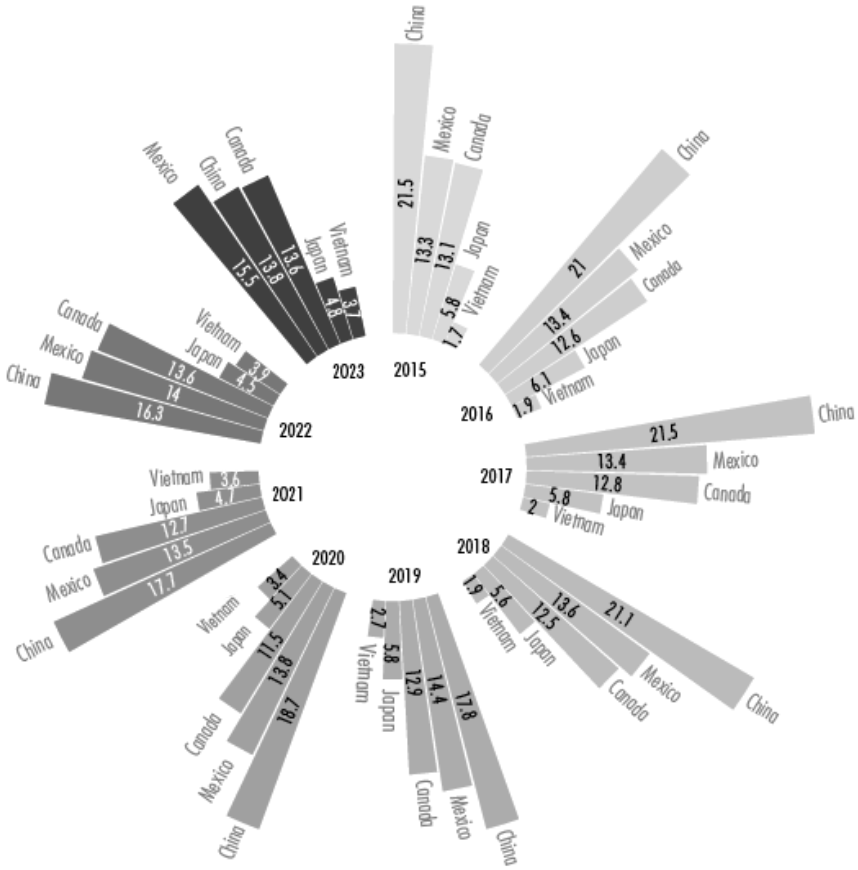


Source: prepared by the authors with information from the OECD (2024).

The trade conflict between the United States and China, as well as the signing of the USMCA, coincided with an increase in the share of US imports from Mexico. Between 2015 and 2017, US imports from China, Mexico, and Canada accounted for 47.6% of total imports (see Figure 2). China ranked first at 21.5%, while Mexico ranked second at 13.3% of imports. In 2023, US imports from China, Mexico, and Canada

accounted for 42.9% of the total, and Mexico replaced China in first place, accounting for 15.5% of total imports, with an upward trend. China came second, accounting for 13.8%, with a downward trend in its share.

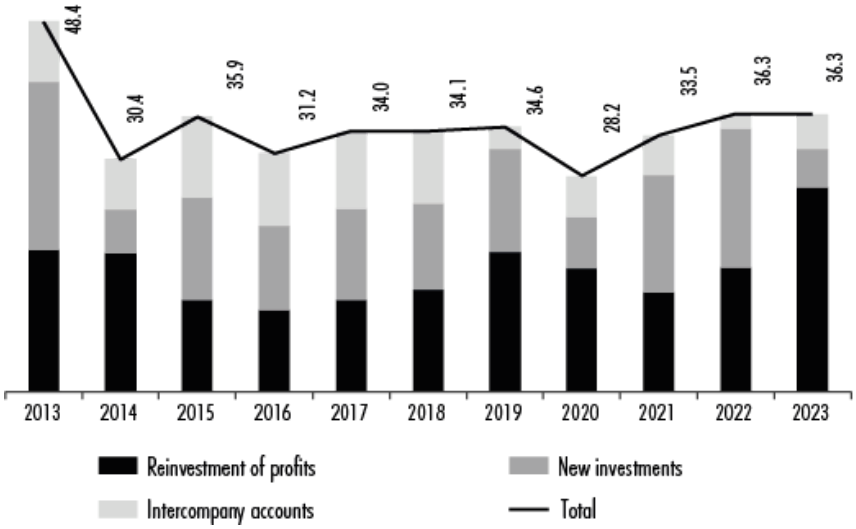
Figure 2. United States imports by country. Percentage of total



Source: prepared by the authors with information from the US Census Bureau (2024).

In the same context, when analyzing the behavior of FDI in Mexico, it was observed that between 2015 and 2019, it decreased at an average rate of -0.7%, while between 2021 and 2023, it grew at an average rate of 2.8%. By breaking down investments by type (see Figure 3), it was found that reinvestments grew at an average annual rate of 10.4% between 2015 and 2019 and an average yearly rate of 35.4% between 2021 and 2023. As a result, this component represented 73.4% of total FDI in 2023. This reflects the intention of companies already established in Mexico to continue and expand their operations in the country.

Figure 3. Foreign Direct Investment in Mexico. Billions of dollars



Source: prepared by the authors with information from the Ministry of the Economy (2024).

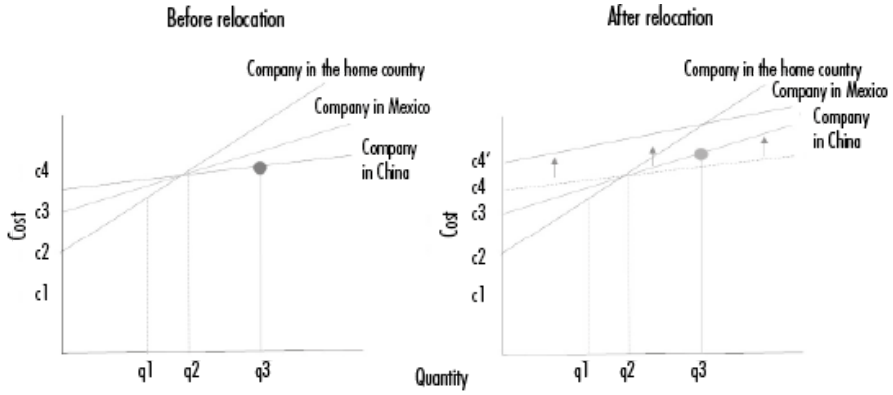
For example, FDI in the manufacturing sector has grown consistently at an average rate of 8% per year since 2021, which could be an indicator of the increase in the production of goods in Mexico to replace the demand for Chinese products in the United States. However, it is important to note that new investments slowed down in 2023, possibly due to the uncertainty generated by the presidential elections in the United States, as the USMCA will be renegotiated in 2026; in addition, due to the context of high interest rates globally, and a negative economic outlook in the short term, especially in the United States.

3. LITERATURE REVIEW

GVCs involve stages of production distributed across several countries, but they can also be carried out entirely within a single country (Antràs, 2020; Kogut, 1985). A change in the location of GVCs has been driven by the reduction of labor and energy cost gaps, which has led some companies to return processes to their countries of origin (Martínez-Mora and Merino, 2014; Sirkin *et al.*, 2014). In 2020, labor costs in China exceeded those in Mexico by 1.7 USD$/hr (Garrido, 2022). Furthermore, tensions between the United States and China have generated a protectionist environment, increasing trade restrictions from 3,190 in 2012 to 5,019 in 2023, according to data presented in Global Trade Alert (2024).

Following Jones and Kierzkowski (1990), the left side of Figure 4 illustrates the costs a company faced before the restructuring of value chains when producing a quantity: production in China turned out to be the most efficient option, with lower costs compared to Mexico and to companies in the home country.[4] However, on the right-hand side of Figure 4, costs in China increase due to factors such as rising labor costs and the imposition of tariffs by the United States. As a result, this increase in costs reduces the efficiency of production in China, and production in Mexico becomes more competitive.

Figure 4. Reconfiguration of production costs



Source: prepared by the authors based on Inomata (2017, chap. I).

Since the outbreak of the war between Russia and Ukraine, two trading blocs have formed: one led by the United States and the other by China. FDI between countries in the same bloc has decreased less than between countries in different blocs (Gopinath *et al.*, 2024). Due to Mexico's integration into GVCs, low wages and the USMCA, FDI from the United States to Mexico increased from 38% (2013-2019) to 44.9% (2020-2023). It is important to highlight that the relocation of production generally transfers less specialized jobs to developing countries (Feenstra and Hanson, 1995). Furthermore, evidence shows that trade agreements boost FDI (Kotyrlo and Kalachyhin, 2023; Cavallo, 2019). In Mexico, it was also observed that the then FTA with the United States and Canada positively impacted Gross Domestic Product (GDP) per capita (Colla-De-Robertis and Garduno, 2021). Campos and Campos (2023) show that the arrival of automotive companies in the Bajío region of Mexico (2007-2014) generated five additional jobs for every automotive job, reducing labor poverty and increasing enrollment in upper secondary education.

To evaluate the impact of nearshoring on economic activity from July 2020 onwards, the GSC methodology proposed by Xu (2017) was adopted, which is based on the previous work of Abadie *et al.* (2015). This methodological approach allows us to compare the results of a group of federal states that have experienced nearshoring with a similar control group that has not. This facilitates the identification of the effects of nearshoring on industrial manufacturing production, FDI and jobs reported by the IMSS.

4. METHODOLOGY

The GSC methodology proposed by Xu (2017) was used to assess the impact of nearshoring on economic activity.[5] Previous work in this area includes studies by Abadie and Gardeazabal (2003), Abadie *et al.* (2007), and Abadie *et al.* (2015). This approach allows us to construct a counterfactual that estimates what would have happened in the absence of the treatment, taking into account untreated units that serve as a reference. According to the method, the existence of J + 1 units is assumed, where j = 1 represents the treated unit, and j = 2, ..., J + 1 represent the untreated units. The time horizon is divided into two periods: T_0, which corresponds to the time before treatment, and T_1, which represents the period after treatment.

The purpose of this exercise is to construct a plausible counterfactual that captures the evolution of the treated unit (Y_{1t}) if it had not been subject to the intervention, allowing it to be compared with the trend observed in the untreated units (Y_{1t}^N for $t > t_0$). To estimate the effect of the treatment, the difference between the treated unit and its estimated counterfactual is calculated, represented as:

$$\alpha_{it} = Y_{1t} - Y_{1t}^N \qquad (1)$$

The standard methodology proposes the determination of a vector of weights W = (w2 , … , w_j + 1), with 0 ≤ w_j ≤ 1, which minimizes the differences between the treated unit and a weighted average of the untreated units. The weightings are chosen so that the resulting synthetic control group reflects the characteristics of the treated unit before the intervention.

However, in the context of this study, the GSC methodology is more appropriate. This is because one of the assumptions of this methodology is that the series have parallel trends before the start of treatment, which is difficult to fulfill in practice. Table A1 in the annex presents evidence of imperfect parallelism in the series, making it more appropriate to use the GSC methodology, which relaxes the assumption of perfect parallelism by broadening the traditional approach to incorporate the use of dynamic factors, multiple treated units and time periods. In this way, GSC allows for the incorporation of unobserved heterogeneity between the treated and control units over time, improving the estimates' accuracy and robustness.

In this case, the GSC methodology assumes that the potential outcomes can be broken down into observed and unobserved factors for the control and treatment units as a whole. Therefore, the units in the control and treatment groups are numbered from 1 to N_{co} and N_{co} + 1 to N, respectively. Then the functional form for each unit can be expressed as: $Y_{it} = \delta_{it} D_{it} + x'_{it}\beta + \lambda'_i F_t + \varepsilon_{it}, i \in 1,2,\dots N_{co}$. Thus, when all units in the control group are considered, the following equation is obtained:

$$Y_{co} = X_{co}\beta + F\Lambda'_{co} + \varepsilon_{co}, \quad i \in 1,2,\dots N_{co}, N_{co}+1,\dots,N \qquad (2)$$

Where $Y_{co} = [Y_1, Y_2, \dots, Y_{Nco}]$ is the set of results of the units in the control group; X_{co} is the observed covariates; β is the vector of unknown parameters; F represents the unobserved common factors of the control units; $\Lambda_{co} = [\lambda_1, \lambda_2, \dots, \lambda_{Nco}]$ is the set of unobserved factor loadings of the control group; and $\varepsilon_{co} = [\varepsilon_1, \varepsilon_2, \dots, \varepsilon_{Nco}]$ are the specific errors of each unit of the control group in a particular period of time.

The advantage of GSC is that not only does it allow for the inclusion of multiple treated units, but it also optimizes the selection of the control group and allows for statistical inference. This last feature is achieved through a resampling technique that allows for the calculation of the standard deviations of the estimates, which reinforces the validity of the results obtained. This methodology is appropriate in the context of policies such as nearshoring, where decisions affect multiple economic units in a heterogeneous way.

In this exercise, the GSC method was implemented to evaluate the impact of nearshoring on key indicators such as industrial manufacturing activity, FDI and employment in the border regions and the Bajío. The indicator of interest is the average effect of the treatment on the treaties (ATT), which measures the average effect of the treatment on the affected units, expressed as:

$$ATT_{(t,t>T_0)} = \frac{1}{N_{tr}} \sum_{i \in \mathcal{T}} [\hat{Y}_{it}^{co} - Y_{it}^{tr}] = \frac{1}{N_{tr}} \sum_{1 \in \mathcal{T}} \delta_{it} \quad (3)$$

Where $\hat{Y}_{it}^{co}$ represents the counterfactual calculated from the untreated units; Y_{it}^{tr} is the value of the units that received the treatment; *Ntr* is the number of treated units; and δ_{it} represents the heterogeneous impact of the treatment on unit *i* at time *t*. In this respect, the GSC makes it possible to measure the average impact of nearshoring on industrial manufacturing activity, FDI and jobs in the border and Bajío regions.

5. DATA

To analyze the impact of nearshoring on the economy of the northern border (Baja California, Chihuahua, Coahuila, Nuevo León, Sonora and Tamaulipas) and the Bajío (Aguascalientes, Durango, Guanajuato, Jalisco, Querétaro and San Luis Potosí), the following indicators for the period 2013-2023 were considered:[6] manufacturing industrial activity reported by the National Institute of Geography and Statistics (INEGI, 2024), the FDI published by the Ministry of the Economy (SE, 2024) and jobs registered by the IMSS (2024).

Table 1 presents the general statistics of the indicators used in the study. It can be seen that manufacturing industrial activity, FDI and the number of jobs recovered for the period of the COVID-19 health contingency and, even more so, in the case of industrial activity and FDI, their growth rate was higher than in 2013-2019. In the case of industrial activity, annual growth of 8.9%, 5.6% and 0.9% can be observed for 2021, 2022 and 2023, respectively. Notably, the increases in 2021 and 2022 were greater than those observed between 2014 and 2019. In terms of the accumulated annual flow of FDI, it became clear that, after 2020, its growth accelerated, which is relevant in the context indicated above, where this variable shows a downward trend worldwide and in the group of G-20 countries. Finally, regarding the number of jobs, it can be seen that in 2021, employment growth was 4.3%, which is similar to the growth rates in 2014 and 2017. However, the number of jobs in that year increased by 846,400, the highest on record.

Table 1. National descriptive statistics

	Industrial manufacturing activity Index 2018=100*		*FDI** Billions of dollars*		*Jobs registered with the IMSS*** Millions*	
Years	*Average*	*Annual percentage variation*	*End of period*	*Annual percentage variation*	*End of period*	*Annual percentage variation*
2013	88.7		48.4		16.5	
2014	92.2	3.9	30.4	-37.2	17.2	4.3
2015	95.4	3.5	35.9	18.4	17.9	3.7
2016	96.1	0.8	31.2	-13.2	18.6	4.1
2017	98.8	2.8	34.0	9.1	19.4	4.3
2018	100.1	1.3	34.1	0.2	20.1	3.4
2019	100.0	-0.1	34.6	1.5	20.4	1.7
2020	91.6	-8.3	28.2	-18.5	19.8	-3.2
2021	99.8	8.9	33.5	18.7	20.6	4.3
2022	105.4	5.6	36.3	8.4	21.4	3.7
2023	106.3	0.9	36.3	0.0	22.0	3.0

Note: *the industrial activity indicator is a monthly index that has averaged each of its records per year; **For the FDI data, the accumulated flow for each year is considered; ***The data at the end of each year is considered.

Source: prepared by the authors with information from IMSS (2024), INEGI (2024) and SE (2024).

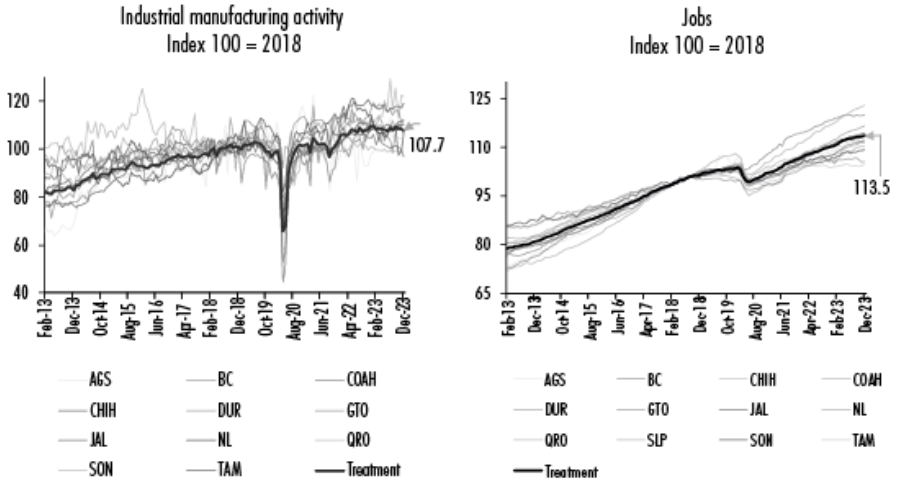
Control and treatment groups

The treatment group was made up of those entities whose economies have a higher degree of integration with that of the United States because, with the policy of business relocation, they are expected to experience a greater demand for goods and increased investment, which in turn could translate into the hiring of a larger number of workers and the growth or creation of new companies. In this respect, FDI and export indicators show that the Northern Border and Bajío states have the highest level of integration with the United States. Between 2013 and 2020, both regions accounted for 54.3% of total investment and reinvestment and 74.9% of total exports.[7] When broken down by region, it can be seen that between 2015 and 2023, exports from the northern border accounted for 57.8% of its total GDP, and in the Bajío, they accounted for 21.2%. In the rest of the country, on the other hand, they represent only 15.8%.[8]

Despite not sharing a border with the United States, it was decided to consider the Bajío states as part of the treatment group due to the aforementioned characteristics and because there is a productive territorial network with specialized industrial groups, urban and employment centers, and specialized services that make up the region (Téllez, 2009). These characteristics are valued by business executives, who also point out the cost of labor, the certification of suppliers and legal certainty (BANXICO, 2016). It is likely that, for these reasons, 13 automotive plants were installed between 2013 and 2019 (Campos and Campos, 2023).

To group manufacturing industrial activity by federal state, the index had to be weighted by each state's share in total manufacturing GDP, taking into account the 2018 State Gross Domestic Product (SGDP) data. Based on this data processing, it was observed that the behavior of manufacturing industrial activity in the treatment group[9] had trajectories that showed a lower variance with respect to the control group[10] (see Figure 5). Between 2013 and 2019, the average annual growth of this group was 2.9%, and between July 2020 and December 2023, it was 5.3%. With regard to the indicator of workers registered in the IMSS, the average annual growth was 4.3% and between July 2020 and December 2023, 2.7%. However, from April 2021, it began to record positive growth rates averaging 4%.

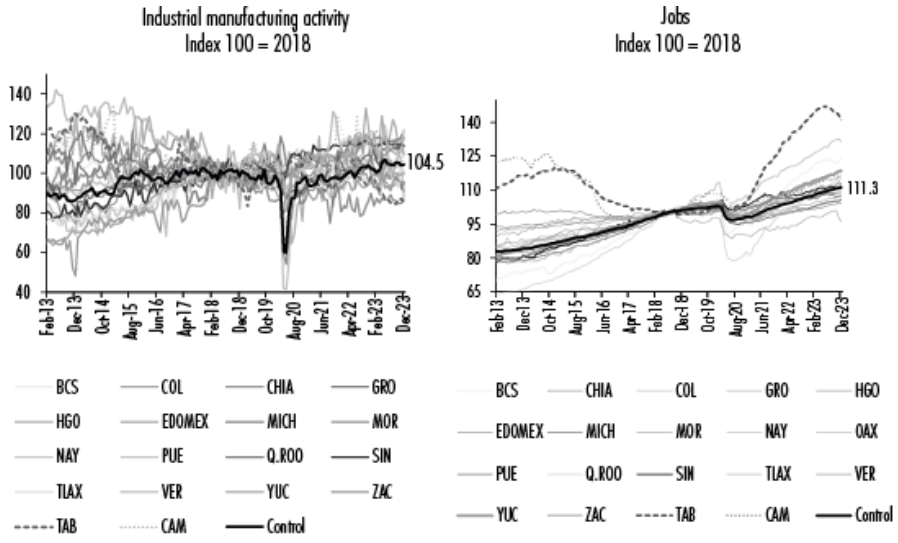
Figure 5. Evolution of industrial manufacturing activity and jobs registered with the IMSS



Source: prepared by the author with information from INEGI (2024) and IMSS (2024).

As can be seen, in the control group, the states of Campeche and Tabasco behave differently from the rest, which could be due to their relationship with the oil industry. Meanwhile, in the treatment group, the trajectories are more homogeneous. To illustrate this behavior, we can see that, between 2013 and 2019, the trajectory of Campeche and Tabasco in the industrial activity of the control group differed from the rest (represented by dotted lines) (see Figure 6). During this period, the average annual decline in these states was 2.7% and 0.5% for Tabasco and Campeche, respectively, while in the rest of the states in the control group, the average annual growth was 1.4%. Regarding workers registered in the IMSS, once again, Campeche and Tabasco's behavior differs from that of the rest. Between 2013 and 2019, there was an average annual decrease of 1% in both states, while in the control group, there was an increase of 3.3%. Between July 2020 and December 2023, the average annual growth in Campeche and Tabasco was 10.8%, while in the control group, it was 2.4%. For this reason, to prevent these states from distorting the synthetic control, it was decided to exclude them from the group of donors (Abadie and Gardeazabal, 2003).

Figure 6. Evolution of industrial manufacturing activity and jobs registered with the IMSS

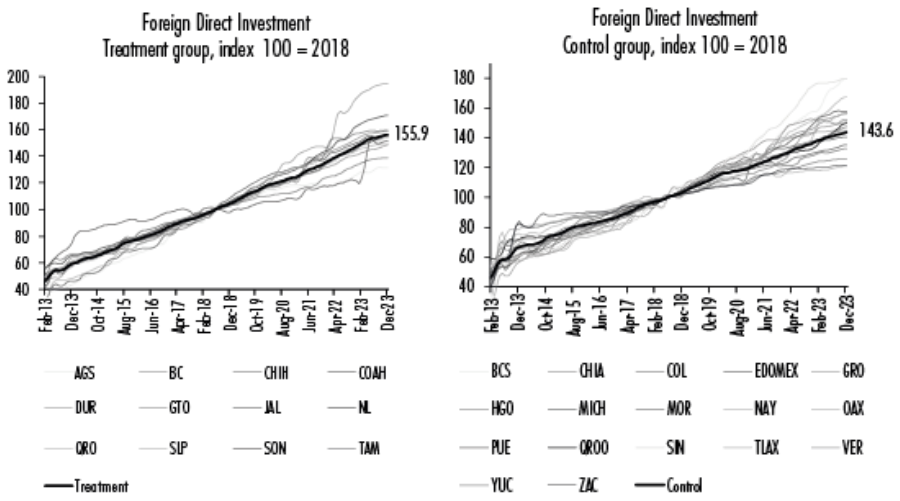


Source: prepared by the author with information from INEGI (2024) and IMSS (2024).

The behavior of new investments and reinvestments of the entities in the treatment and control groups before the start of the treatment shows a lower variance compared to the period after July 2020 (see Figure 7). Concerning the treatment group, between 2013 and 2019, it registered an average annual growth of 14.6%, while from July 2020 to December 2023, it grew by 8.2%. In particular, the state with the highest post-treatment growth was Durango, with an average increase of 15.4%; however, it is important to mention that this state represents 2.2% of new investments and reinvestments in this group. Meanwhile, the average annual growth of the control group between 2013 and 2019 was 14.3%. The lowest growth corresponds to Quintana Roo, which grew 11.2%, and the highest growth corresponds to Oaxaca, which grew 32.5%, i.e.,

2.9 times more. After the treatment period, the average annual growth of the control group was 6.3%, and the lowest growth was recorded in Oaxaca, with an average growth of 2.9%. The case of Guerrero is also noteworthy, growing at an average rate of 26.6% per year between 2013 and 2019, 1.8 times more than the group average and between July 2020 and December 2023, it grew at an average rate of 6.6% per year. It is important to emphasize that it was decided to exclude Mexico City from the study because it is the financial and economic center of the country, which means that FDI is administratively registered in this entity even though it is destined for other entities.[11]

Figure 7. Evolution of new investments and reinvestments



Source: prepared by the author with information from the SE (2024).

From July 2020, different growth rates are observed between the treatment and control groups. Table 2 shows the largest difference in investment and reinvestment of 1.9 pp on the annual growth of both groups. Note that the average yearly growth of the control group was 14.7% between 2013 and 2019 and 6.3% between July 2020 and December 2023. Meanwhile, industrial production accelerated its growth between July 2020 and December 2023, relative to what was observed between 2013 and 2019 in both groups. However, job creation slowed down partly because the period considered was between July 2020 and April 2021, when the fluctuations were negative due to the impact of the health emergency on the labor market.

Table 2. Average annual percentage variation in industrial manufacturing activity, new investments and reinvestments and jobs registered with the IMSS

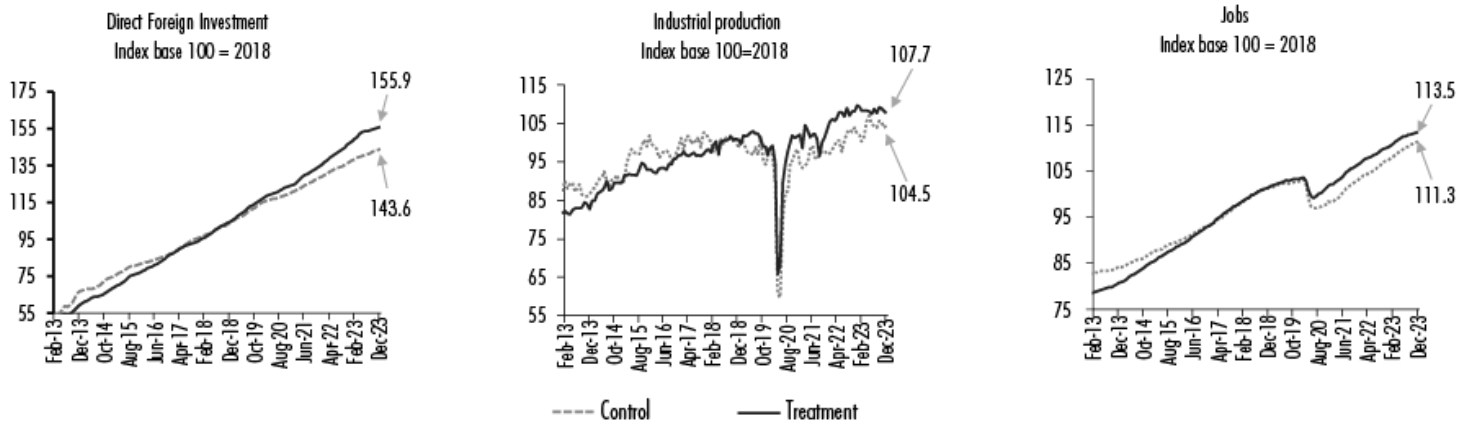
Group	*Period*	*Industrial manufacturing activity*	*Investments and reinvestments*	*Jobs*
Treatment	2013-2019	2.9	14.6	4.3
		(2.6)	(5.8)	(0.9)
	July 2020-December 2023	5.3	8.2	2.7
		(11.4)	(1.0)	(2.5)
Control	2013-2019	1.4	14.7	3.3
		(4.5)	(10.6)	(1.0)
	July 2020-December 2023	5.6	6.3	2.4
		(13.5)	(0.8)	(3.7)

Note: the standard deviations of each series are presented in brackets.

Source: prepared by the author with information from IMSS (2024), INEGI (2024) and SE (2024).

Figure 8 shows the evolution of the indicators analyzed above, contrasting the control and treatment groups. It shows that, in industrial activity, the difference between the control and treatment entities as of December 2023 was 3.3 pp. This is explained by the fact that, in May 2020, the entities in the control group fell on average 8.7 pp more than those in the treatment group, probably because their economies were not as integrated into the GVCs as the treated units were.

Figure 8. Evolution of industrial production, FDI and jobs registered with the IMSS in the control and treatment group



Source: prepared by the author with information from INEGI (2024), SE (2024) and IMSS (2024).

Regarding the indicator of new investments and reinvestments, the difference was 12.2 pp in December 2023. This is explained by the fact that, between July 2020 and December 2023, the average annual growth of this indicator was 6.3% for the control group and 8.2% for the treatment group. Finally, the difference was 2.2 pp in December 2023 for the number of jobs. The explanation is similar to industrial activity (see Figure 8). The control group showed a more significant decline, probably because the jobs in the untreated units are in the service sector, which was not declared an essential activity and is also more dependent on domestic demand.

In short, the border states and those of the Bajío region were selected for the treatment group because of their closer integration with the United States. All other states except Mexico City, Campeche, and Tabasco were chosen for the control group. The treatment group consisted of 12 federal states, while the control group consisted of 19. Given the descriptive statistics presented in this part of the study, it can be seen that there is a difference between the levels observed in December 2023 for the groups formed in all indicators, indicating an effect of nearshoring in Mexico. Along the same lines, in addition to the trade war between the United States and China and the global problems in supply chains due to the dependence on inputs from Asia, especially China, there have also been public policies in Mexico that could affect certain sectors, such as the labor market. One example is the outsourcing reform that will be implemented in 2021, which prohibits companies from subcontracting personnel to carry out activities directly related to their commercial objectives, as well as the increase in the minimum wage, which will increase by 12.8% in real terms between 2019 and 2023.

6. RESULTS

Using the GSC methodology, we analyze the behavior that industrial production, FDI, and the number of jobs registered with the IMSS would have had without nearshoring. To do this, we conduct different exercises with the variables of interest for 2013-2023. In all the exercises, the treatment date was the entry into force of the USMCA in July 2020. In the first exercise, the GSC methodology was applied to the treatment group without considering control variables, while in the subsequent exercises, they were included.[12] The results obtained were positive and significant for industrial production and FDI. However, for jobs, the effect was positive but not significant, most probably because the impact is direct; in other words, it only affects the company that receives the FDI (Saucedo *et al.*, 2020). In addition, the reform of labor subcontracting and the increase in the minimum wage could counteract the effect of nearshoring. Finally, the magnitude of the effect is similar for the variables where the results were statistically positive and significant in all exercises. Table 3.

Table 3. Summary of resultss

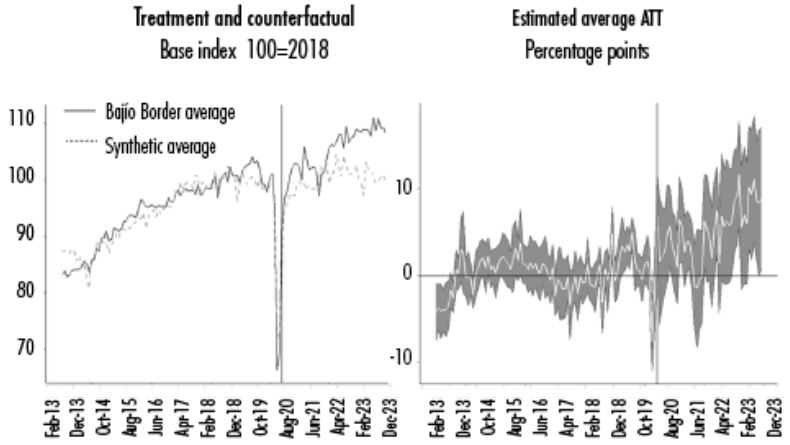
Variables	*Industrial production*	*p-value*	*FDI*	*p-value*	*Jobs*	*p-value*
No controls	7.00	0.00***	11.40	0.02***	0.94	0.66
Controls						
Industrial production			11.23	0.02***	0.95	0.66
FDI	6.52	0.00***			0.97	0.65
Jobs	6.67	0.00***	11.36	0.06**		
FDI and Jobs	5.19	0.03***				
FDI and industrial production					0.97	0.65
Industrial production and Jobs			11.36	0.06**		

Notes: *** 99% confidence level, ** 95% confidence level, and * 90% confidence level.

Source: prepared by the author using information from IMSS (2024), INEGI (2024) and SE (2024).

Figure 9 represents the evaluation of the impact of nearshoring on the industrial production indicator. We can see that after July 2020, i.e., after the intervention, the ATT experienced an average increase of 5.2 pp. Between July 2020 and July 2021, the average ATT was 3.7 pp; however, in this period, the confidence intervals crossed zero, so in some cases, this difference was not significant. From the second half of 2022, the difference between the treatment and counterfactual groups increased, averaging 7.6 pp. It is important to note that this difference is on an upward trend. It should also be noted that the maximum point of difference is observed in the third quarter of 2023, during which the ATT was 10.3 pp.

Figure 9. Estimation of the synthetic control for industrial production



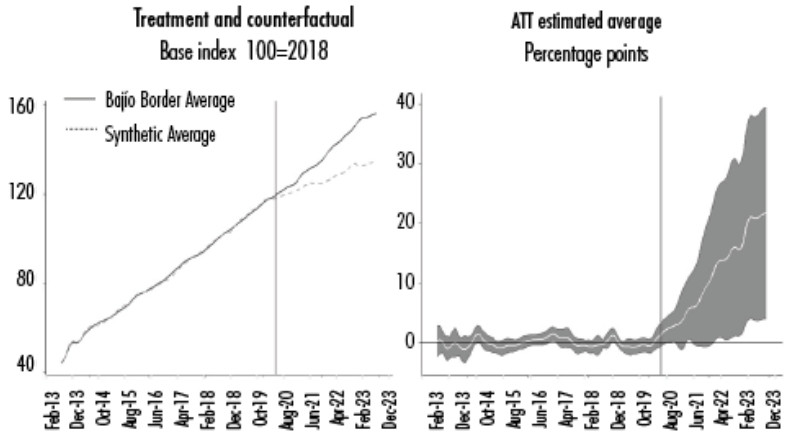
*Note: * difference in pp between the average effect of the treatment on the treated and the indicator.*
Source: prepared by the author with data from INEGI (2024).

In the case of industrial production, it was found that the states that benefited most from nearshoring were Chihuahua, San Luis Potosí and Sonora, which have seen the fastest growth in the manufacturing sector of their economies. In other words, while on average, the units studied increased by 5.6% between July 2020 and December 2023, the states that benefited the most saw growth of 7.9%. Meanwhile, Querétaro experienced no effect and even had a negative result, i.e., from the start of treatment, its growth was 6.7 pp lower than expected. In contrast, Tamaulipas had mixed results, particularly in 2023, when it grew 2.0 pp less than its counterfactual.

The estimate of the cumulative average growth of FDI in the treated units and the synthetic control is presented in Figure 10, where it can be seen that the ATT is positive and significant, with an average difference of 11.36 pp after the start of treatment. In addition, the trend shows that

the gap between the synthetic control and the treated entities widens over time, suggesting a sustained and growing effect. Empirical evidence supports the idea that firms with greater integration into US production chains have captured an increasing flow of FDI since July 2020. Thus, between July 2020 and December 2023, the treated entities received an additional flow of USD$16.9 billion in new investment and reinvestment, representing a 4.8% increase in total FDI at the national level.

Figure 10. Estimated synthetic control of new investments and reinvestments

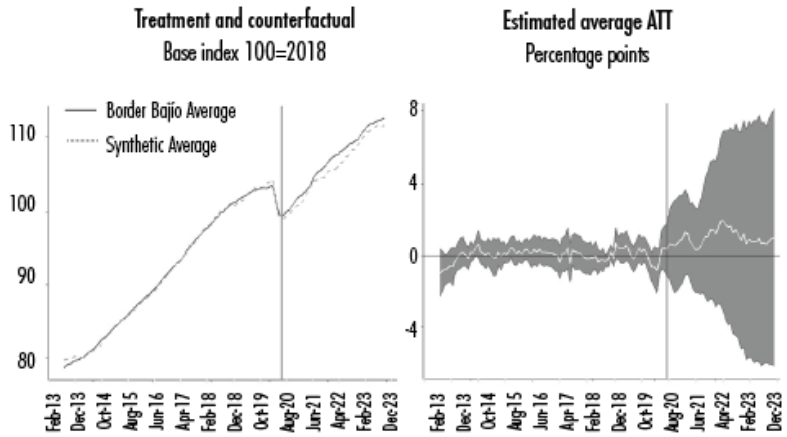


*Note: *difference in percentage points between the average effect of the treatment on the treated and the indicator.*
Source: prepared by the authors with data from the SE (2024).

In terms of FDI in each of the states studied, it was found that 10 of the 12 entities considered in the treatment group registered a positive effect. In particular, the Bajío region registered the highest flow in relation to what would have happened in the absence of nearshoring; in other words, Aguascalientes, Durango and San Luis Potosí together received an additional USD$4.5 billion compared to their synthetic control. In the case of the northern border, Baja California, Sonora and Chihuahua were the entities with the most significant effect since, between the three of them, they accumulated an additional flow of USD$4.4 trillion in terms of their synthetic control. Furthermore, between 2022 and 2023, the growth of Gross Fixed Investment (GFI) was higher than the average observed between 2013 and 2019 for the total indicator and its components. On the one hand, machinery and equipment increased by an average of 12.9%, while between 2013 and 2019, it grew by only 1.1%. As for construction, the growth in the non-residential sector was 25.4%, in contrast to the negative average variation of 3.4% observed between 2013 and 2019. However, data on total Gross Fixed Capital Formation is not available at the state level, making it impossible to carry out a comparative exercise similar to the one presented in this study.

Considering that a positive impact on industrial activity was observed, an analysis is made of whether the same phenomenon was transferred to the labor market due to the increased demand for employment. For this reason, the methodology for the number of jobs was estimated where it is observed that, once the USMCA came into force, the trend of the ATT was positive between July 2020 and December 2021, with an average difference of 0.97 pp; however, this is not significant. This result aligns with the literature where it has been empirically observed that the impact of FDI in the manufacturing sector has a positive effect, especially on workers in manual jobs (Nunnenkamp and Alatorre, 2007). Future studies propose analyzing the behavior of the number of jobs in the manufacturing sector to identify a positive and significant effect.

Figure 11. Estimated synthetic control for the number of jobs



*Note: *difference in percentage points between the average effect of the treatment on the treated and the indicator.*
Source: prepared by the author with data from the IMSS (2024).

7. CONCLUSIONS

In the specialized literature, it has been observed that free trade agreements (in the case of Mexico, the signing of the USMCA) increase FDI flows. In Mexico, this treaty coincided with the company relocation policy due to the trade disputes observed between China and the United States from 2017 onwards and the contingency measures implemented by China. This study yielded significant positive results regarding the effect of nearshoring on industrial production and FDI since growth above the synthetic control was obtained in accordance with the methodology applied.

Based on these models, we identified that, in industrial manufacturing production, the average difference between the treated entities and the counterfactual was 5.19 pp, and for new investments and reinvestments, it was 11.36 pp. In the particular case of new investments and reinvestments, it can be seen that the difference has increased over time, and this could be prolonged due to the gradual realization of the FDI announcements made mainly in the entities bordering the United States, such as Pacific Limited (USD 14 billion) and Lingong Machinery Group (USD 5 billion), projects that began development in 2024.

Based on the results obtained, from a public policy perspective, the integration of more entities into GVCs could be promoted. As suggested in this study, this could translate into more significant growth of their industrial production, which, according to Campos and Campos (2023), is a key mechanism for reducing inequality, increasing employment and improving schooling levels in the population. In the context of nearshoring, it is crucial that the three levels of government take advantage of opportunities to attract foreign companies to Mexico, providing the necessary infrastructure for their operation and fostering the development of human capital capable of responding to labor demand, as indicated by Banxico (2016). In addition, the renegotiation of the USMCA, which will take place in 2026, can generate certainty for companies in the medium term.

One of the limitations is that the specific destination of FDI is not known, which can make it difficult to draw conclusions from this study. This was one of the reasons why it was decided not to consider Mexico City in the analysis since this is where most of the corporate headquarters are located and where investment is recorded. Furthermore, this methodology is correct for measuring the impact of an event; however, when seeking to explain the reasons for the effect, a clear interpretation of the model's parameters is not found.

In the future, this work could be extended by breaking down the information to a smaller geographical area in order to examine more precisely the direct effects on foreign firms, the cities and the economic sector where the FDI arrived, and the indirect impact on local firms, neighboring cities and other economic sectors. In addition, the exercise can also break down the effect on employment by wage level since the literature suggests that the effects are mainly observed among more skilled workers. Similarly, the exercise could be strengthened by including other control variables, such as exports, or by using a methodology that allows for a spatial breakdown of FDI.

ANNEX

Evidence of parallelism in the series

The GSC methodology allows the assumption of parallelism in trends to be relaxed by incorporating dynamic factors that capture unobserved heterogeneities. A regression is performed considering the temporal effects of the series through fictitious variables to assess whether the

series have a parallel trend. For industrial production, imperfect parallelism is observed in 50% of the years, and for FDI, 62.5% of cases. Regarding jobs, the trends are not parallel in most cases as a non-significant interaction coefficient is observed in only 12.5% of the cases.

Table A1. Results of the regression with fictitious time variables

Variables	*Industrial production*	*p-value*	*FDI*	*p-value*	*Jobs*	*p-value*
Intercept	89.53	< 2e-16***	43.03	< 2e-16***	81.53	< 2e-16***
Treatment	-6.83	0.00***	0.09	0.95	-4.79	< 2e-16***
2013	-1.67	0.33	14.23	< 2e-16***	1.94	0.00***
2014	0.57	0.74	26.87	< 2e-16***	4.02	0.00***
2015	7.25	0.00***	35.41	< 2e-16***	7.09	< 2e-16***
2016	7.89	0.00 ***	41.21	< 2e-16***	10.18	< 2e-16***
2017	11.26	0.00***	49.00	< 2e-16***	14.04	< 2e-16***
2018	10.47	0.00***	56.97	< 2e-16***	18.47	< 2e-16***
2019	8.34	0.00***	66.09	< 2e-16***	20.66	< 2e-16***
2020	-7.57	0.00***	73.29	< 2e-16***	18.29	< 2e-16***
Treatment:2013	1.67	0.49	-3.82	0.03*	0.93	0.18
Treatment:2014	4.59	0.06*	-6.21	0.00***	2.12	0.00**
Treatment:2015	2.32	0.34	-5.55	0.00**	3.23	0.00***
Treatment:2016	3.34	0.17	-2.64	0.14	4.24	0.00***
Treatment:2017	3.12	0.20	-0.96	0.59	5.07	0.00***
Treatment:2018	6.83	0.01**	-0.09	0.96	4.79	0.00***
Treatment:2019	9.87	0.00***	1.57	0.38	5.27	0.00***
Treatment:2020	12.12	0.00***	2.57	0.21	6.27	0.00***

Note: *** 99% confidence level, ** 95% confidence level, and ** 90% confidence level.

Source: prepared by the author with information from IMSS (2024), INEGI (2024) and SE (2024).

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[2] Throughout this article, this variable is referred to interchangeably as industrial activity or manufacturing industrial activity.

[3] China represents 9.7% of total intermediate goods exports, i.e., a difference of 1.6 pp with the United States, in first place, and 4.2 pp with Germany, in third place.

[4] The “company in the home country” refers to the economic units located in the company's country of origin (INOMATA, 2017).

[5] The analyses in this paper were carried out using R software. For the GSC exercise, the *gsynth* library available in the CRAN repository was used. This library provides the necessary tools to implement this methodology.

[6] The FDI data is quarterly, while the IMSS data and industrial activity data are monthly. Therefore, they were transformed to monthly frequency using the Denton-Cholette methodology according to Gonzales (2014). In addition, the IMSS data was deseasonalized using the X13Arima-Seats program.

[7] Total exports to the United States represented 82.6% of total Mexican exports as of October 2023. During 2022, the United States contributed 56.6% of total FDI in Mexico.

[8] 8 For the rest of the country, the states of Campeche and Tabasco are not included, as their exports represent only 5% of GDP in the same period.

[9] Treatment group: Aguascalientes (AGS), Coahuila (COAH), Durango (DUR), Querétaro (QRO), Baja California (BC), Nuevo León (NL), San Luis Potosí (SLP), Sonora (SON), Guanajuato (GTO), Chihuahua (CHIH), Tamaulipas (TAM) and Jalisco (JAL).

[10] Control group: Baja California Sur (BCS), Colima (COL), Chiapas (CHIA), Mexico City (CDMX), State of Mexico (EDOMEX), Guerrero (GRO), Hidalgo (HGO), Michoacán (MICH), Morelos (MOR), Nayarit (NAY), Oaxaca (OAX), Puebla (PUE), Quintana Roo (Q.ROO), Sinaloa (SIN), Tlaxcala (TLAX), Veracruz (VER), Yucatán (YUC) and Zacatecas (ZAC).

[11] In 2022, Mexico City had 1,200 corporations, leading the country and accounting for a significant part of FDI. However, not all resources remain there, since, according to Antrás *et al.* (2012), corporations control the flow of resources to other destinations.

[12] The control variables were chosen because previous studies showed that FDI has a positive impact on employment and manufacturing production, by creating companies and increasing productivity (Aitken *et al.*, 1996). However, the methodology may face problems of endogeneity between variables.