

Impacts of Fiscal Policy cuts and Minimum Wage Increases in the North
Frontier of Mexico: a case study of the IMMEX sector in the North
Frontier Economic Free Zone.

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Abstract:

Based on a Synthetic Control Method, this master thesis analyses the effect of public interventions packages in the North Frontier Economic Free Zone, in Mexico, being the effects of fiscal and labor policies in this study overall nonexistent in employment levels in the IMMEX sector and the manufacturing sector, this was the minimal goal of the Mexican Government, it is also obtained that even in situations where the studied units have high levels of Economic heterogeneity the Synthetic Control Method is an important tool that can give us and insight of the impact of placed based policies.

Overall, the results show that the creation of the NFZ and the implementation of its stimuli packages had no impact on the employment levels of the municipalities studied.

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1.-Introduction

In December 2018 the president of Mexico, Andres Manuel Lopez Obrador, published in the official Journal of the Federation (DOF) the new tax law for 2019 and further, in particular this new package included fiscal policies and labor policies focalized in 38 municipalities in the North Frontier of Mexico, and the 5 municipalities that comprise Baja California, hence creating the North Frontier Economic Free Zone

This economic package considers the cut in taxes (Value Added Tax "VAT" from 18% to 8% and the Income Tax "IT" from 30% to 20%) and a rise in the minimum wage of 100% (88.36 to 176.72 Mexican Pesos per day). Creating this free economic zone produces a special treatment between the rest of the country and the NFZ, the Mexican government intend the policy to incentivize the economic competitiveness and industrial development, attract investments and generate employment, foment the consumption of the inhabitants of the region and contain migratory influx. Something that is important to denote about the NFZ is that it has greater commercial openness than the rest of the country, and that has special access to international markets of goods and services due to its proximity with the United States, this is why it has its own migration and social processes, differentiating it from the rest of Mexico.

In the NFZ's Secondary sector we have relevant sectors as the manufacturing industry and the Industria Manufacturera, Maquiladora y de Servicios de Exportacion (IMMEX). The policy package intends that this industrial development that the NFZ already has can help in the improvement of the economy and use this economical structure as an opportunity to achieve the goals of the policy implementation.

This is why we have that the Mexican economy is a perfect place to study place based policies, this in regards to the structure of its economy as a country, with high diversification in its regions where some of the regions present higher level of heterogeneity than others, but nonetheless follow the national trends having its specific exemptions as this paper will show, and that in studies of Mexican researchers are commonly separated, they need an special way to study them (Fuentes N., 2016), hence the presented policy in 2018 as a tax and wage placed based policy package, results of interest to evaluate the effects in this region that as explained even before the policy it presented structural differences and processes than the rest of the Mexican economy, and the impact that produced in the employment in the IMMEX, one of the sectors that was intended as a mean to achieve the goals of the policy, this is why I introduce a study in two capacities, first with the evaluation on employment and then the evaluation of the ratio of the IMMEX sector employment over the total workforce.

There are studies as (Campos-Vazquez, 2020) and (Fuentes, Bruges, Konig, & Carrillo, 2019) that focus in this policy package, and show that the effects of this policy had negative impacts on the economy,

the second one (Fuentes) focuses on prices and production, and states that the labor policy is a measure of low inflationary effects and that slightly improves the purchasing power of the ones that earn the lowest in the manufacturing sector, moreover Fuentes establishes that the effect in the region lowered the employment around -0.18% up to -3.2% depending on the sector of the economy, this study is restricted to 2019, and published the same year, not even a calendar year after the policy was established, whereas the work of Campos uses a Synthetic Control Method to analyze the overall effect in the total workforce of the North Free Economic Zone, this study is focused on creating synthetic controls comparing the municipalities that just have a border with the United states and creates a comparison with the United states cities that border this municipalities to analyze the impact in the workforce, this study is limited to 2019 as well and results that the effect created a decrease in 30,000 workers over the studied municipalities.

Having this policy already studied but in such a restricted time period that did not even allow the economy to adopt itself to the new policy and the companies to be able to profit from the benefit of the reduction of the VAT and the consumers of the IT, I consider that having a post-treatment period sample that goes in a monthly series from 2019-january to 2022-January, should be of interest to study and analyze not only the short term effect but as well the mid-term effect in the IMMEX sector and how the region adapted to the policy if it had to or if the policy had or is having an effect on the region.

Taking the latter into account and the studies abovementioned, in this study I go further than them, and I present a method of synthetic control developed by (Abadie, 2021) and some modifications offered by (Wiltshire, 2021) to analyze the effects of the implementation of the North frontier economic free zone in Mexico, and as said its impact in the IMMEX sector as an important part of the whole manufacturing sector, the difference is that this study only takes municipalities relevant to the IMMEX sector and that is not restricted to only 2019, and has a period of study going from 2007-July to 2022-January.

Using the synthetic control method to analyze this policy package offers a data driven method for choosing the control groups (untreated units), in this case the control units need not to be chosen with special characteristics or similitudes, this because the IMMEX program establishes these conditions by itself and provides the municipalities of relevance in its data base. Leaving us with 31 untreated municipalities and 10 treated municipalities. The synthetic control also offers a simple but sophisticated method to evaluate the effect of the policy recreating a synthetic path that the treated unit would have followed if the policy would have not been implemented.

According to economic literature we have that a rise in wage should create a decrease in the level of employment, studies as (Allegretto & Reich, 2017) and (Cengiz D., 2019) tell us that the effects of increases in minimal wage should in most cases have minimal effects to the levels of employment. in the

case of the fiscal part of the policy package (Tiebout, 1970) specifies that a policy that targets the reduction in taxes can create an increase in consumption giving and creating an increase in production. with the same idea of a reduction in production costs via a reduction in bought intermediate goods and services can be beneficial for the sector, but it is important not to take here a rise in production via an increase of consumption (National) for the IMMEX sector, because since the IMMEX sector is restricted to export its production is not benefited by the increased purchasing power of the Mexican population. Hence the idea of this paper is that the reduction in the fiscal policy will help neuter the effect of the minimum wage increase.

The results of the synthetic control yielded that the effect of the minimum wage increase goes in according to the results of (Belman Dale, 2014) that stated that in a first stage some industries will let go of some workers, this initial stage is quite short and after this stage ends the economy reestablishes its levels by hiring new workers with higher salaries, hence in other words “it had minimal effect in employment or no effect in some cases” this as an intended outcome of the Mexican government in the sense that it throws out one of the arguments against the rise of the wage coming from the COPARMEX (Confederacion Patronal de la República Mexicana) this is the National Confederation of Mexican Employers, that were against it, saying that it would hurt the economy and will create a loss of jobs and inflationary effects.

Following the results discussion, it is important to note that even though we have that overall, the effect was minimal, in some of the cases the policy resulted beneficial for the municipalities and that it didn't harm the employment of the IMMEX sector and neither in the total workforce of the municipalities and in some cases as we will see it helped in the fall of employment in the COVID era. This result is important as it shows that an extended analysis of a policy can yield better results than one that is restricted and its also observed that the synthetic control method as a tool of policy analysis can help in the evaluation even when some regions have greater differences than the rest of the control regions analyzed as is the case in Mexico.

2.-Literature Review

This study relates to three types of literature, first it relates to based placed policies, where it shows the importance of this kind of policies and the possible effects on the economic structure of regions, treated and untreated units. The second type is based on tax changes literature and its effect in economic activity. And thirdly literature based on wages, showing that if minimum wage changes are relatively small or if the minimum wage is low and the increase is high but nonetheless the overall level of the wage stays low, then the impact on employment has little to no effect (Belman Dale, 2014).

2.1.-Based-Placed policies

By studies of (Abadie A. D. H., 2010) it is known that place-based policies are still debated across the academic community and how to create and refine the methods to analyze their efficiency and accuracy. Nonetheless according to (Ladd, 1994) these studies are geographically targeted to individuals and in some cases enterprises with an intent of helping disadvantaged units. These placed based policies have been around within the European Union and been used to target underperforming areas such as downtown business districts that are eligible to a regional development aid (Neumark D., 2014).

In this study the main case of analysis will be placed based polices related to labor markets and tax-cut modifications. (Neumark D., 2014) mentions that the main objective of these policies is aid disadvantaged areas and individuals in an economic region, and normally they are mainly established among the same country, in this case it quite different from the normal set up, since the NFR is not at all in a disadvantage with the southern regions, in fact it could be at the same level or just with a significantly higher advantage due to transportation costs. Hence the NFR is only in disadvantage not with its own country but with the southern states of the United States of America.

(Fuentes N., 2016) constated the recessive, distributives, and inflationary effects on the Homologation of VAT of 16%, as well as an outflux of Mexican consumers with a destination to southern US cities, that in by a wide margin continued to dominate the market in this binational region. And (Corrales, 2017) states that the homologation of the VAT provides an even higher attractive to Mexican consumer to flee to spend in the US, as even before the homologation the US cities had an important weight not only by competitiveness but also by commercial tourism, and this must be considered to categorize our region study as a disadvantaged region against the US southern region.

Going back to the place-based policies, (Campos-Vazquez, 2020) in their 2020 study, mention the difficulty of analyzing exactly this policy as the Mexican policy is one of the most ambitious in Mexico's history, with the main goal of improving living standards for low-wage works and the reestablishment of competitiveness against the US southern states, and according to (SHCP, Gobierno de Mexico, 2022) reducing crime within the region.

Placed based policies as the Mexican one, have been implemented in other parts of the world, as in the US, French urban areas or in the European Union, which target disadvantaged areas (Busso & Kline, 2006). The difference is that policies like these have been implemented without the increase in wage, so they use a different methodology to assess the changes in the region.

2.2.- Tax policies

Tax policies and rates are extensively different between places and locations even within countries or states, an example is United States with a diverse determination of taxes via city, state or county, another example is the case of study of this research that is Mexico with different taxed areas. This differentiation between taxes can produce a difficulty for central governments at the moment of income redistribution and provision of public services. According to Kleven (2019) it is of utmost importance to revise and carefully think when designing tax policies, this due to the changing mobility costs across the world and even thinking about globalization, which provides an easiness now of economic activity mobility, as it is not as difficult to move economic activities from a location to another.

Having a particularity tax policies of incentivizing or disincentivizing capital and personal mobility, a precise and careful study of these policies is necessary, literature about financial migration and human migration is extensive in relation with tax policies, an example is (Tiebout, 1970) in its research “ a pure theory of local expenditures” explains that if a policy that reduces the cost of any service or good also produces an increase in a set of services or goods, then the policy will not be economically justified unless the welfare function can be known, otherwise it would be a violation of the economic sense and will produce negative effects in the consumer behavior”.

In other cases, literature as (Mirrlees, 1982) mention that the optimal taxation rate induces quite important effects in the decision of an individual of migrate or not migrate, in this paper it is stated the difference of taxation between working abroad and working home and receiving a taxation rate for the government in both cases. While an important case comes through this study is that with higher taxation rates an individual can be induced to the decision of working abroad and if the taxation rate of his home place regarding working abroad is also high, then the individual could consider even rejecting its own citizenship in favor for the one of the place abroad, hence the government of the home place losing taxing individuals due to non-optimal tax policies that could lead to economic and fiscal determent.

Nonetheless in this situation we can see that a change in the tax rate has repercussions in the totality of the region, they could be beneficial or not, the impact of this analysis in tax modification can be traced back to the work of (Keynes, 1936) where we know that fiscal policy can be a tool to achieve a better equality in income distribution and that its effect on the propension to consume is, in some sense higher to detonate a rise in economic growth, not without saying, that the fiscal policy is also a financial mechanism for the public spending, and that at the moment of reducing the VAT and the IT, it can be achieved a result completely opposed to the one that the policy was designed for.

2.3.- Wage policies

In their paper (Kline & Moretti, 2013) study the variations of place based policies in unemployment, and explains that if hiring costs are too high enterprises will post less vacancies for employment, and proposes that a way to offset this issue could be to set place based policies, where there's a hiring subsidy, where the optimal subsidy comes from the local productivity, something important to take from this statement into our research is that, the government of Mexico believes that increasing the wage by 100% will not significantly increase the costs of the enterprise and that if there's such distortion created by the policy, a way to offset this to a more natural state is the reduction in the VAT and the IT, due to the increase in consumption of the individuals, hence creating a higher demand of goods and services in the region, and this increasing the production of the local manufacturing and maquiladora sectors.

While in theory an increase in purchasing power could increase local production, it is of upmost important to note that in the IMMEX sectors these units are in majority of exportation, by definition a Maquiladora has to export what it produces, while in the manufacturing sector is not mandatory but we encounter that in many cases it is more profitable to export than to sell to locals, this being the case in the north of Mexico.

(Belman Dale, 2014) in its book shows by survey data and meta-analysis of employment, that a change in the actual minimum wage has an impact in employment that is at most small, this is important in the sense of the duration of the study because he states that an increase in the minimal wage will suddenly create changes in the labor market, this is to say that at the first stage the companies will let go of some employees, creating a rise in unemployment, nonetheless these job separations will remain constant after a brief period of time, in other case hirings will stop or fall importantly for a brief time until it converts into a constant. After these two events happen, then companies will take a turn to fill their firm vacancies easier, leading to a gradual increase in hirings to even a higher level than before the minimum wage increase, and in some situations reduce unemployment to its previous level or even lower, but this last event is not constant in all the observation studies.

(Riley & Rosazza, 2017) in their study show that an increase of minimal wage can create increases in productivity and that enterprises that already pay higher than the new established minimal wage should be less affected by the modification than the enterprises that received the impact of the increase, Riley only analyzes changes into productivity induced by the increase of the minimal wage. Hence here we can take an important statement, The Mexican chamber of commerce (2018) stated that in the north of Mexico in the IMMEX sector the minimal wage was mostly not applied and that a modification in the law was not necessary due that it was paid more already, whereas the president of Mexico, Obrador (2018), mentioned

that according to governmental data this was not the case, and that an application of the new policy will provide a higher welfare to the population of this region and a higher productivity to the businesses.

2.4.- Motivation of the analysis

Analyzing Mexico's tax and wage policies results of importance for the development of place-based policies in developing countries, moreover in a particular situation where its own disadvantages are exogenous to the country and where we encounter a fairly distributed levels of production around the north and center of the country. As mentioned before research of mixed place based policies is not common in literature, as well as even the implementation of one place based policy is debated among the academic community, hence analyzing and providing of scientific methods for a mixed place based policy where the main changes are tax and wages, can produce a clearer sight for the path of place-based policies.

One of the most important policies for the start of the Mexican government was the implementation of these two fiscal changes. Giving as a justification the increasing economic and disadvantageous gap that exists between the north and the center of the country, as well as a plan to implement in future policies like this in Special Economic Zones further in creation by the government, an analysis of this policy is of upmost relevance to gather data and to be able to compare why the creation of the NFR is important as the government specifies. In the last presidency of Mexico from 2012-2018, there were created Special Economic Zones in the south and center of the country, giving them a special status among the Mexican Economy, but after 10 years of its first implementation no results have been seen, in fact some of these SEZ have disappeared and return to their original status.

Mexico Being a country with a high diversity in culture and resources, presents a perfect scenario to create and implement place based policies well designed, having this in consideration, a study about the north, one of the regions that is the most integrated and homogenous across its region, could give us a clearer path to the creation of zones and better designed PBPs, and not only this, analyzing an specific area of the economic structure of the region such as the IMMEX that accounts for a quarter of the economy of the region and 60% of their exports, can give us a solid insight about the efficiency of the policies, and its effect over the labor market that in 2018 accounted for around 19% of the total workforce of the region and to a fifth of the whole nation. Being of upmost importance to see the impacts of such policies that can benefit or detriment the economic state of the region as well as to create important disturbances in the labor market of the country.

Using scientific methods and economic analysis can result in important tools specially in the use of Synthetic control methods in Mexico, a furthermore so the academic community can take advantage of these tools and methods to analyze the economic situation in other developing countries of Latin America

or the world, but specially in Mexico and Latin America that share similitudes and characteristics of their economies.

3.-Institutional Context

3.1.-Tax situation in Mexico

Historically Mexico has had a value added tax rate that is differentiated between the north frontier and the rest of the country, this is from 1990 to 1994, in the frontier the VAT (Value Added Tax) was of 6% in the frontier, meanwhile in the rest of the country it was of 15%, from 1995 to 2009 it was 10% and 15% respectively, it changed in 2011 when the presidency established an 11% and 16%. This change lasted until 2014 when the new fiscal policy introduced the VAT homologation of 16% for the whole country.

In the case of the Income Tax (IT) it has a different development, since for this tax, it has never existed a differentiated tax between the north and the rest of the country, this is important due to the case that a reduction in this rate could generate effects and incentives difficult to quantify, as well as the use of strategies coming from enterprises that rely on subsidiaries across the country in regard to moving its operations to zones with a higher competitiveness or with the incentives of a lesser tax rate.

In 2018 the Mexican government, led by President Andres Manuel Lopez Obrador, published a new decree, the fiscal income law of 2019 (DOF, 2018). The economic plan of the government presents some general criterion to stimulate the economy with the implementation of fiscal and labor stimuli, it is localized in a North Frontier Region (NFR) in an area of 25 km of the border with the United States (US), with 38 municipalities that are affected plus the 5 states of Baja California, giving a total of 43 municipalities affected by these stimuli, in figure 1, it is shown the set of the municipalities that received the policy package.

Figure 1.- Municipalities affected by the North Frontier Zone Policy Application in 2019



Source: Gobierno de México. <https://www.gob.mx/se/acciones-y-programas/zona-libre-de-la-frontera-norte>

The fiscal decree has as an objective according to the president of Mexico: To support the north region of the country; in a specific way the north frontier with the United States, is an important project to create investments and employment, and to benefit from the strength of the border states of the American Union. (Obrador, 2020). Overall, this economic package has the thesis to increase competitiveness, attract investment, generate employment, stimulate the consumption of the inhabitants of the region and contain the migratory influx.

This economic package for the NFR is based on the reduction of the value added tax (VAT) of 50% (From 16% to 8%) to enterprises that have their turnovers in the region; a reduction of 33% on Income tax (ISR, as Known in Spanish, from 30% to 20%); and an increase of 100% in the minimum wage to establish it in \$176.72 pesos (Daily). And a small adjustment of gas prices to standardize them to the ones of the south of the US.

According to the Secretary of treasury (SHCP, Gobierno de Mexico , 2022) this stimuli package comes from the hypothesis that the state must act over the internal demand with fiscal policy as its main tool, and its idea is that the fiscal reduction will help to reduce the general level of prices, and this will produce and multiplicative expansive factor via the augment of the spending, and a rise in production and

income, producing an increase in employment and so on. The SHCP states that this fiscal policy will induce an important economic growth and rise in welfare for the region.

Hence it is important to analyze the impact of the fiscal policy established in 2019 where these stimuli in the NFR and in sectors as important as the Manufacture and Maquiladora industries and services of exportation (IMMEX) that represented as high as around 85% of the regional (North of Mexico) GDP during the start of the decade of the 2010's (Ocegueda, 2011), in actuality representing 60% of all foreign investments, due to the increase of diversification of activities in the northern states in 2020 (INEGI) manufacturing sector represented around 25% of the GDP of the northern states, in particular this represents the importance of the maquiladora and manufacturing sector for Mexico and the northern states.

This research has as an objective the analysis of the labor market changes in the northern states of Mexico: Baja California, Chihuahua, Coahuila, Sonora, Nuevo Leon and Tamaulipas, and will use a Multiple synthetic control method analysis, with 12 non treated municipalities from the rest of the country. In particular the questions expressly answered are: How does the modification in the VAT and IT rates are incorporated in the labor changes (employment by municipalities and states)?, how does the reduction in tax rates modify the opening and closure of businesses in the NFR? Does these changes could be reflected in the variation of the GDP by state level? How does the IMMEX whole production is affected by the policy? Are there benefits from this policy to the IMMEX and the NFR?

3.2.- IMMEX: Industria Maquiladora, Manufacturera y Servicios de Exportación

The importance of the IMMEX program comes from the establishment of the North America Free Trade Agreement (NAFTA) in 1994, where the introduction of the maquiladora created a new economic sector where high quality products were produced at lower costs, this across industries such as electronics, health machinery and artifacts, aerospace and automotive. The IMMEX program enables foreign companies to operate in the country under a special and preferential framework, where they can only operate and is not available to other companies that do not meet the requirements of the program.

The description of the program is important due to differentiate between sectors and to clear out why the maquiladora and manufacturing sector is important to the north of the country and why its proximity with the United States is relevant and can cause an advantage or disadvantage regarding the policy analyzed.

The program in short allows foreign manufacturers to import raw materials and components into Mexico, this with tax duty free, just under the condition that 100% of all that finished goods will be exported out of Mexico within a government mandated timeframe.

Its goal is to expand the Mexican economy by enabling a competitive environment, through job creation, Mexico's modernization and globalization, creation of infrastructure, specialized technologies and knowledge to the region. And this introduction of benefits into Mexico translates into tax incentives to the enterprises that are members of the IMMEX program.

In a first stage of the program this was the only modality that it had, over the years and modifications to the IMMEX regulation, where according to the secretary of economy (2020) the program can also allow under special circumstances and the meeting of requirements to not only export all of its production but to also sell it internally, this while doing an adjusting to the tax agreement of the program, remembering that in the program most of the time the machinery and the products are free of import taxes and capital taxes. And having all this into account it is that the IMMEX program from 2006 to 2016 accounted for around the 85% of the total manufacturing exportations of Mexico, Secretary of Economy (2016)

Returning to the paper of (Campos-Vazquez, 2020) we get that the setup of this situation is very different to the normal ones studied across the literature since there's not relevant research that contains a scientific and systematic method to analyze the situation and compare them with the effect of the Mexican Policy. Nonetheless having plenty of literature of analysis in both regards (tax cuts and wage rises), it is possible to study the effects of these policies in the NFR and its labor market.

3.3.-Mexico's economy liberalization

It is important to give a context about Mexico's economic liberalization due to the importance of the IMMEX implementation thanks to the North American Trade Agreement (NAFTA), and to the globalized model of the structure of this manufacturing program that as said before works as

In the context of Mexico's economy, there exists cyclic economic crises, being the most important ones in 1982, 1994, 2001, 2008, 2013. According to (Cambreros, 2015) the process starts by pressure of international organisms as the International Monetary Fund (IMF) and the World Bank, these pressures come as result of the lending of funds to the payment of the Mexican debts, due to the incapacity of the Mexican government to pay its debts to the international markets. Hence as a condition to these aids, it was asked to change the protectionist policies in favor of opening the economy to the international markets.

In the year of 1982 the Mexican government led by the President Miguel de la Madrid, implements an strategy to create an structural change in the economy, these changes come as a response to the same year's crisis, Pedro Aspe in his book (Aspe, 1993), and as secretary treasury during this period, secretary that at the moment in Mexico, contained many of the faculties of a secretary of economy,

mentions that globalization and commercial openness were of sum importance to liberalize the Mexican economy that at the moment was tied to protectionist policies that were implemented three decades ago (1950) by the post-revolutionary governments.

By the end of the 80's Mexico already succeeded in eliminated a commerce policy where it needed an administrative permit to be able to import to the country, this as a mean to reduce importations. This served in favor of a system of tariffs to import, even though this tariff system was topped at a 29% where the average tariff was 9.7% (Gittli, 1990)

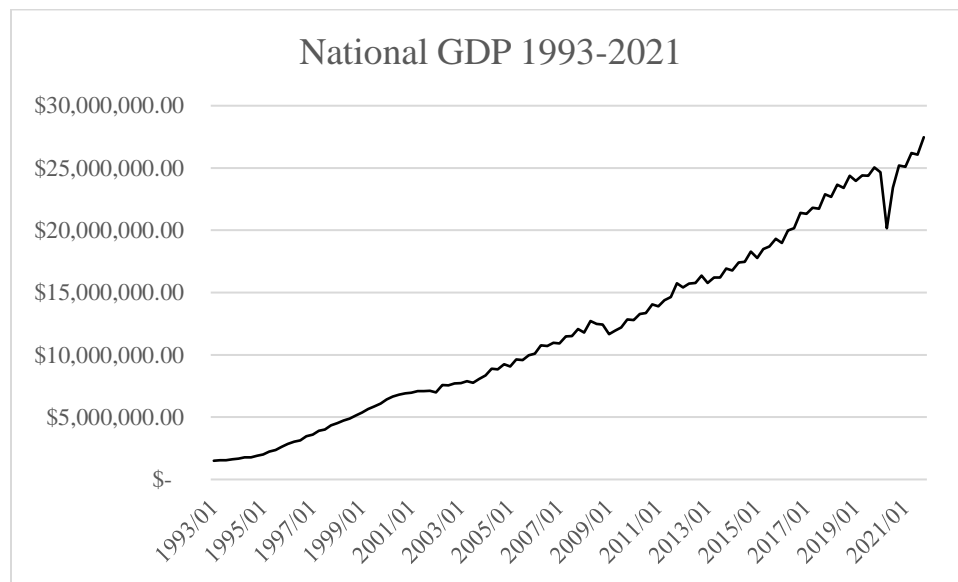
The Mexican economy does not solidify its economic liberalization until 1994 with the signature of the North America Trade Agreement between Canada, Mexico, and the United States. Aspe mentions that during this period this liberalization process constituted the new era of Mexico's development, Mexico's new path where the uncertainty of the economy would stabilize and where for the next three decades (Duration of the NAFTA) would bring prosperity, growth and employment.

After the signature of NAFTA, Mexico started to sign more agreements with other countries as Chile, Japan, South Korea, and the European Union, and by this period these agreements were not a product of the international pressions but came from Mexico's own will to globalize itself.

3.3.- Macroeconomic indicators during the liberalization process and the implementation of the IMMEX program

Economic growth in the manufacturing sector (Production) and inflation are some of the most important indicators to evaluate the results of all these changes that Mexico was having, according to (Cambreros, 2015), these were some of the tools to analyze the results of the opening of the markets and the manufacturing sector.

Figure 2.- Mexico's Gross National Product 1993-2021 (monthly, millions of pesos)



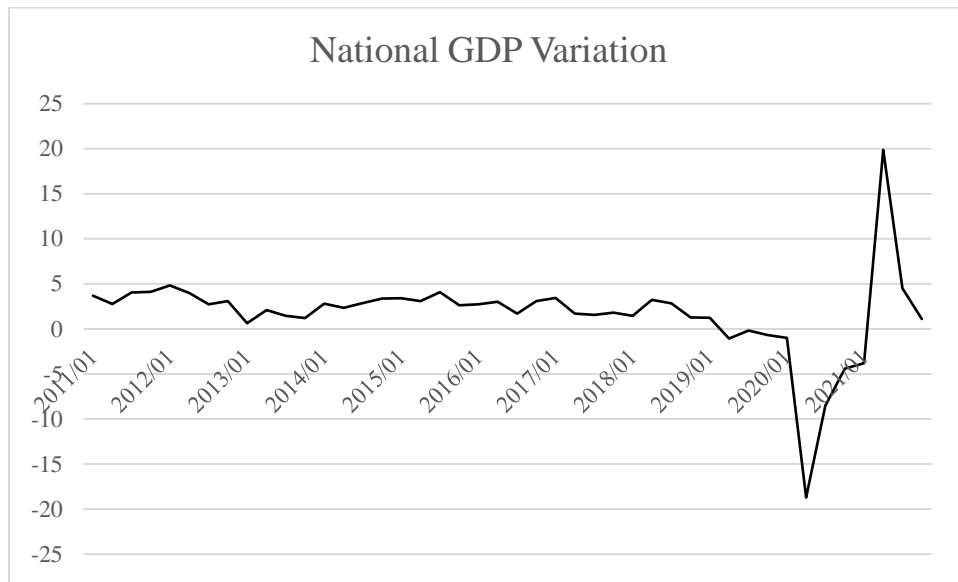
Source: Own elaboration with INEGI data

For this analysis of Mexico's GDP (figure 2), it was accounted the data since 1993, this firstly because before this year there was another currency denomination in the country, and it also serves to analyze its evolution since the full liberalization, and we can see the effect until the end of the 2021 where we can see it's change since the tax and wage policies where implemented.

The GDP here shows an ascendant trend, in sense that even though we have 4 economic crises during this period, we can clearly see the upward trend, but if observed carefully we can see the deceleration in 2001, the fall of 2008, 2012 and finally 2019, where the policy starts but also when covid-19 occurred around the world causing a crisis and deceleration of the economies around the world.

To extent and deepen in the analysis of the policy before 2014 (remembering that here there was first implemented an augment in the VAT and IT in the NFT), Figure 3 shows the change in GDP since 2013 to 2021 in the country.

Figure 3.- National GDP variation 2013-2021 (Quarterly)



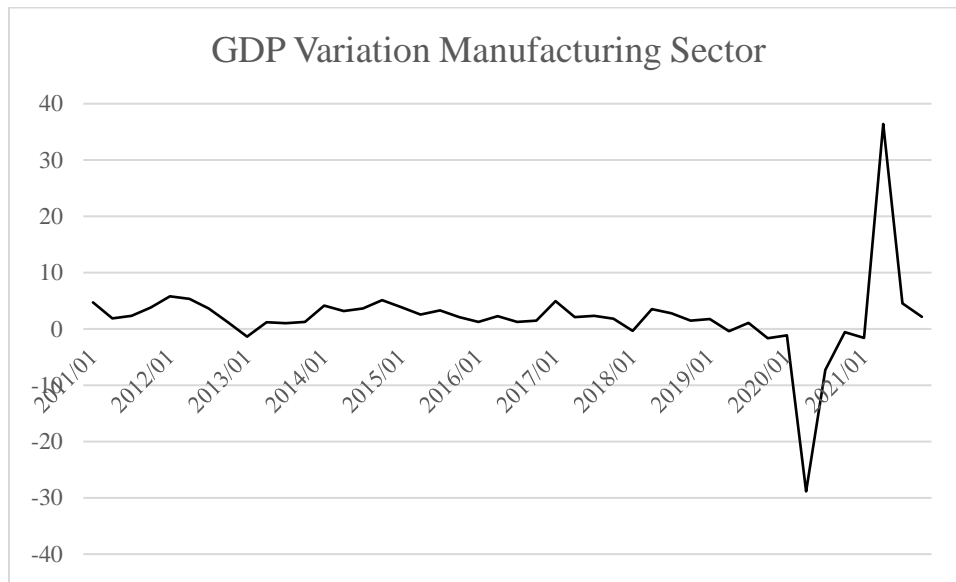
Source: Own elaboration with INEGI Data

Figure 4.- Mexico's manufacturing gross national product 1993-2021 (Quarterly, millions)



Source: Own elaboration with INEGI data

Figure 5.- Manufacturing GDP variation 2013-2021 (Quarterly, percentage)



Source: Own elaboration with INEGI data

The Manufacturing sector in Mexico has its changes and variations in a similar trend as the national GDP (Figure 4 & 5), having its movements in the same direction, as is important to notice that in the period of 2019-1, the percentual change in the manufacturing sector starts to decrease going negative in 2019-2, but having a brief positive change in 2019-3 and then negative until 2021-2. This abrupt effect as we know is produced without discussion from the COVID-19 pandemic, but we can see that in 2019 there are already effects that have taken place from the implementation of the policy as the manufacturing sector is one of the most affected by this change.

4.-Treated States Characteristics and Economic structure

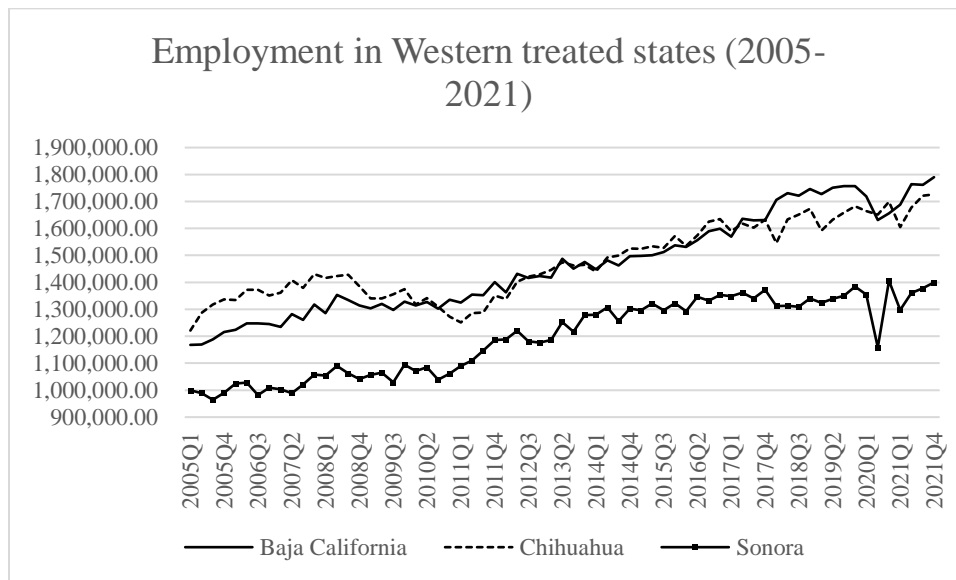
4.1.-Labor Markets before and during COVID-19

The year of 2020 is the start of the worldwide pandemic with several repercussions that last until the redaction of this work, during the start of this year first world confinement started as a result of the greatest emergency in modern history; the size of the problems caused by this emergency have been lived for around for two years, but one of the most severe was the economic brake that led to deep crises around different countries. These ones had to use their abilities and resources to reduce the impact of the brake in the economy and emerge from the depression.

4.2.-Pre-pandemic situation in the treated states

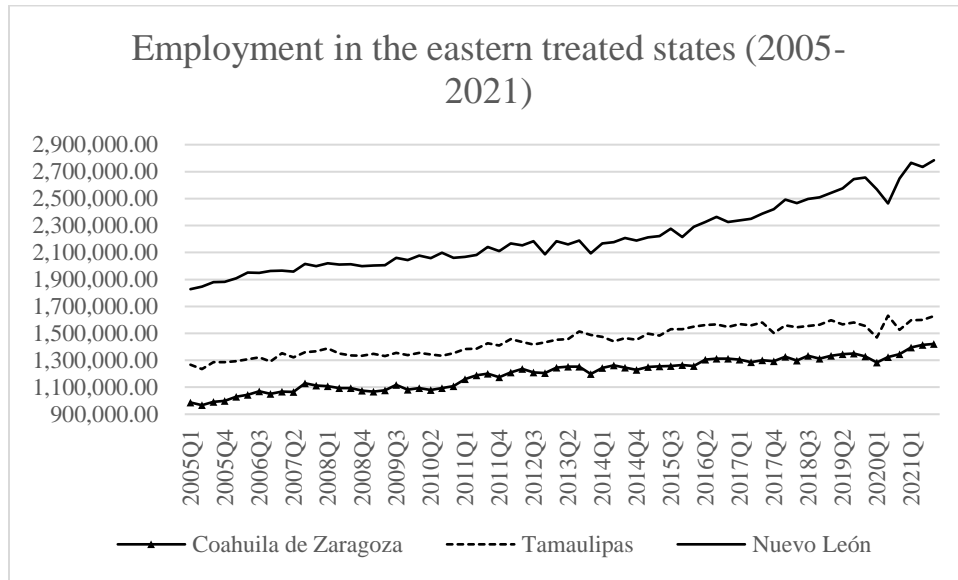
With data as the last quarter of 2021, it is important to notice that in this part of the analysis we are analyzing the employment by state data and not municipalities, hence we cannot separate between treated and untreated municipalities in the states, being the only exception the state of Baja California, state that in its whole is a complete treated state. Continuing the analysis, it can be seen in figure 6 & 7, that the employment in Mexico in the whole north region at during the last 9 years prior to COVID-19, employment has had a steady upward trend, with its variations, but nonetheless upward; considering Mexico's political and economic climate, we can clearly see the changes in the crisis 2008, the slight and subtle change during the 2012 elections and change of administration, as well as a clear and abrupt downward change during 2020 in its first quarter.

Figure 6.- Employment in Western Treated States (2005-2021)



Source: Own elaboration with INEGI data

Figure 7.- Employment in eastern Treated States (2005-2021)

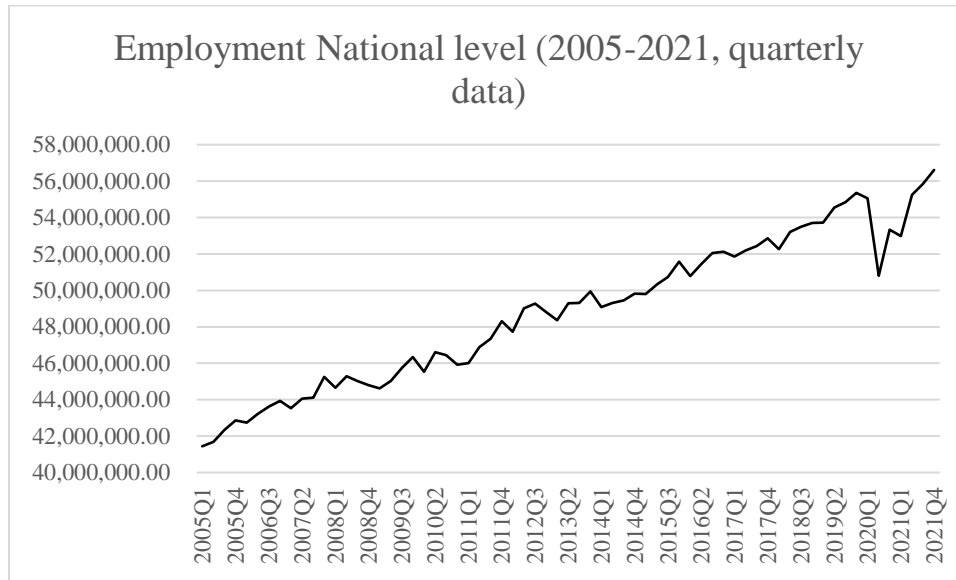


Source: Own elaboration with INEGI data

There are important differences to note between the set of treated states; as observed in the figures, eastern states (Coahuila and Tamaulipas) provide a smaller variation in employment, whereas western ones (whole set) has a higher variation and just by analyzing the start and finish values we can say that at very end they had a similar growth rate, having as an exception Baja California and Nuevo Leon, where they had the highest growth and whose took the longest to recover from the covid downfall in employment.

In figure 8 we can analyze the national employment level throughout the same period as before, there is no relevant downward trend in employment until covid times, not even during the first year of the application of the policy, and in the contrary, it seems that employment in general, kept its growing trend during all this period. In covid times we have that there is a loss of around 5 million jobs nationwide, this loss is not recovered until 2021-Q2, and after that until the end of the year we can see a growth in the trend.

Figure 8.- Employment National Level



Source: Own elaboration with INEGI data

Nonetheless analyzing the data variation, we can see the evolution of employment during this period and take into account the 2008 economic crisis and the brief periods of 2013-Q1 and 2014-Q1 where there were some downward spikes, the former being just a period of political transition, and implementation of political reforms, and the latter, that is relevant for this study because is the start of the rise of the National VAT and IT, as well as the homologation of these taxes in the north frontier zone, here we can see that employment across the country goes in a downward trend for the first quarter of 2014 but after grows in a steady way until the first quarter of 2016.

This is important to note, because even with a tax rise nationwide, and in the north frontier, we can compare graphs 6, 7 & 8; and see that even the northern states that should be the most affected because they had the highest increase in these taxes than the rest of the nation. For the nation the rise was from 15% to 16% in VAT, for the NFR was from 11% to 16%, meanwhile nationwide the Income Tax changed from 30% to 35%. And with these increases in taxes, it seems to have not a relevant effect in employment levels.

4.3.-Economic structure

In this analysis the states that are studied are: Baja California, Chihuahua, Coahuila, Sonora, Nuevo Leon and Tamaulipas; in this part of the study, there's going to be a description of their Economic structure, population and employment.

Baja California

Baja California is the most northwestern state of Mexico, one that has a frontier with the American state of California, according to the Study of Economic complexity of Baja California 2020 (SHCP, 2020), we have that the state occupies the 7th position at economic activity level, and its proportion of the national GDP, around 3.7%.

Baja California is an important player in the foreign commerce, as in 2021 it had a surplus in its commercial balance, having imports of \$46.4 thousand millions of USD and exports of \$51.1 thousand million USD, from this commerce around \$46.5 thousand million USD went to the United States, and from all the commerce its main exported products were from the IMMEX sector at \$10.6 thousand million USD, being the products monitors, projector and Televisions (Economia, 2022), its other main partner were Canada with US\$724 Million and Colombia with US\$404 Million.

The state of Baja California reported that in 2021 its first 10 economic exportations were: Machinery, Vehicles, industrial instruments, Textiles, Rails for trains, Plastics, Vegetal products, Chemical products, Paper Products and Animal Origin products; from this list we can observe that 8 out of the ten activities have a part in the Manufacturing and Maquiladora sector.

For the case of the first 10 economic imports, it was Machinery parts, Vehicle parts, Plastic articles, Iron products, textiles, paper products, chemical products, vehicle accessories, articles for culture, gymnastics and athleticism and wood; and in this category it can be seen that 8 out of the 10 correspond to manufacturing sector, but they correspond clearly to the activities that are exported. And being the main sellers of these articles the United States with US\$18,673 Million and China US\$14,268 Million

In population and employment, Baja California is a hub of immigration having in the last five years the three main international immigrants from: USA, Venezuela and Haiti, yielding a 60 thousand people in total (Mexico, 2022), while in internal immigration is of 250 thousand people coming from other parts of the country. The state contains a 61% of working population and a 2.04% of unemployment rate by the 4th quarter of 2021 (INEGI, 2022).

Chihuahua

Chihuahua a middle northern state, that has a frontier with the American states of New Mexico and Texas, has a population of 3.7 million inhabitants (INEGI, 2022), and according to the secretary of treasury (SHCP, Gobierno de Mexico, 2022) it has the 9th place in contribution of economic activity to the national GDP (3.6%).

Chihuahua as an industrial state plays an important role in international commerce, in 2021 its commerce balance was of \$64.5 Thousand million USD of exports and \$59.1 thousand million USD of imports, having a surplus in its trade. From this commerce it is important to note that \$61 thousand million USD of exports went to the USA and the main exports were part of the IMMEX sector being: Machines and units of data processing, electric accessories, medical instruments, machines used in medical sciences. The rest of the main trade partners of this state were Canada with \$542 Million USD and China with \$326 million USD.

In its 5 main exports the state has: Machines and units of data processing, electric accessories, medical instruments, machines used in medical sciences, plastic accessories. While in its imports it has: integrated electric circuits, parts and machine accessories, iron manufactures, medical instruments, textiles, chemical products; with the latter it can be seen that imports and exports are related and most of these activities are part of the manufacturing sector and processes, having the US as a main destination for manufactured products and more than half of the imported products coming from Asia, it is important for this state an analysis of its economic performance after an important policy as the one analyzed in this research.

In its population and employment, Chihuahua has 1.88 million of men and 1.85 million of women, from these numbers 61.6% of it is working force and it has unemployment rate of 2.8% by the last quarter of 2021 (INEGI, 2022), in immigration regards, Chihuahua is not a hub of immigration in comparison to Baja California, in fact it has little foreign immigration being USA, Cuba and Argentina its main origin countries, whereas in internal immigration it has an increase of 101 thousand national immigrants from 2016 to 2021 (Mexico, 2022).

Coahuila de Zaragoza

Coahuila is a middle northern state that has a frontier with the state of Texas, it has a population of 3.1 million people. And it holds the eighth position in national contribution to the GDP with a 3.6% (SHCP, Gobierno de Mexico , 2022).

In its economy, Coahuila is a small state, this in comparison to all the other treated states, having a positive trade balance with exports of \$25.9 thousand million USD and imports of \$14.5 thousand million USD. Being its main exports: parts and accessories for automotive sector, silver, conditioned air machinery, iron manufactures, textiles, and zinc minerals. In its imports it has parts and accessories for the automotive sector, pieces for altern combustion motors, internal combustion motors, and petroleum gas. Having this trade structure, we can see that the main part of its economy is based on manufactures of exportation as the other states, falling into the category of the IMMEX program.

Population and employment in Coahuila are as follows, 1.58 million women and 1.56 million men, having from the total a 60.7% of working force, and a 4.81% of unemployment, making this the treated state with the highest unemployment. This state also contains the least immigration both foreign and internal, with 7 thousand and 77 thousand respectively.

Nuevo León

Nuevo Leon is a state with the highest population in the north 5.7 million people, as well as being the most active economically among the treated states and holding the 3rd position in regard to the national GDP contribution with an 8.2% (Mexico, 2022). This state also has a small frontier with the USA (Texas).

In its international trade Nuevo Leon is remarkably high, only being the state of Baja California the one that approximates its level of trade. It has a positive trade balance with \$53.3 thousand million exports USD and \$51.8 thousand million USD imports, its main five products of exports are: automotive vehicles, machines and units for data processing, refrigerators and freezing equipment, iron manufactured products, lightning products and equipment. While its imports are intermediate iron products, parts and accessories for vehicles, electronic integrated circuits, plastic materials, Petroleum Gas. With this small part of the trade structure, it can be clearly seen that Nuevo Leon has the IMMEX sector in its main activities.

Population and employment in Nuevo Leon are the following: 2.89 million women and 2.89 million men, which from 61.1% are working force and 3.75% is its unemployment rate. Being the second highest from all the northern states. In international immigration Nuevo Leon has barely a growth in the period of 2016-2021 having an increase of 14 thousand being the vast majority from the USA, then Venezuela and Honduras, but in national immigration Nuevo Leon holds the first place from the treated states having an increase of 271 thousand people from inside the country (Mexico, 2022)

Sonora

Sonora is the neighbor state of Baja California, and it has a frontier with the states of Arizona, and New Mexico, it has a population of 2.9 million (INEGI, 2022), and it is the 10th largest contributor to the national GDP with a proportion of 3.6%

Sonora as an international trade player is not as big as the other states, but still having a positive trade balance, with \$14.8 thousand million USD exports and \$10.2 thousand million USD imports, it can be seen that its imports structure is quite different from the other states being its main products: Electric cables, frozen fruits and vegetables, copper minerals, medical instruments and meat (Beef and pork origins). While its imports are mainly: Pieces for the use of electric circuits, copper mineral concentrates, iron manufactures, plastic articles and fertilizers. Having state its trade basic structure, Sonora is a state divided

in manufactures and the import and export of whole goods, as the copper, meat, fruits and vegetables. For both imports and exports, the main partners are USA, China and Japan.

For its population Sonora has a 1.47 million women and 1.47 million men, which from 63.7% are in the workforce of the state with a 3.6% rate of unemployment being one of the highest from the treated states. In immigration, Sonora has one of the smallest immigration values with an increase of 12.5 thousand in the last five years. Being most of them from the USA, Venezuela, and Cuba. Whereas in internal immigration it also holds the lowest place with 66 thousand people increase.

Tamaulipas

Tamaulipas the most northeastern state in Mexico with a frontier to Texas, has a population of 3.5 million people in 2021 (INEGI, 2022). This state is number 12th in its contribution to the national economic activity due to its 3.1% GDP percentage.

In its international trade the state has a positive balance with a \$29.2 thousand million (USD) exports and \$26.6 thousand million (USD) imports, yielding a surplus in its commerce balance, from this balance \$27.5 thousand million of the exports go to the USA and being its main 5 products Monitors and projectors, televisions, parts and accessories of vehicles, machines and units of data processing, medical instruments.

For its imports, its main partner is the USA with \$11.3 thousand million USD the other main partners were China with \$6.2 thousand million USD and South Korea with \$1.5 thousand million USD, its five main imports were: electric integrated circuits, crystal liquid articles, parts and accessories for vehicles, plastic materials, and hydrocarbons.

For its population it has a 1.79 million of women and 1.73 million of men, and from this it has a 61.2% of working force while it contains a high unemployment rate of 3.55. For immigration, Tamaulipas barely has foreign immigration being an augment of almost 14 thousand people from 2016 to 2021, being the main origin the USA with 13.6 thousand and the rest from Cuba and Honduras. While in internal immigration it is like the other states with a 108 thousand rise of population due to nationals moving into the state.

5.-Data

The data used for this analysis in the Synthetic control method model will be in its entirety recompiled by the INEGI in its Economic Bank Information and the ENOE (Encuesta Nacional de Ocupacion y Empleo-Employment National Survey), and the IMMEX. This Data set in is fully conformed by a data panel of eleven variables relevant for the analysis.

This set consists of forty-one Municipalities across the country and only ten being municipalities treated with the policy, giving us thirty-one municipalities that share the same IMMEX status relevance and that are not treated. The Municipalities treated are:

Acuna, Ensenada, Ciudad Juárez, Matamoros, Mexicali, Nogales, Nuevo Leon, Reynosa Tecate and Tijuana, all of them share similitudes of being highly industrialized, having a border or being quite close to the border of the US.

The range of the Data goes from July 2007 to January 2022 being monthly data. In a first instance our outcome variable will be total work enforced by the IMMEX, this being a simple sum of all the related labor that is needed so these units can operate, this is the sum of Labor workers, Outsourced labor workers, administrative workers, and Outsource Administrative workers. Yielding us a variable called “Employment” (emp), and then use its logarithm to assess for high difference in the levels of employment of the municipalities treated and nontreated. Then we encounter several variables that will be used as independent variables, a total of 7 , that are described in Table 1.

Table 1.- Variables used for the construction of the Synthetic Control

Variable	Description label
est	Establishments
emp	Total Employment IMMEX
man	Manufacturing Sector Employment
pea	Economically Active Population (Total employment per municipality)
twh	Total sum of work hours
tp	Total Payments to personnel
wdm	Worked Days of Manufacturer
ni	Total income coming from National Market
fi	Total Income coming from International Market
pt	Total payments for services (production related)
v25	Consumed good and services not accounted, but relevance in national market

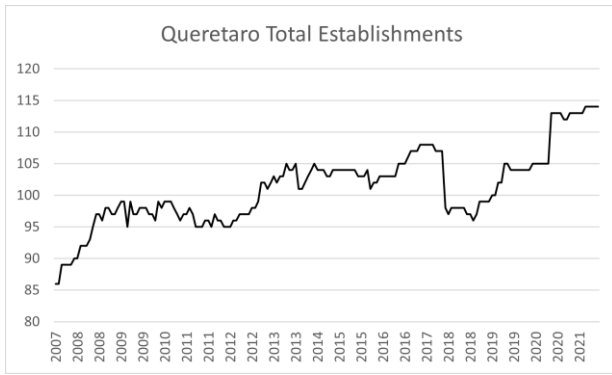
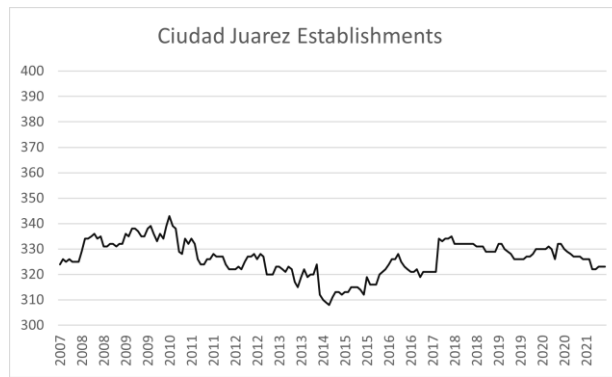
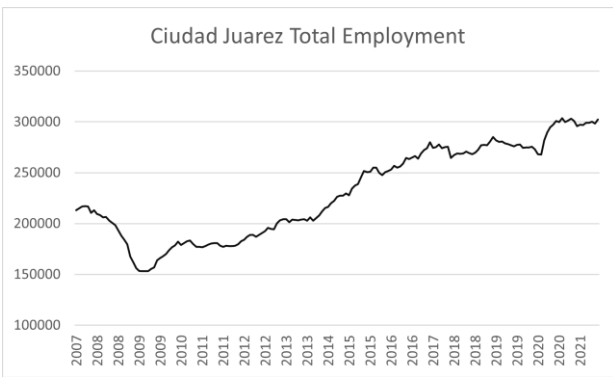
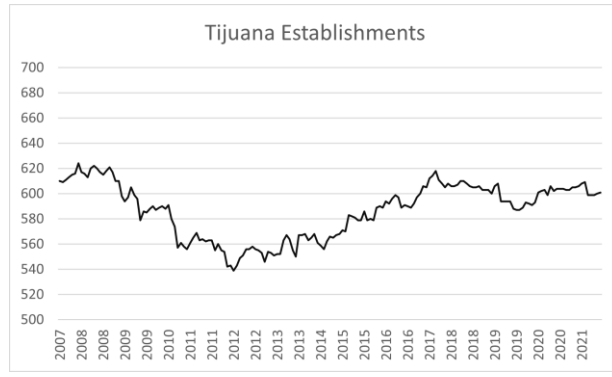
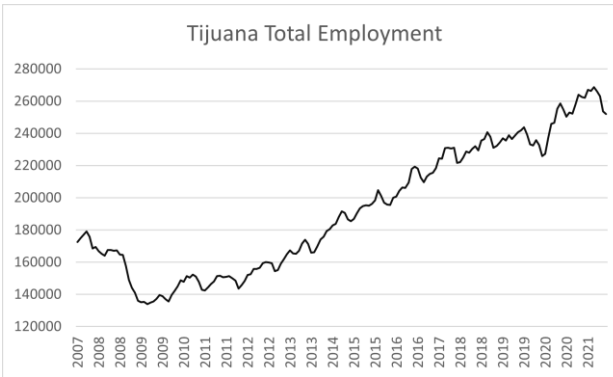
Source: Own elaboration

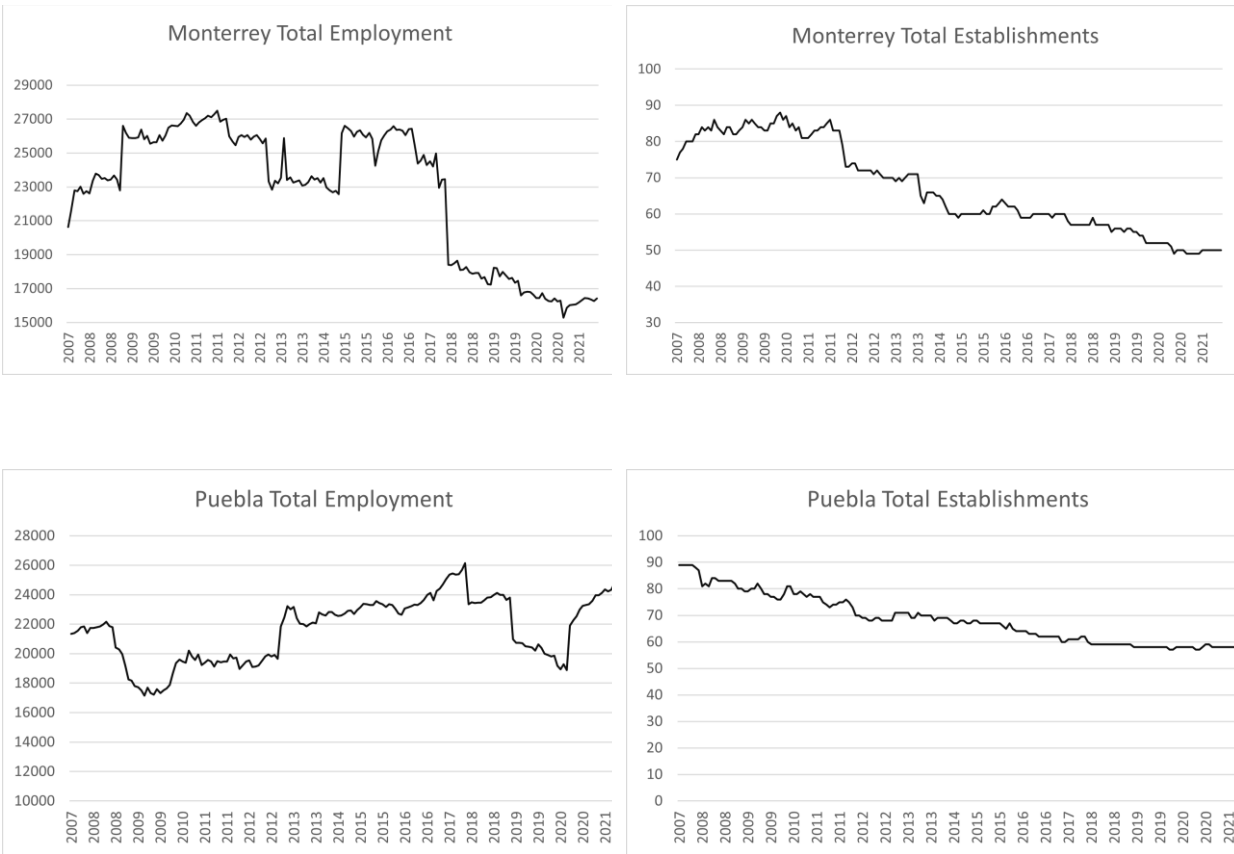
5.1.- Some Characteristics of the Treated and Untreated units

Here are presented some of the characteristics of the labor markets in the respective three most important municipalities of the treated and untreated units, hereby I choose the importance of the municipalities by economic, political, and internal relevance to country matters. These municipalities in the treated units are Tijuana, Mexicali, and Ciudad Juarez, while in the untreated are Monterrey, Puebla, and Queretaro.

Some chosen characteristics to analyze is the evolution of total employment and total establishments in the IMMEX program.

Figure 9.- Total Employment and Establishments in the IMMEX Sector in some treated and untreated municipalities





Source: own elaboration from INEGI data.

Taking into account last graphs it is of sum importance to note that, even though the policies started its effect on the first month of 2019, most of the municipalities present at least one steep decrease in their employment after 2017, and some already had a decreasing trend, hence by simple sight it can't be said that a policy affected or not in the labor market levels neither in the creation of establishments, for example: in Monterrey, we have that the establishments in the IMMEX program have been decreasing since 2011, meanwhile in its workforce it has been steeply decreasing since 2018, having two important factors even before any policy was included, remembering that Monterrey is not a treated unit, can give us hint studying this, so if the policy created a worsening effect to this unit.

In other examples Tijuana municipality saw a decrease of labor force at the end of 2019, that in some case could be attributed to the policy or even considering the effects of covid-19, this is said due to the magnitude of the decrease that is minimal and after a period of six months return to an even higher state than before the policy and going upward. But in the case of its establishments, it has been fairly constant from 2016 fluctuating among 580 to 620 establishments and the impact of this policy could be verified more precisely with the SC method.

6.-Methodology

Hereby having the setup of the policy stated, it can be said that the NFR provides a clear setting to estimate the implication and effects of the policy over the region whether it is beneficial or not, and if in any case it fulfill its main goals (Criminality rates and migration stay out of the scope of this study, this is mentioned as it was an expected effect from the government as specified before).

It is considered first that we have a place based policy that targets an specific area in the north of Mexico, for all these 41 municipalities we have that all of them are close to the border with the united states (25 km) and the whole state of Baja California, then the policy is very likely to be separated from the rest of the country and use the other IMMEX municipalities as controls, one of the limitations that can be encountered in the study is that, the effect of the policies cannot be separated nor quantified by themselves, this being the tax cut policy and the increase in wage policy.

Another specification to note is, there are municipalities that are treated in the NFR and are not part of the IMMEX program as these municipalities do not contain an important weight in the manufacturing sector. Hence by these only significant municipalities for the manufacturing sector are selected across Mexico.

In the case of threats of identification for the units, this study has very clear conditions that have to be met, therefore, there are not such threats to identify treated and untreated units via the application of the policy and then the participation in the IMMEX program.

Using Abadie (2010) methodology of a synthetic control method, we can exert a model with monthly employment data across all the IMMEX member municipalities, monthly fluctuation of business units, labor personnel outsourced and not outsourced and administrative, work hours for administrative, laborers and technicians outsourced and not outsourced, payments to these same segmentations, as well as 12 more independent variables that will be further explained.

The data in this model goes from July 2007 to January 2022, is recompiled directly from the National Institute of Geography and Statistics (INEGI) and the IMMEX, it is monthly data of not all the 43 municipalities that are affected by the policy but by the municipalities that are member of the IMMEX program, hence the municipalities that are relevant for the government regarding the manufacturing and maquiladora industries.

Therefore, we obtain a perfect set up to use as said a synthetic control method, but even going further it is possible to use a new methodology explained and used by (Abadie, 2021) that is the Multiple Synthetic Control Method.

It is also important to specify that there will be a variation of the model, where the first one is running the logarithm of employment and a version called SOP (Share of IMMEX employment over Total Employment in the municipality), synthetic controls over all treated municipalities, for this effect I run the model for the municipalities of Ciudad Juarez, Reynosa and Tijuana since these three municipalities provide anomalies further explained in the results area but are corrected running the SOP version of the SC. Secondly there is an estimation of the stacked version of the synthetic control where it is just ran on the SOP version since, running the log-employment version can arise to bias and overfitting problem due to the anomalies that Juarez, Reynosa and Tijuana cause.

Finally I run a set of placebo test for robustness based on (Abadie A. D. A., 2015) (Abadie A. D. H., 2010) (Wiltshire, 2021) that are estimated by the methodology of Wiltshire in the allsynth program and uses the information of Abadie.

6.1.- Synthetic Control Method

Synthetic control methods have been widely used since its first appearance in 2003 by Albert Abadie, and are an important tool in empirical research economics, according to (Abadie, 2021) they have been used over the last 15 years in literature regarding legalized prostitution, immigration policies, corporate political connections, taxation, organized crime, wages and many other kinds of policies.

A synthetic control (SC) method aims to estimate the effects of interventions, that is, interventions that are implemented at an aggregate level, affecting a small number of large units, these units could be cities, regions, or countries, even a bit smaller than cities, but that depends on the administrative regulations and data availability. But in the last years the SC has been used to analyze settings with a higher number of units (Acemoglu, Johnson, Kermani, Kwak, & Mitton, 2016).

To analyze the effectiveness at using a SC we need to consider the following:

Size of the effect and volatility: this corresponds to the exactly the magnitude of the policy, the model cannot detect effectively small changes in policies due to other shocks that could happen at the same time, as well as it is dependent on the rate of volatility of the outcome we are analyzing, hence it is important to consider a policy with an important impact in the economy and that does not depend significantly on a high rate of volatility.

Availability of a comparison Group: by the structure of the method and the goal of the analysis is of sum importance to have an control group that we can compare with the treated one, if we fail at having a comparison group with similar characteristics and that are not treated , the analysis will be innocuous, as well as it is important that the control units present no sign of interventions that can affect the result of the

comparison, therefore our comparison groups should be the most similar possible to our treated units. By the nature of the SC, we have that the model will try to weight any differences and characteristics to average them and avoid big discrepancies in the model.

No Anticipation Synthetic control estimators could be biased if important agents in the economy could anticipate and react in a forward-looking way according to the policy intervention, or if a prelude of the intervention is put place before the official application of the policy. Hence to elude this problem it is important to date the data set to a period where this anticipation is not in place, with this this bias could be reduce or at some point eluded completely.

No Interference in the Synthetic control in some instances an intervention could have spillover effects on units that are not targeted by the policy. Hence (Abadie, 2021) suggests that assuming that these effects do not exist becomes a strong restriction that must be enforced in the design of the study or at least accounted in the analysis of the results. But if these spillover effects do exist and are strong and affect units (municipalities) that are close to the treated ones, then biased estimates can arise on the counterfactual outcome without intervention.

Time Horizon: This is the effect of the intervention across time, clearly some polices need time to adjust to their set up and to have effect in the units, in our case is a mixed situation since the wage increase takes effect immediately but the tax cut needs be processed by the secretary of treasure and then it gives an effect in the region and the units. For our analysis we have a time horizon of exactly the entireness of 2019, 2020, 2021 and just one month of 2022, hence is a perfect time framework to exert the SC.

In the Multiple SC it is encountered a main difference, and it is that we get multiple treated units, according to Abadie (2021) the presence of these multiple treated units does not present any additional challenge. As the method can be estimated by each individual unit separately or/and in an aggregated second step. Thus, having all of the above mentioned we can state that the multiple synthetic control method is applicable for our situation and can provide of reliable results as the set-up characteristics goes in accordance with requirements of the model.

6.2.-Stacked Synthetic Control Estimator

(Wiltshire, 2021) presents a novel synthetic control estimation method, in which this methodology attempts to eliminate the bias, he states that common research designs that use panel data include the adoption of OLS or IV regressions with unit and time fixed effects, this is referred also as a “difference-in-difference” methodology (DD) or “Event Study” designs, and depending on how the treatment is modelled, if dynamic

or not then the design is decided and the option of including or not untreated control units could arise, in which not using them can cause a design that is not balanced in the event time.

In this methodology (Wiltshire, 2021) presents simulations that show how, when the treatment effect is estimated via Two-Way Fixed Effects (TWFE), the event study estimators will generally yield biased estimates of the average treatment effect on the treated (ATT). Hence Wiltshire proposes an alternative for estimators designed to address the effects, where these estimators are unbiased for the ATT. And finally, before this methodology Wiltshire showed that the TWFE estimators are all biased for the ATT when conditional pre-trends are non-linear or non-common across cohorts, hence violating the parallel pre-trends assumptions. And with this estimation shows that even when conditional pre-trends are non-linear and non-common across cohorts, the stacked-in-event time synthetic control estimator yields unbiased estimates for the ATT.

To facilitate estimating the effect of the policy, it is used Wiltshire's estimation methods, where the well-known synthetic control method is adapted to accommodate many treated units and a treatment overtime. What this proposition does is: the synthetic control method constructs a weighted average of the untreated units to resemble the pre-treatment characteristics of each treated unit as in (Abadie A. D. A., 2015) given a 'donor pool' of untreated municipalities that are not subject to endogeneity concerns. A well-matched synthetic control estimates the evolution of an outcome of interest in a treated municipality in the absence of treatment, in this way facilitating an estimate of the dynamic effects of the treatment. Then the stacked-in-event-time synthetic control estimator is an event-time specific weighted average of the treatment effects over all treated counties.

6.3.- Formal Setting

Formally, data is observed for a total of $I+J$ municipalities, with treated municipalities $j=1 \dots I$ and the selected 'donor pool' municipalities $j=I+1, \dots, I+J$, some combination of which are comparable to each treated municipality. All municipalities are observed through $t=T$. Each treated municipality $i=j \leq I$ is observed a strictly positive number of years prior to treatment. Treatment occurs in time $t=2018$ for all municipalities, for each j and t , the outcome of interest is Y_{jt} , and the set of k predictors for j . These k predictors can include r covariates and M linear combinations of the outcome variable, all observed prior to treatment. The $k \times J$ matrix $X_o = [X_{I+1}, \dots, X_{I+J}]$ contains the values of the predictors for the donor pool municipalities. For each $\{j, t\}$, define Y_{jt}^N as the potential outcome if j is not treated and Y_{jt}^{Int} as the potential outcome if j receives a treatment and is observed in $t > T_{0i}$. The marginal treatment effect of interest for i in $t > T_{0i}$ is

$$\hat{\tau}_{it} = Y_{it}^{Int} - Y_{it}^N$$

For each treated unit in the treated period $t > T_{0i}$ it is observed $Y_{it}^{Int} = Y_{it}$, so to estimate $\hat{\tau}_{it}$ it is only necessary to estimate Y_{it}^N , this is the counterfactual dynamic path of Y_i and calculate:

$$\hat{\tau}_{it} = Y_{it}^{Int} - Y_{it}^N \quad \forall \{i, t\}$$

The classic synthetic control estimator for Y_{it}^N is a weighted average of the outcome values of the donor pool units, it is selected to make the synthetic control resemble the treated unit in the pre-treatment period:

$$\hat{Y}_{it}^N = \sum_{j=I+1}^{I+J} \hat{w}_j Y_{jt} \quad \forall t$$

These weights $\hat{W}_i = (\hat{w}_{I+1,i}, \dots, \hat{w}_{I+J,i})'$, attempt to minimize the distance between i and its donor pool municipalities, given a set of weights on the k predictors, $v_{1,i}, \dots, v_{k,i}$, which determine the relative importance of the predictors. That is given $v_{1,i}, \dots, v_{k,i}$, the synthetic control estimator for I selects \hat{W}_i to minimize

$$\left(\sum_{h=1}^k v_{h,i} (X_{h,i} - w_{I+1,i} X_{h,I+1} - \dots - w_{I+J,i} X_{h,I+J}) \right)^2 \quad s. t. \quad \sum_{j=I+1}^{I+J} w_{j,i} = 1, w_{j,i} \geq 0 \quad \forall j \in \{I+1, \dots, I+J\}$$

Where the constraint according to Wiltshire, prevents against extrapolation bias. With this method the donor pool is also allowed to vary for each i , if specified as in the authors model, in this case they are not decided in condition to their proximity and more in accordance with (Abadie, 2021) methodology of weights in donor pool.

The synthetic control outcome path for each i , \hat{Y}_i^N , is a valid counterfactual for the actual outcome path Y_i , any bias resulting from dynamic systemic changes in the Y_i is ‘‘Cleaned’’ from each $\hat{\tau}_{it}$, yielding unbiased estimates of the casual effect of the treatment on the outcome in each $\{i, t\}$. Nonetheless bias can still occur due to differences in the predictor variables between a treated unit and its synthetic control donors. To treat these issues a Stata Package is provided, this is ‘‘allsynth’’ and works implementing the automation of this procedure. This provides of the estimator of the bias-corrected average treatment effects on the treated, for each e , is then:

$$\hat{\tau}_{BCe} = \sum_{i=1}^I \gamma_i \hat{\tau}_{BCie} = \sum_{i=1}^I \gamma_i (\tilde{Y}_{ie} - \tilde{Y}_{ie}^N)$$

Each $\hat{\tau}_{BC_e} \times 100$ is an estimate of the percentage average treatment effect on the treated in the event year e . It is important to note that this setup nests the classic synthetic control estimator for τ_{1t} with a single treated unit, $I = 1$.

6.4.-Inference

According to classic literature in synthetic control, test statistics based on the permutation of the model are the standard procedure. Originally (Abadie A. D. H., 2010) proposed the Ratio of the Mean Square Prediction Error (RMPSE) to test for significance of the estimated treatment effects.

In this paper the RSMPE is the approach used to test for significance and calculate the *p-values*, after this it is created the “placebo test” to calculate the average treatment effects as used in (Abadie A. D. A., 2011) (Abadie A. D. A., 2015) (Abadie, 2021). And taking the methodology of (Wiltshire, 2021) reassign the treatment from each treated municipality i to each i 's untreated donor pool municipalities. Placebo method also estimates marginal treatment effects for $\hat{\tau}_{jie}$ for each $j > I$ and e using a donor pool of i , and as the number of $\hat{\tau}_{jie}$ grows, the number of placebo average treatment effects also does. With this methodology the placebo averages construct each sample a permutation distribution of the average treatment effects.

7.-Results

The results section will be divided in the next order, firstly I will analyze the effect of the policy running a version of the classic synthetic control used by (Abadie, 2021) and with a small alteration already explained and performed by (Wiltshire, 2021), this will allow us to see the classic results of the model, the estimations will be performed as already explained, this is with a model based on the employment of the sector and the second variation based on the share of the IMMEX sector workers over the total work force (SOP) of the municipality, secondly I will analyze the results from the Stacked version of the SOP model. Lastly I present a set of placebo tests for the model that will be further explained in its section.

An important note for the analysis of the SC is that as having two versions of the model we can use the results to complement one for the other, as using the share of IMMEX employment over the total employment of the municipality, will give us a ratio to analyze the performance of the IMMEX sector over the whole workforce, and how these decreases or increases in employment had an impact on the municipality

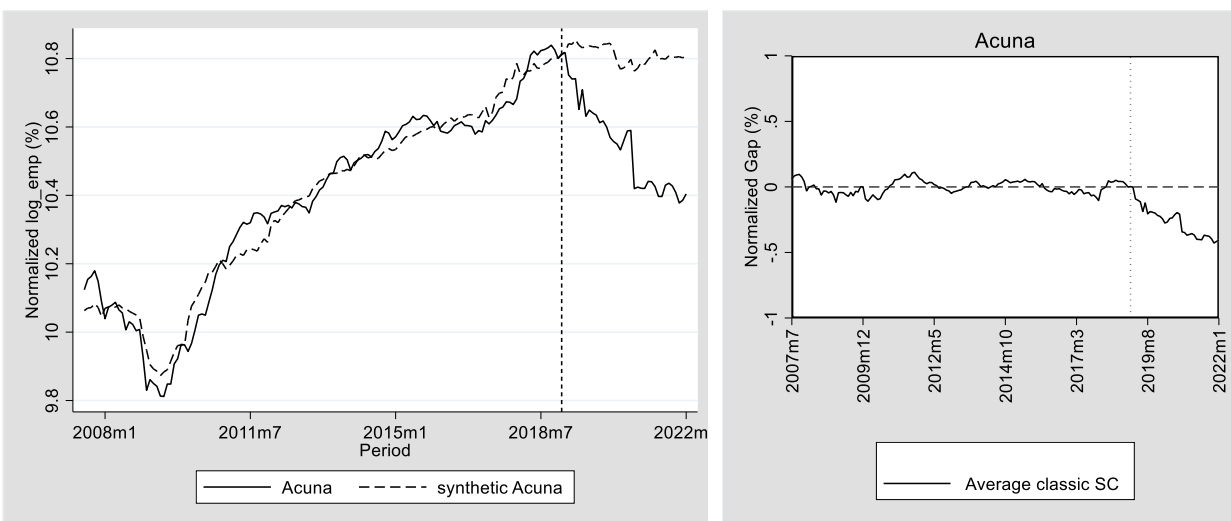
Acuna

For Acuna according to figure 10, the two left hand side graphs are the synthetic controls where the right hand sided are the gaps showing the effect that the policy had in the version of the model. In the log employment model, we have a quite close pre-treatment synthetic control, and in the post-treatment period the gap starts to arise as it can be seen in the graph of the right, yielding a negative gap.

The effect of the policy in Acuna is clearly negative, and it doesn't follow the hypothesis that the expected effect will be a short term decrease of jobs and a reestablishment of hiring after the first stage of lowering the employment, what we actually have is a steep decrease in employment level that is the lowest since 2013, and not even in 2022 has started to take a path to recover its pre-treatment levels. and it can be attributed to its economic structure of Acuna, where we know that the IMMEX sector comprises around 40% of the total workforce of the municipality, while for the manufacturing sector in the last ten years has an average of 80% of it. Hence the effect of a rise in minimum wage has affected the municipality in an important way meaning that the municipality was offering to many workers minimum wages and the companies did not have the capacity to pay higher wages.

It is also important to note in the SOP model that the effects over the whole manufacturing sector where the same as in the IMMEX sector, this due to the high percentage of the manufacturing sector the latter comprises, meaning that the in its whole the policy had a negative effect in the municipality of Acuna.

Figure 10.- Synthetic Control Log employment model and its gap figure (Acuna)



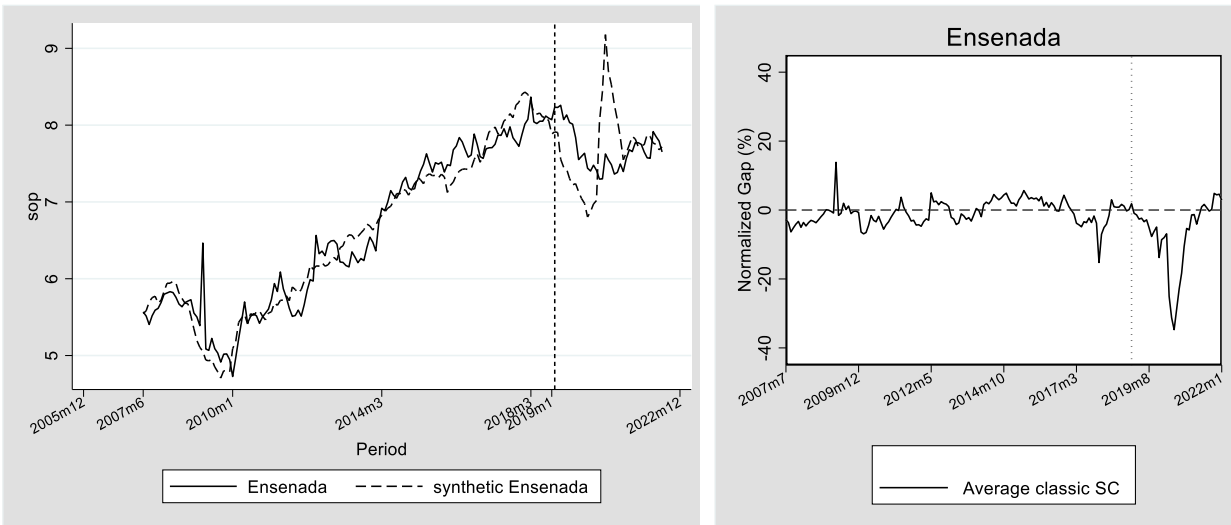
Source: Own elaboration

Ensenada

The municipality of Ensenada in its SOP model (Figure 11) has a SC that follows a quite close trend to the actual levels, having exceptions in the post-treatment period, but this extreme peak is not taken into account due to the credibility that the employment could grow such a fast rate comparing it to other peaks in the pre-treatment period, it can be said analyzing the right hand side graph, that the policy had no effect in Ensenada where we can actually see the small gap of the SC. In figure A2 we also have a similar case analyzing the Log employment model where the effect is nulled.

Hence for the case of Ensenada the effect is inexistent, the policy did not affect in a significant way to the municipality yielding at least until the available data the minimal outcome of the government where it did not affect the employment levels. But increased the purchasing power of the workers.

Figure 11 Synthetic Control SOP model and its gap figure (Ensenada)



Source: Own elaboration

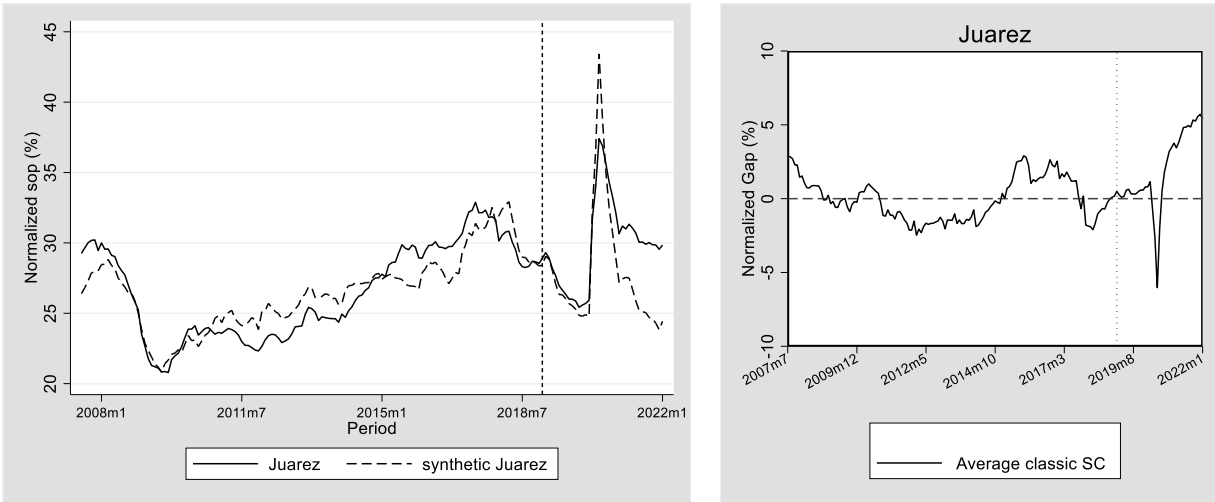
Ciudad Juarez

For Ciudad Juarez in figure 12 we can see that it has a good pre-treatment fit, and that even in post-treatment it has good fit with the exception of the year 2021 where it starts having a considerable gap, the SOP model gap figure shows that indeed the effect in the city was minimal and just slightly positive, whereas the log employment model figure A3, can only be used to analyze the policy in this case in a parallel trend case where we could say that the according to the trend it had no effect.

The case of Ciudad Juarez, is one of the anomaly cases where due to its size as a municipality and its complex economic structure it separates itself from most of the studied units treated and untreated, even if the NFZ has already differences with the rest of the country Ciudad Juarez is a city that is particularly

different even in the NFZ, this is why analyzing the municipality with the SOP model results interesting and important, because we can see the actual effect of a policy that even with heterogeneity in the treated and untreated units, can analyze the impact in employment levels both for the total workforce and the IMMEX sector

Figure 12.- SOP Model Synthetic Control and gap figure (Ciudad Juarez)



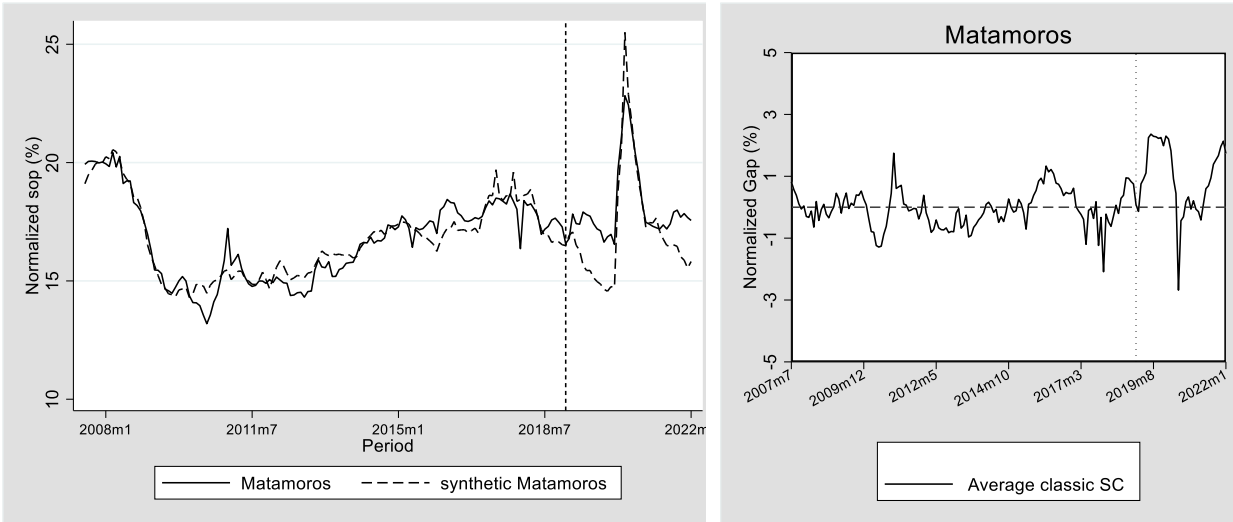
Source: Own elaboration

Matamoros

For this municipality (Figure 13) we get a closer SC control for the SOP Model with minimal gaps but follow a quite close and good pre-treatment fit, in the figure we can see that the gap is so minimal that the effect of the policy can be clearly said that it was null, and since the policy had no effect and nonetheless there was a increment in the minimum wage, the population have higher purchasing power, and the employment levels both for the workforce and for the IMMEX sector did not decayed because of the policy, an interesting feature of the graph is that what happened in the peak of the post-treatment period was a decrease in the total employment of the municipality (This during covid time) but the IMMEX sector was not affected by this decay but this situation cannot be attributed as a benefit of the policy package.

The policy implementation in Matamoros had no significant effect on the employment levels of the municipality, even if Matamoros is an important city for the Tamaulipas state, and contains an important part of its workforce, we can see that at least the minimal goal of the government was reached.

Figure 13.-SOP model and its gap figure (Matamoros)



Source: Own elaboration

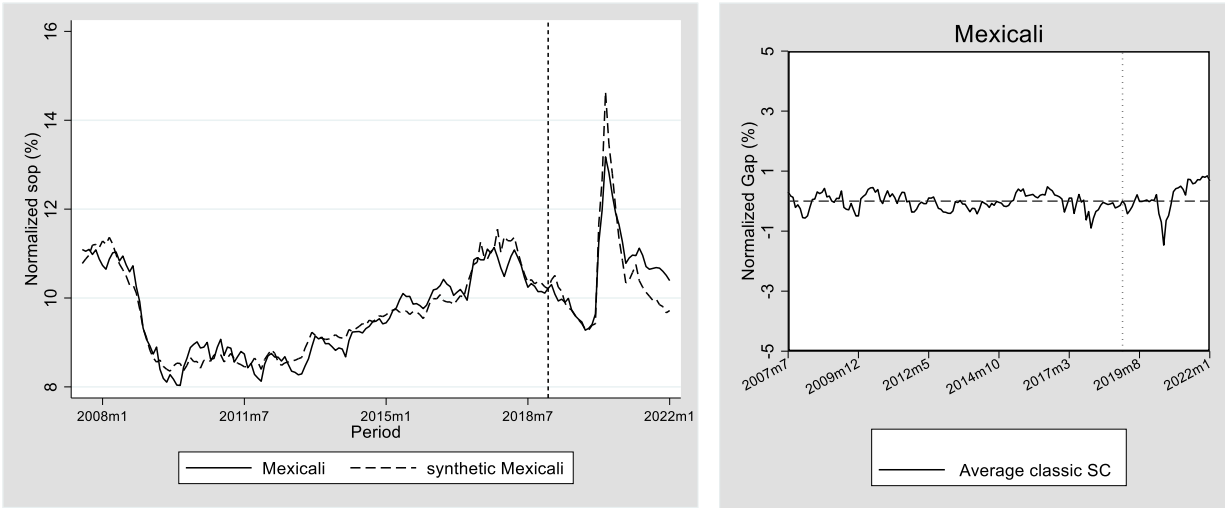
Mexicali

The Synthetic control of Mexicali in figure 14 follows almost a perfect fit in the pre-treatment period and even in the post-treatment period, as well as in the gap figure, where we have that the synthetic control has a minimal gap, that can be attributed to the estimation, this meaning that the effect of the policy was nonexistent, and not in positive or negative effects as the estimation shows without the policy Mexicali would have followed the same path.

Considering figure A5 we can complement the analysis of employment, analyzing the log-employment level, where we have a good pre-treatment fit and we can see in the post-treatment that the policy had almost not estimated effect, where the gap of the synthetic control over the post-treatment period is of around -0.05 and -0.05 %, meaning clearly that there's no effect of the policy in the employment levels of Mexicali.

For Mexicali is an interesting case because the complexity of its economy is at the level of municipalities as Ciudad Juarez, Reynosa or Tijuana, cities that arise abnormalities in the models, but we obtain almost a perfect fit with the Synthetic control, this could result as the independence of Mexicali as a city against the other three, with this I mean, the other three cities are not the main cities in their respective borders, they are dependent on their US City border, where in the case of Mexicali, it is the dominant city as well as being the capital city of Baja California. It results of interest that the municipality of Mexicali and Tijuana are quite close since they are in the same state, nonetheless present different levels of economic complexity and integration with the rest of the NFZ and the country.

Figure 14.- SOP Model Synthetic Control and its Gap Figure (Mexicali)



Source: Own elaboration

Nogales

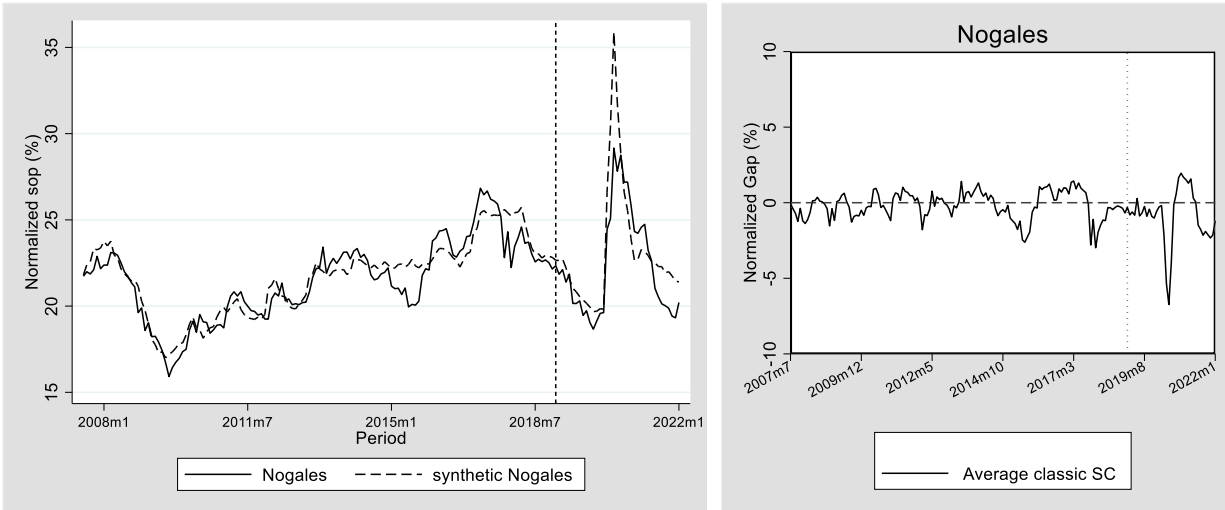
In Figure 15 we can see the goodness of fit of the pretreatment period in the municipality of Nogales, as well as the post-treatment period that present an almost perfect fit and as in the other municipalities it yields that the policy had no effect on the employment levels, this can be complemented with the figure A6 where it can be seen that the employment levels in the IMMEX sector were not affected by the policy in a significant way.

The policy according to the SOP model, affected (not affected) in the same way overall the employment sector of the municipality as we can see that the ratio of employment did not seem have an impact if the policy was or not implemented.

For Nogales the implementation of the policy and that it did not create disadvantages in its economic competitiveness was important, in difference with Tijuana or Mexicali, Nogales is a Border city in Sonora, and it's an equal to its border city also called Nogales but in the United States, both cities have complex economic systems in their own state, but both are highly industrialized cities that rely on manufacturing as we can see in figure 15, just the IMMEX sector is around 20-25% of the total employment in the municipality of Nogales (Mexico), meaning that if the policy had a negative impact in the employment of the IMMEX the effect on the municipality could have created great disparities in the competitiveness of the municipality against its border sister city.

Hence we have that Nogales did not experience an impact in its employment levels, by the stimuli packages that the government implemented, hence I confirmed that the minimal intended outcome arised from the policy.

Figure 15.- SOP Model Synthetic Control and its Gap Figure (Nogales)



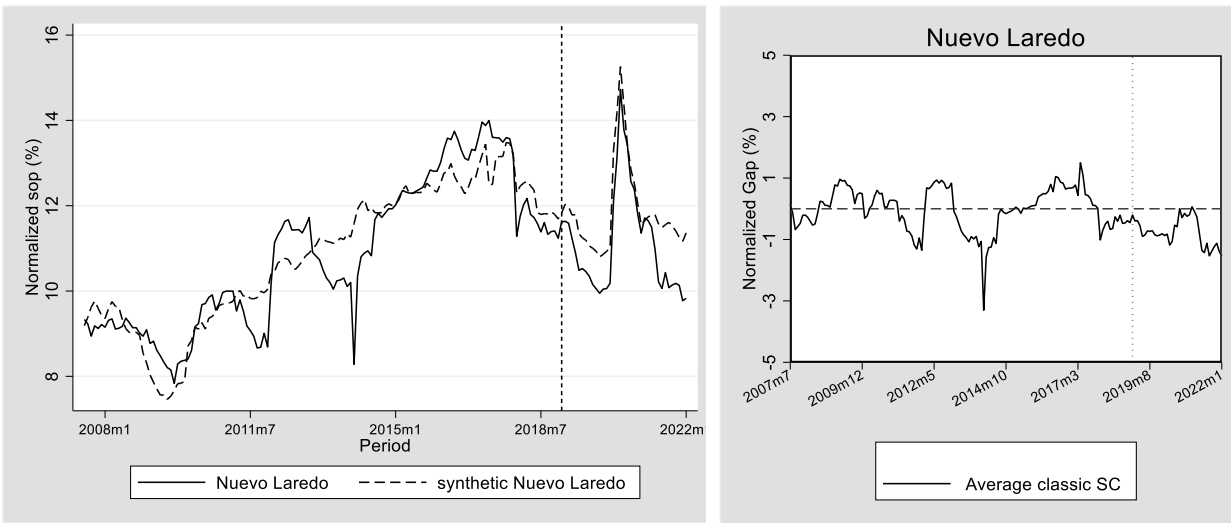
Source: Own elaboration

Nuevo Laredo

Nuevo Laredo is also a border city that competes with its sister city Laredo (US), hence here is also important to evaluate the direct impact of the policy in the employment levels and ratios, by figure 16 we see that the pretreatment fit its fairly well, as not perfect or almost perfect as in other municipalities, it foes follow its trend, hence we have that the effect is nonexistent and that the municipality would have followed the same trend without the policy implementation this as a result of the good fit with in the post-treatment period.

Observing figure A7 we can confirm even further when in the log employment model, the gap of the synthetic control goes around -0.01 and 0.02 %. The latter results of sum importance observing that the policy does not have an effect or is so minuscule that it cannot be estimated by the model. And with this the result of the policy is the same as with the other municipalities where the minimal intended outcome of the government was achieved.

Figure 16.- SOP Model Synthetic Control and its Gap Figure (Nuevo Laredo)



Source: Own elaboration

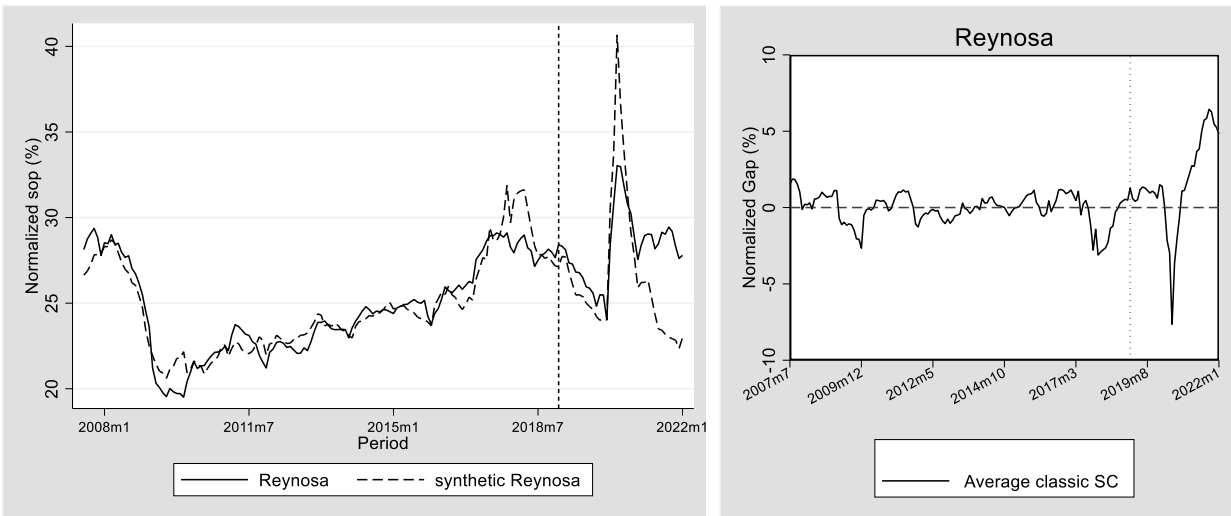
Reynosa

Reynosa is one of the anomalies of the study, in figure A8, we can see that it could not achieve the synthetic control with log employment with a wellness of fit, the best that did is achieve a parallel trend, that this at least let us know how the municipality would have probably reacted in the case of the non-implementation of the policy, in the case of the figure 17 we have an almost perfect pre-treatment fit, but as well a good post treatment fit at least until 2021 where it starts to differ.

Here it can be said that the effect on the employment was an improvement in the IMMEX sector this corroborated by the absolute values of the IMMEX sector against the total employment of the Reynosa, meaning that with the implementation of the policy Reynosa, the IMMEX grew more than it would without the policy.

With the above-mentioned we can say that the effect of the policy was minimal but positive in this municipality adding dynamization to the minimal goal of the government, where in this case it helped in the creation of new jobs in the sector.

Figure 17.- SOP Model Synthetic Control and its Gap Figure (Reynosa)



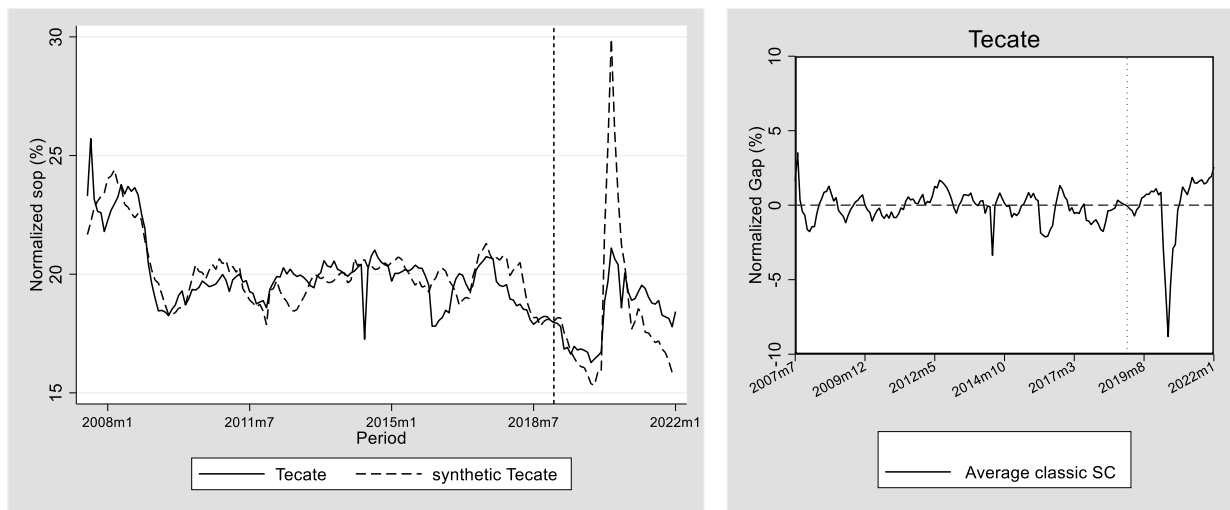
Source: Own elaboration

Tecate

The case of Tecate (figure 18 and A8) we can see that the effect in this municipality that is in between Tijuana and Mexicali, all three part of the State of Baja California and the three of them border cities with the US, we obtain synthetic controls with almost perfect pre-treatment fit, and in the SOP case (figure 18) even in the post-treatment period we have a perfect fit, with a small difference in a peak, that can be discarded due to an estimation error, and can be said that in the ratio of employment, the policy had no effect for the municipality.

Returning to the log employment model, in A8 we can see that in fact it complements the above statement where the policy did not have a significant effect on the employment in the municipality, leaving the IMMEX sector follow the path it would have followed if the policy was not implemented. And yielding the minimal goal of the government.

Figure 18.-SOP Model Synthetic Control and its Gap Figure (Tecate)



Source: Own elaboration

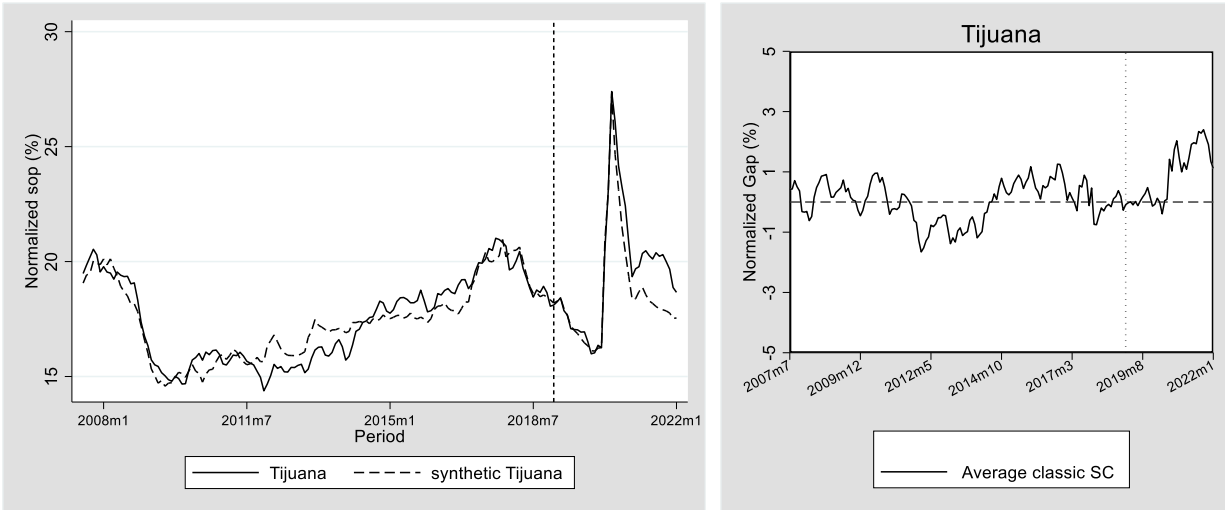
Tijuana

This last municipality is another one of the anomalies of the study as is one of the municipalities that does not fully integrate to the NFZ and to the rest of the country, being border city and having one of the most complex economic, social and cultural relations with its sister city San Diego (US), where by far the dominant city is the American one, at being the so called “Most transited city in the world” meaning that it is transited via crossing the border to the US, inhabitants of both cities share culture and in some cases economic preferences, where if an small impact occurs in their purchasing power they can deviate their consumption to the other city, as well as if the employment decays, some Mexican can look out for jobs in the American city, more than in other cities around the border.

Being the most complicated city to adapt the synthetic control due to its particularities, the log employment model in this city did not yield a good fit for any period, but yielded a fairly good parallel trend, with this the analysis of Tijuana will only consist in the SOP model where we actually see that the fit is almost perfect for both the pre-treatment and post-treatment period.

With this we see that the effect of the policy for the post-treatment period is nonexistent until the last part of 2021 where we see a small gap, showing that a small benefit from the application of the policy. Hence it can be said that the effect of the policy in the short term is null, but in the midterm is minimally beneficial.

Figure 19.- SOP Model Synthetic Control and its Gap Figure (Tijuana)



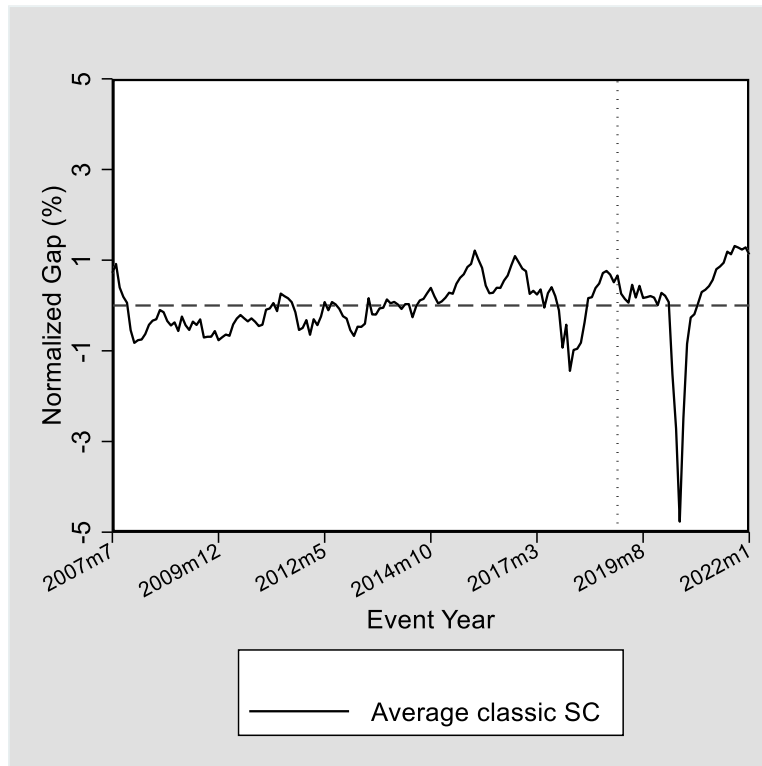
Source: Own elaboration

Stacked Version of the Model

For the Stacked Version of the results, we have figure 20. Where it can be seen that remembering that 0 is the SC and the gap value corresponds to the difference of the actual values against the SC, hence for the treated municipalities we have the next results:

For the treated municipalities, Acuna, Ensenada, Juarez, Matamoros, Mexicali, Nogales, Nuevo Laredo Reynosa, Tecate, and Tijuana the SC in the stacked version yields a small positive gap but minimal, meaning that overall the impact was small almost nonexistent taking into account that is 1% and this can be just part of the estimation results, hence in its whole for the sum of the municipalities we have that the policy yielded a null effect and according to the government goal it did not impacted negatively the labor market, as for the individual cases yield results in the same line, where in most cases 8 out of ten the effect is null and in the other two the effect is minimally positive.

Figure 20.- Gap figure for the Stacked version of the SOP Model,



Source: Own elaboration

7.2.-Robustness Tests

7.2.1.-Placebo studies

Using the techniques of (Abadie A. D. A., 2015) in their paper, an evaluation of the results will be conducted with a placebo study where the event of interest, that is the policies applied, is reassigned in the data set to years different than 2019 and to the control municipalities (untreated units). First of all, it has to be calculated the effect of the policies in an established year prior to 2019 (it has to be at the start of the calendar year since in Mexico, these kinds of policies can only take place at the start of the year according to the Official Journal of the Federation). It is important to note that if we encounter large placebo estimates, this will actively undermine the confidence in our model, that the results are indeed indicative of the employment levels variation.

First it is showed the results for the case when the policy is reassigned to the year of 2016, this year was chosen as in this period two years have passed after a change in a fiscal policy, where an increment in the taxation rates happened and affected exactly the NFZ, as in 2015 there was a big academic and political

movement to bring back the taxation rates before the 2014 increase, it could be specified that we assumed this succeeded and in 2016 our 2019 policy took place, instead that in our original timeline. .

The results from figure A17-A25 show the result of the estimations of the classic model using the logarithm of employment and using the model SOP, changing the date as a robustness test is seen as a tool to revise the accuracy of the models, and used (Abadie A. D. H., 2010) as well with the modelling from Wiltshire , in brief by analyzing the tests we have that the new estimations result in a confirmation of the results obtained before

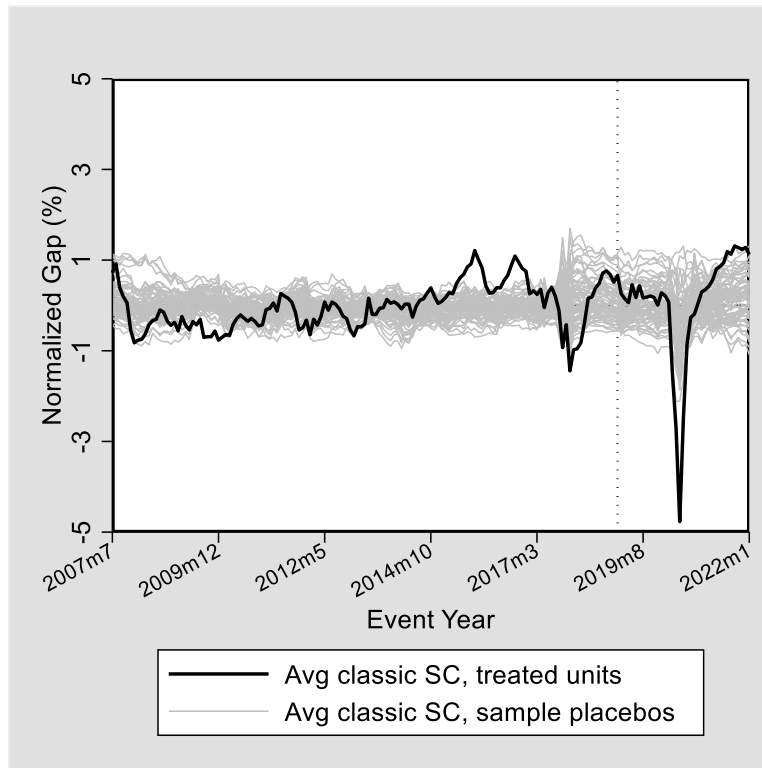
Another alternative to elaborate this study is to artificially reassign the policy to the untreated units, in this way it could be obtained a synthetic control estimation for a municipality that did not experience it in the original timeline. Applying this idea to all municipalities in the donor pool, will allow to judge whether the policy effect estimated for the NFZ is unusually large or if it obtains a wellness of fit.

It is important to note that to create the second iteration of the placebo test, the study could be affected by the heterogeneity of the municipalities in the donor pool, since they did not experience the same events as in the NFZ, but nonetheless could have experience other type of shocks that lead to variations in their manufacturing sector during this period. If these shocks had large effects on the manufacturing sector of the units, the estimated placebos for the donor pool will be large and perhaps even comparable to the estimated effect in the NFZ municipalities.

In figure 21, we can see the placebo test of the SOP model of synthetic controls, and as said before, the placebo test consist in considering the untreated units as treated units and applying fake policies to them and see how they would have reacted if the policy was also implemented to them.

In figure we see that the treated units stacked synthetic control fall into the placebo space, giving us a reassurance of the results. But not in the way that a normal synthetic control placebo works where the placebo space is compact and gives better assurance to the model, in this case the wideness of the placebo space can be attributed to the heterogeneity of treated and untreated units and the complexity of their economies. Nonetheless the result of the test falls into significance and gives certainty to the results presented.

Figure 21.- Synthetic Control Placebos Using Allsynth Command for the SOP model



Source: own elaboration

6.-Conclusion

Based on a Synthetic control method with an adjustment to Bias-Control, this study shows that a public intervention via tax cuts and raise in wages by 100% in the North Frontier Economic Free Zone in Mexico, and specifically in the IMMEX Manufacturing sector have null effects in the employment levels of the studied municipalities, and indeed not even in their total employment levels. Indeed, after the intervention of the government the effects that are minimal in some cases seem to be minimally positive in two of the 10 studied municipalities that integrate the IMMEX sector in the NFZ.

This paper finds that this policy is in general what the minimal goal of the government intended, this is: not a negative impact in the employment levels and still create an increase in the purchasing power of the workers that receive the minimum wage. On other hand it seems that even when the whole of Mexico as the world also did, had the covid-19 impact, this did not by any means change the effect of the policy.

The results that this thesis yield are important for economic analysis and of interest in the sense that a dual implementation of fiscal policies and labor policies can actually be beneficial for the economy, in the sense that for this study we see that at least the levels of employment were not harmed by the policy and that the workers that earned the minimum wage increased their purchasing power, this meaning in a sense that (this remains for another analysis) the wellbeing of the population that earned the less increased as the government intended.

This thesis also demonstrates that policy studies as the papers of (Campos-Vazquez, 2020) and (Fuentes, Bruges, Konig, & Carrillo, 2019) can in the short term show a result of the policy, this can be incomplete and biased, with the sophistication of the Synthetic Control and the Bias-Correction, we have results that can show that after a the treatment the studied municipalities did not presented an impact in their respective labor markets and that the policy was successful in not harming the employment levels.

This paper contributes to the methodology in the sense of using the SOP model to evaluate the effects of a policy in the Manufacturing sector in this case the IMMEX sector, nonetheless this model can be translated into the manufacturing sector or even to labor intensive sectors, it also contributes the elaboration of the log employment model where as we have seen it can yield significant results when the units do not present high levels of complexity and heterogeneity as Juarez, Reynosa and Tijuana, showing that the use of two synthetic control models can complement the results and certainty to the estimations and even go further to be able to evaluate the effect of the total employment at the moment of using a Ratio over the total employment.

The use of the Synthetic Control Method in this intervention is important due to the necessity of a tool of policy analysis in countries and regions as Mexico, specifically Latin America, where we have big countries where each region presents diverse levels of heterogeneity and for this we must have a tool that can achieve the goal of including this effect and evaluating the effectiveness of public policies. More importantly with the forthcoming implementation of the South Frontier Economic Free Zone in Mexico (SFZ) that is going to be implemented with similar characteristics to the NFZ but with special differentiations adapted to the southern border of Mexico, where there the manufacturing does not play a role in its economy and is dominated by the primary sector and the Tourism sector. With this a tool like the Synthetic Control can be used to assess the impact of this new policy package. Accounting as well for the special characteristics of this region.

7.-Bibliography

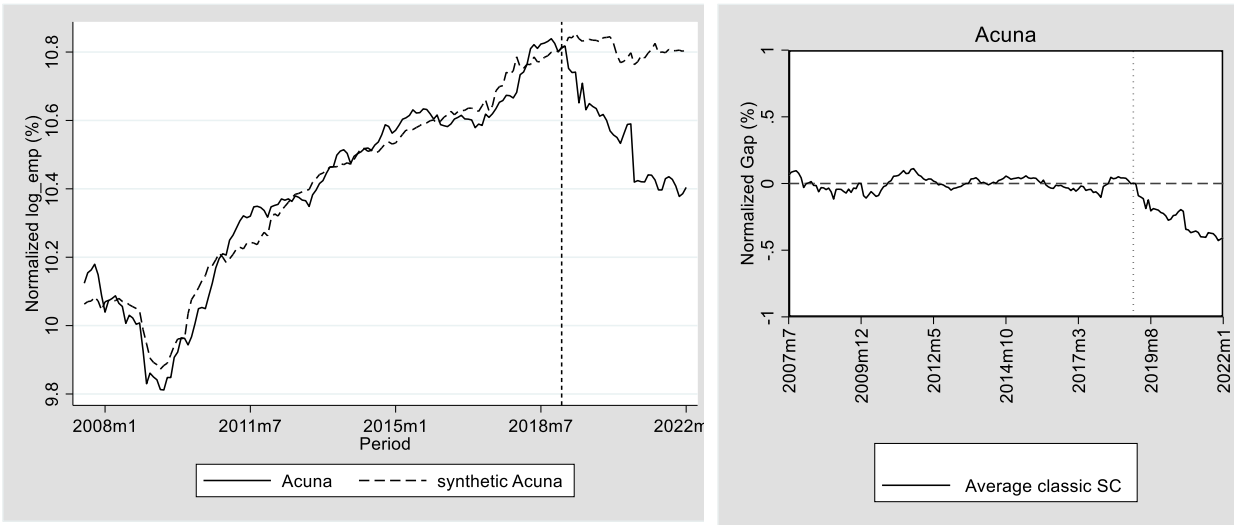
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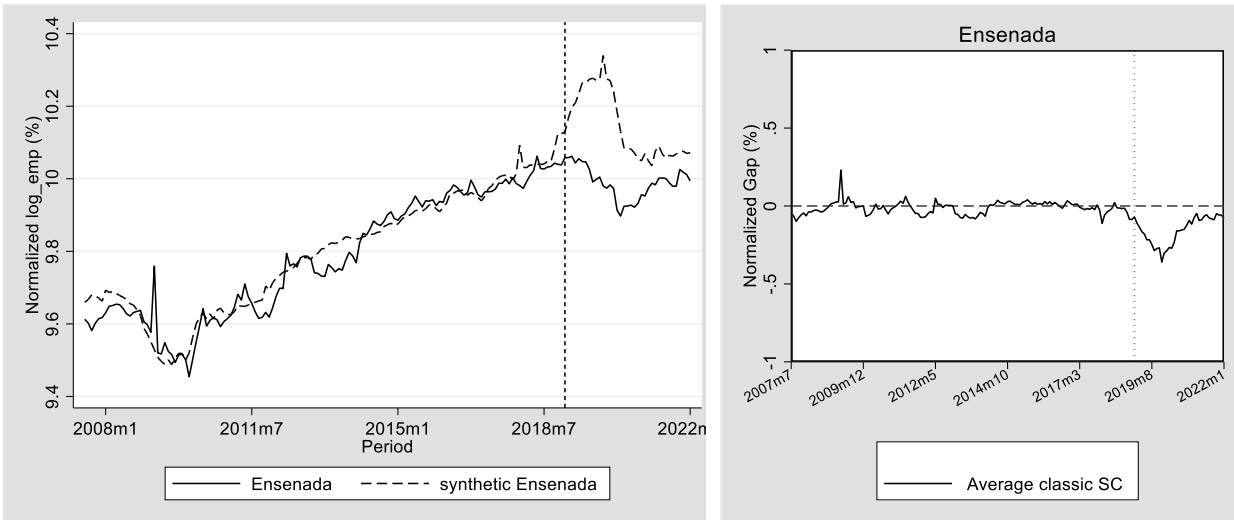
Appendix

Figure A 1.-Synthetic Controls of Acuna Log Employment-left and gap figure



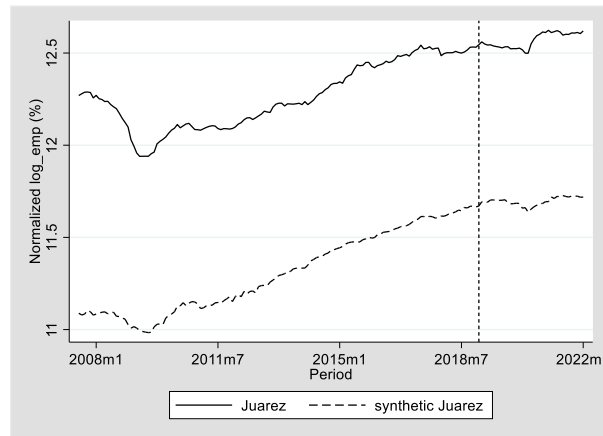
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Figure A 2.-Synthetic Controls of Ensenada Log Employment-left and gap figure



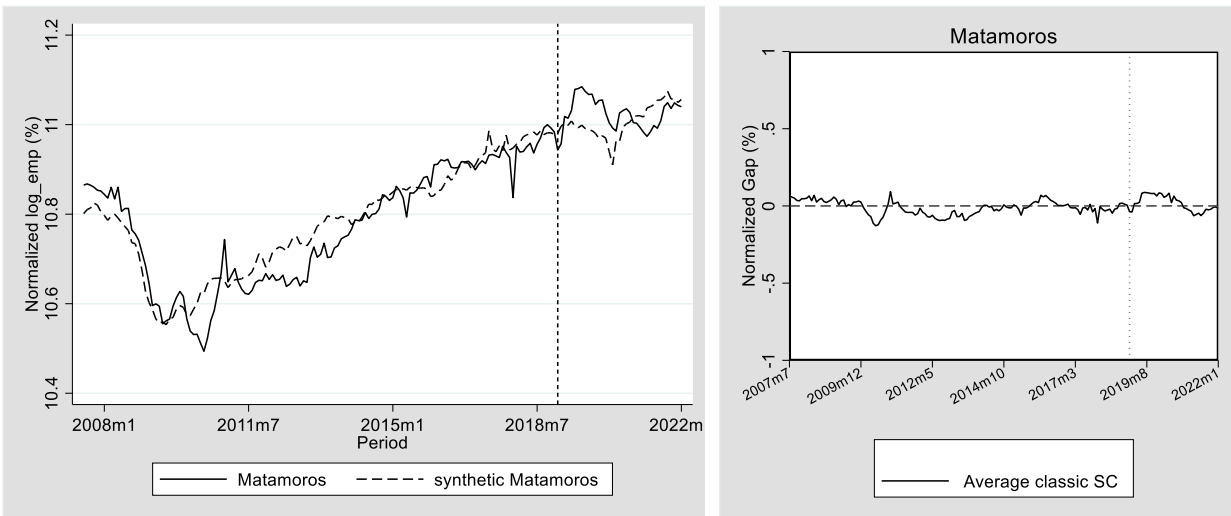
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Figure A 3.-Synthetic Controls of Ciudad Juarez Log-Employment



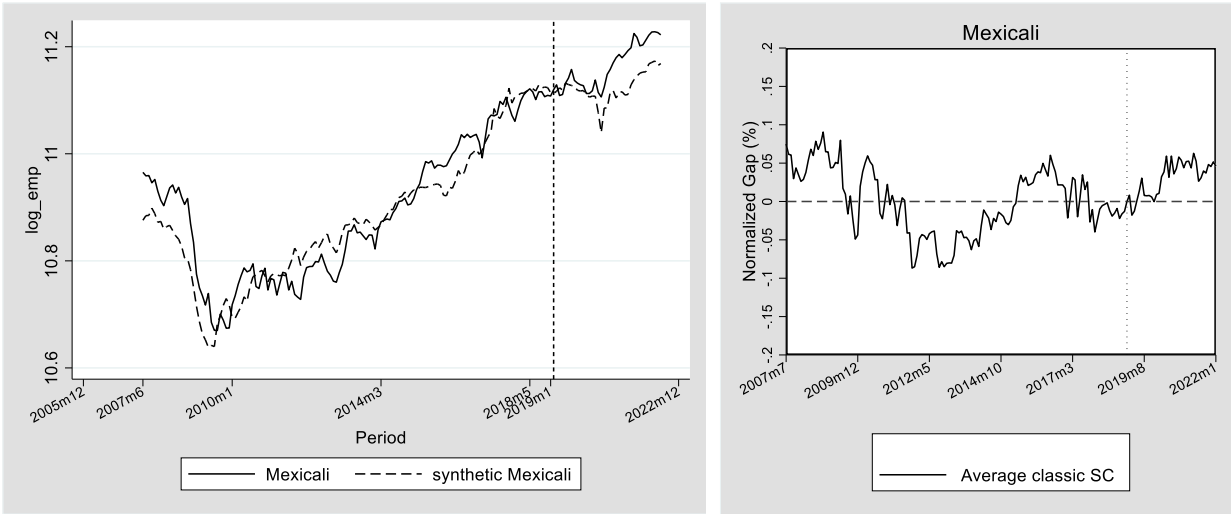
Source: Own elaboration with Data from INEGI

Figure A 4.-Synthetic Controls of Matamoros Log Employment-left and gap figure



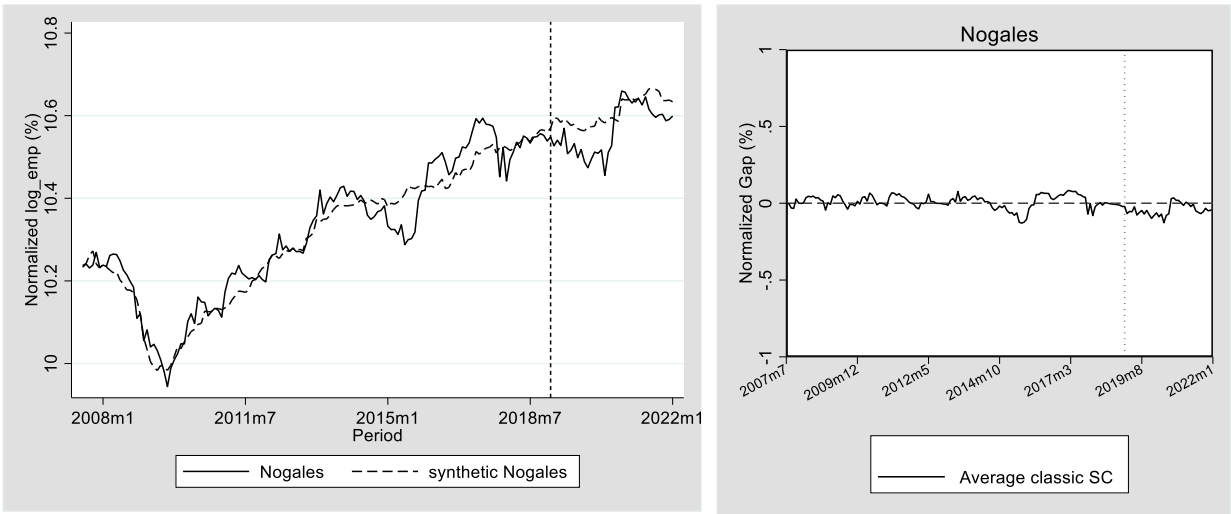
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Figure A 5.-Synthetic Controls of Mexicali Log Employment-left and gap figure



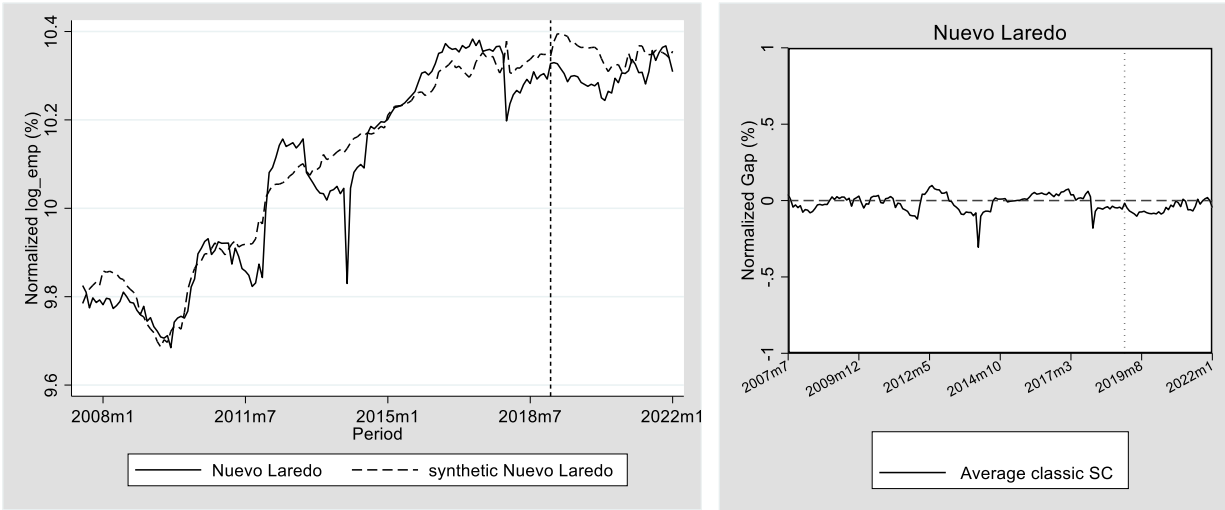
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Figure A 6.-Synthetic Controls of Nogales Log Employment-left and gap figure



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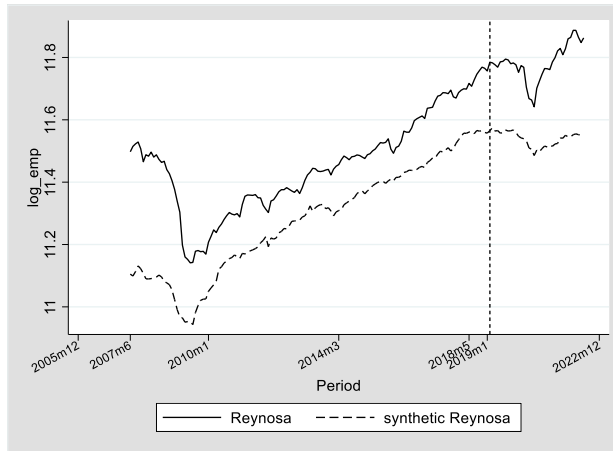
Figure A 7.-Synthetic Controls of Nuevo Laredo Log Employment-left and gap figure



Source: Own elaboration with Data from INEGI

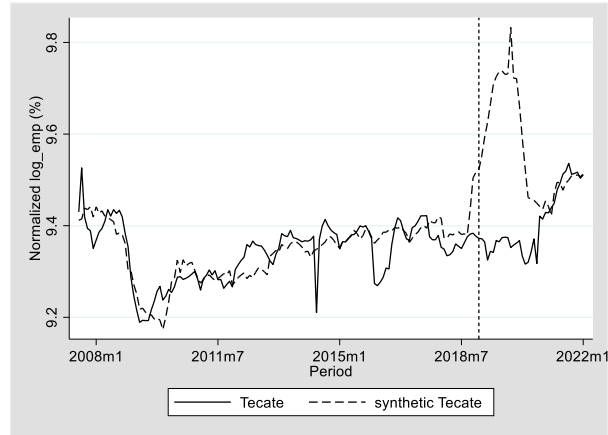
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Figure A 8.-Synthetic Controls of Reynosa Log Employment



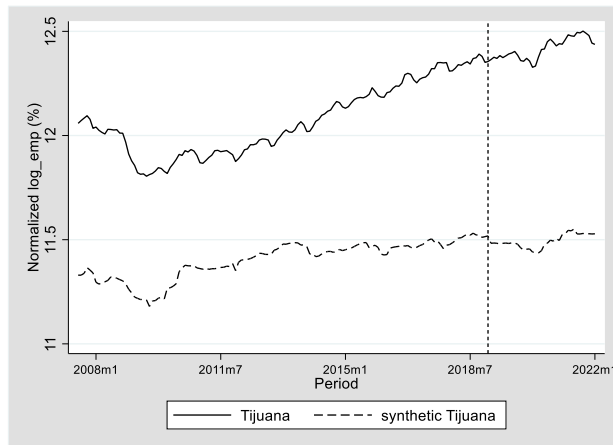
Source: Own elaboration with Data from INEGI

Figure A 9.-Synthetic Controls of Tecate (Log Employment)



Source: Own elaboration with Data from INEGI

Figure A 10.-Synthetic Controls of Tijuana (log-Employment)



Source: Own elaboration with Data from INEGI

Figure A 11.-Synthetic Control Placebos Using Allsynth Command for the SOP model

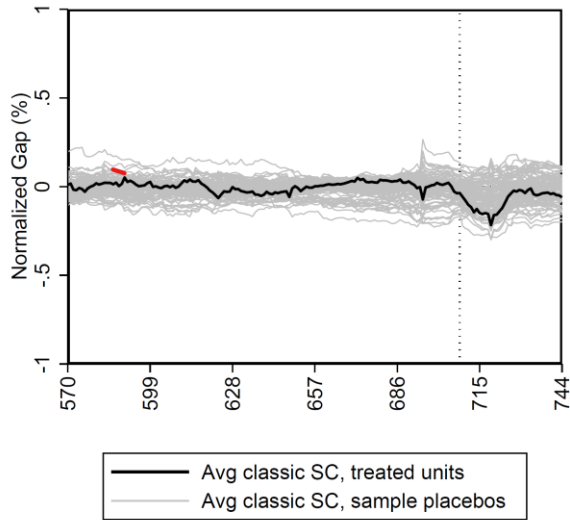


Figure A 12.-Synthetic controls using the Stacked function segmenting treated units (employment-left and Log of Employment-right)

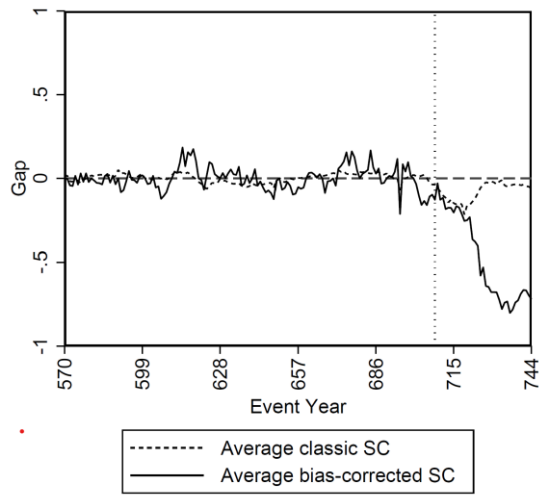
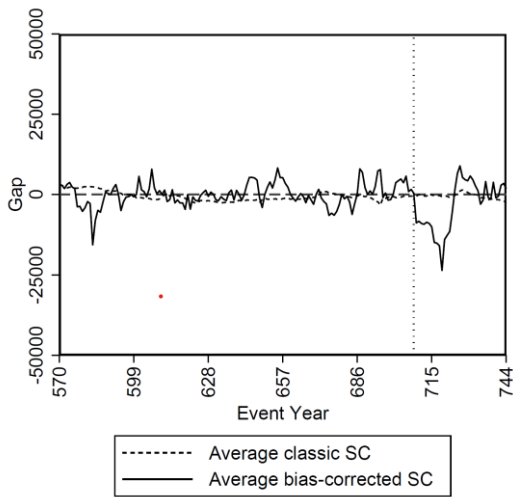


Figure A 13.-SC using stacked for C.Juarez Reynosa and Tijuana (employment-left, Log-employment-right)

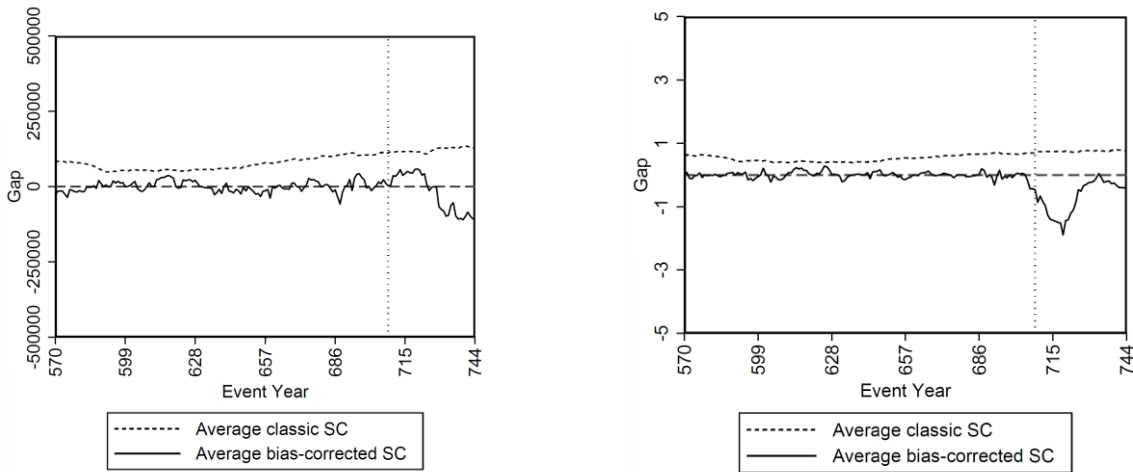
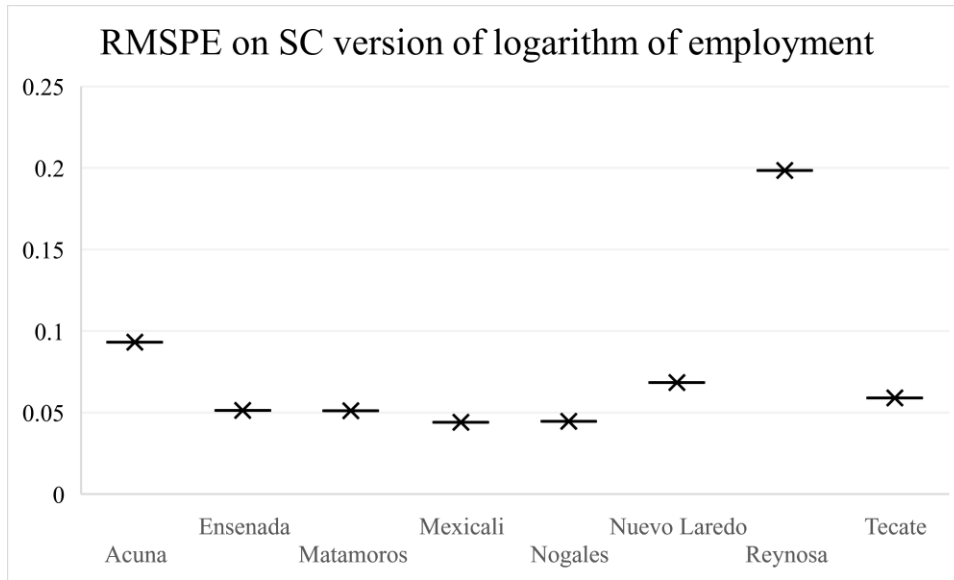


Table 2.-Weights of the SOP version of the model

Donnor Pool	Nuevo									
	Acuna	Ensenada	Juarez	Matamoros	Mexicali	Nogales	Laredo	Reynosa	Tecate	Tijuana
Apodaca	0	0	0.528	0.374	0	0	0	0.495	0.379	0
Chihuahua	0	0	0	0	0	0.275	0	0	0	0
Guadalajara	0	0	0	0	0.075	0	0	0	0	0
Guadalupe	0	0.326	0	0	0	0	0	0	0	0
Hermosillo	0	0	0	0	0	0	0	0	0	0
Leon	0	0.384	0	0	0	0	0	0	0	0
Merida	0	0	0	0	0.02	0	0	0	0	0
Monterrey	0	0	0	0	0	0	0	0	0	0
Otros mun Chih	0.101	0.017	0	0.225	0.155	0.193	0	0.278	0.052	0
Otros mun Coah	0.656	0	0.455	0	0	0.083	0	0.196	0	0
Otros mun Edomex	0	0	0	0	0.296	0	0	0	0.076	0.895
Otros mun Guana	0	0	0	0	0.333	0	0	0	0	0
Otros mun Jali	0	0	0	0.073	0.044	0.2	0	0	0	0
Otros mun NL	0	0.143	0	0	0	0	0	0	0	0
Otros mun Puebla	0	0	0	0	0	0	0	0	0	0
Otros mun Queretaro	0	0	0	0	0	0	0	0	0	0
Otros mun SLP	0.026	0.024	0	0	0	0.147	0.622	0	0	0
Otros mun Sonora	0	0	0	0	0	0	0	0	0	0
Otros mun Tam	0	0.023	0	0	0	0	0	0	0	0
Otros mun Yuc	0	0	0	0	0	0	0.014	0	0.421	0
Puebla	0	0	0	0	0	0	0	0	0	0
Queretaro	0	0	0	0	0	0	0	0	0	0
Ramos Arizpe	0.217	0	0.018	0.01	0	0.103	0.072	0.032	0.07	0.105
Saltillo	0	0	0	0	0	0	0	0	0	0
San Luis Potosi	0	0	0	0	0	0	0	0	0	0

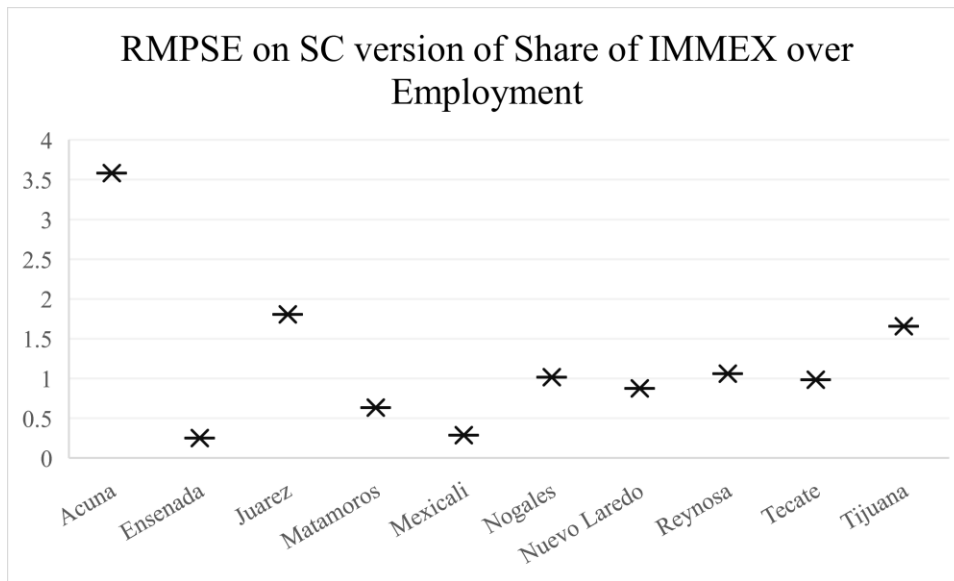
Source: own elaboration with data from the model

Figure A 14.-RMSPE values of the log version of the SC



Source: Own elaboration with Data from the model

Figure A 15.-RMSPE values on the SOP Version of the model



Source: Own elaboration with Data from the model

Figure A 16.-Robustness Tests graphs moving treatment period to 2016 (Acuna)

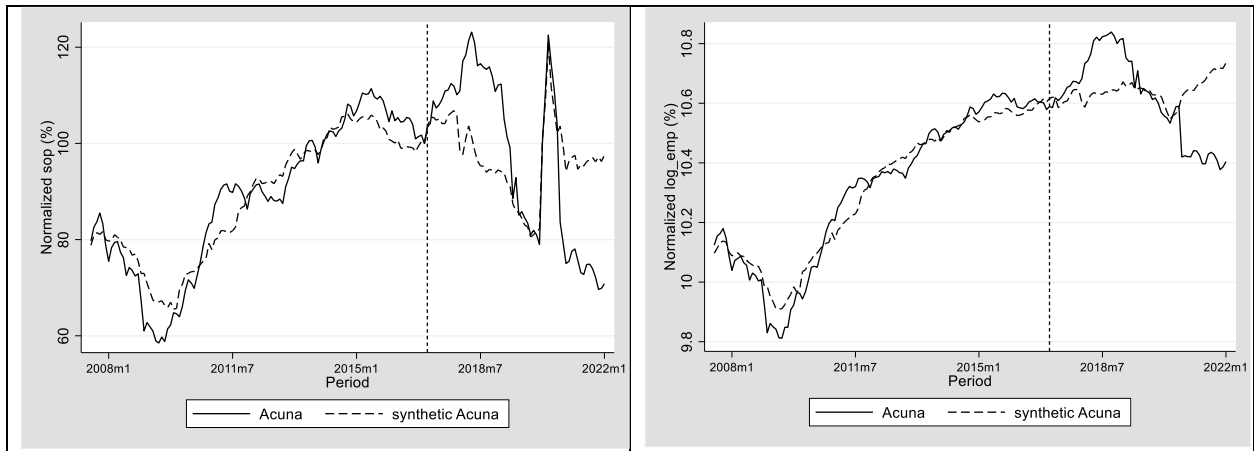


Figure A 17.-Robustness Tests graphs moving treatment period to 2016 (Ensenada)

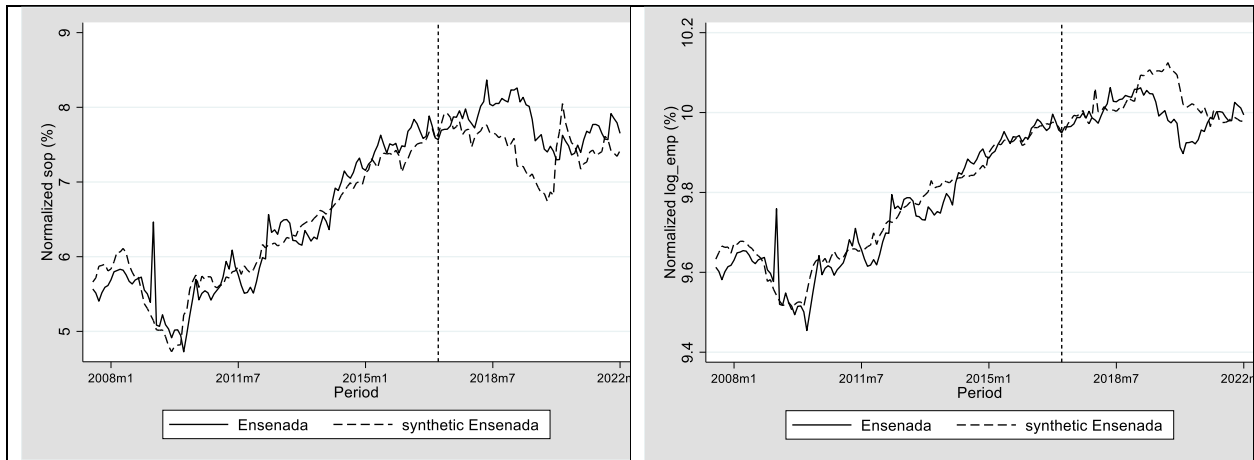


Figure A 18.-Robustness Tests graphs moving treatment period to 2016 (Ciudad Juarez)

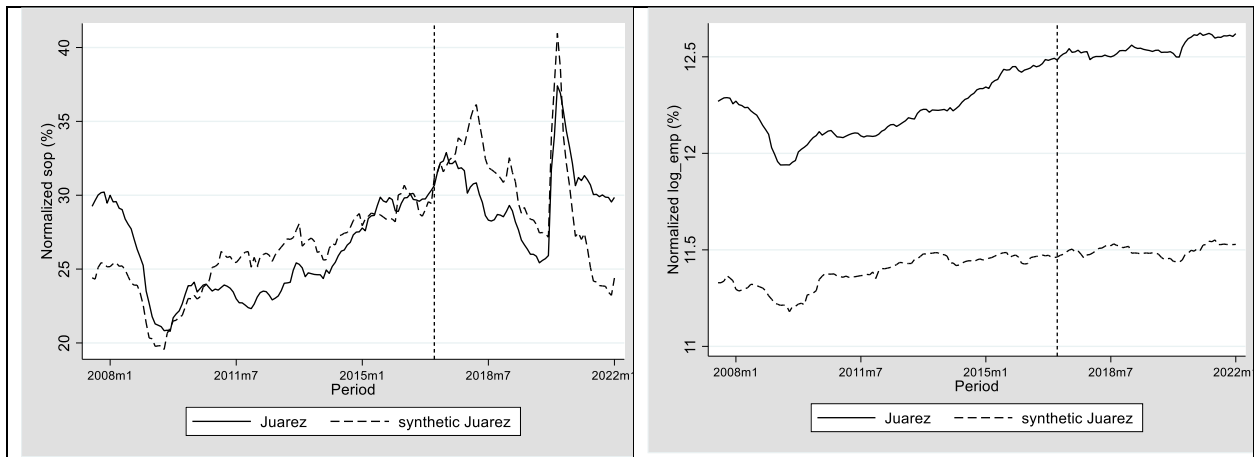


Figure A 19.-Robustness Tests graphs moving treatment period to 2016 (Matamoros)

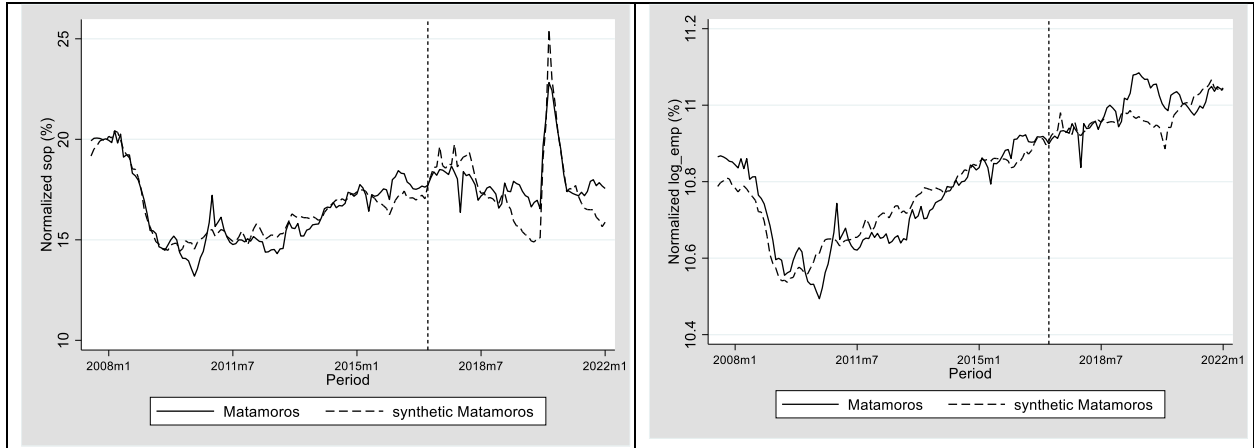


Figure A 20.-Robustness Tests graphs moving treatment period to 2016 (Mexicali)

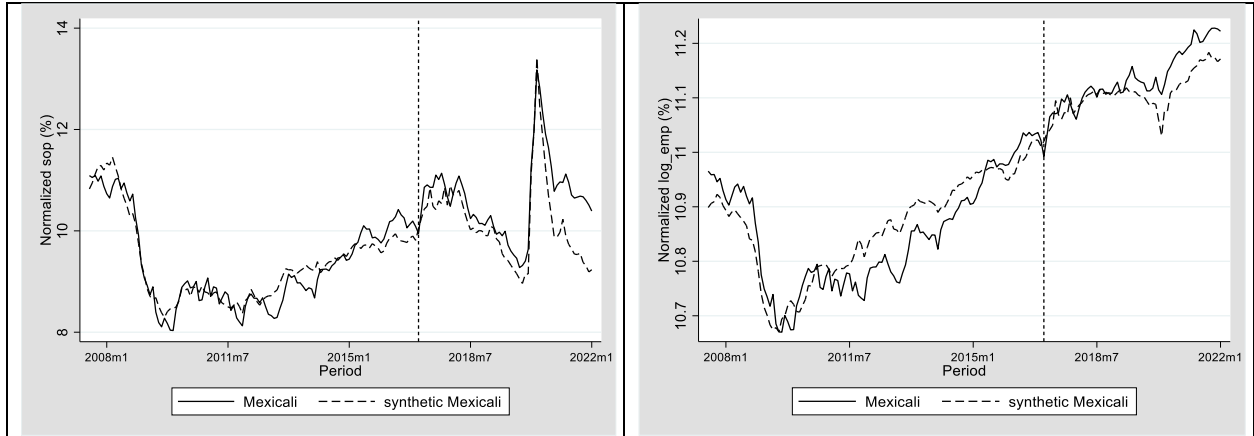


Figure A 21.-Robustness Tests graphs moving treatment period to 2016 (Nogales)

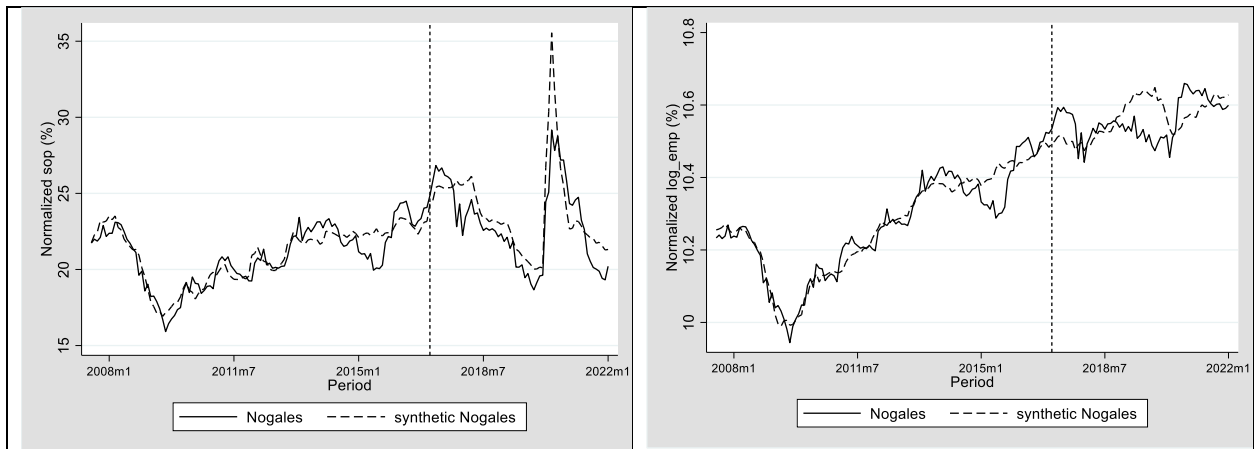


Figure A 22.-Robustness Tests graphs moving treatment period to 2016 (Nuevo Laredo)

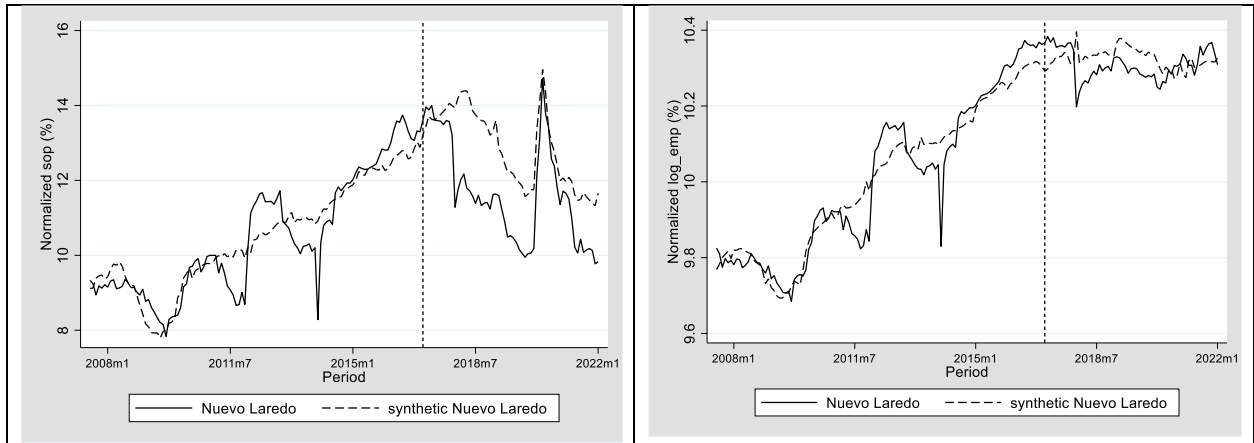


Figure A 23.-Robustness Tests graphs moving treatment period to 2016 (Reynosa)

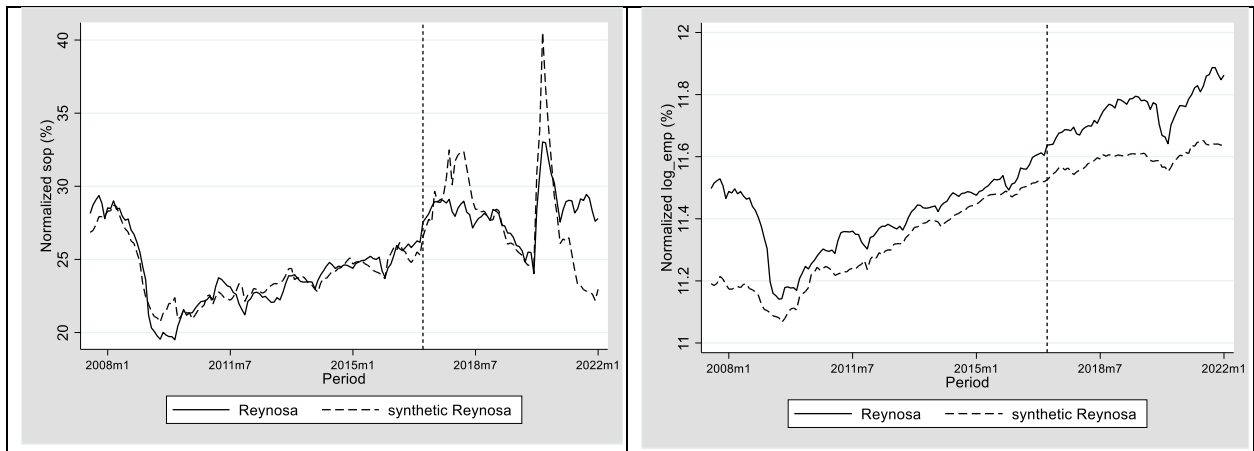


Figure A 24.-Robustness Tests graphs moving treatment period to 2016 (Tecate)

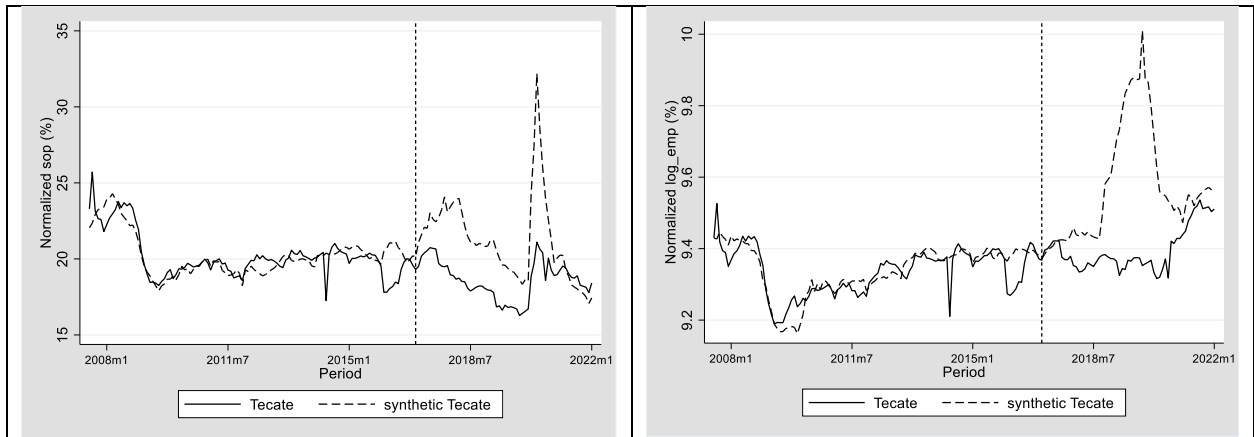


Figure A 25.-Robustness Tests graphs moving treatment period to 2016 (Tijuana)

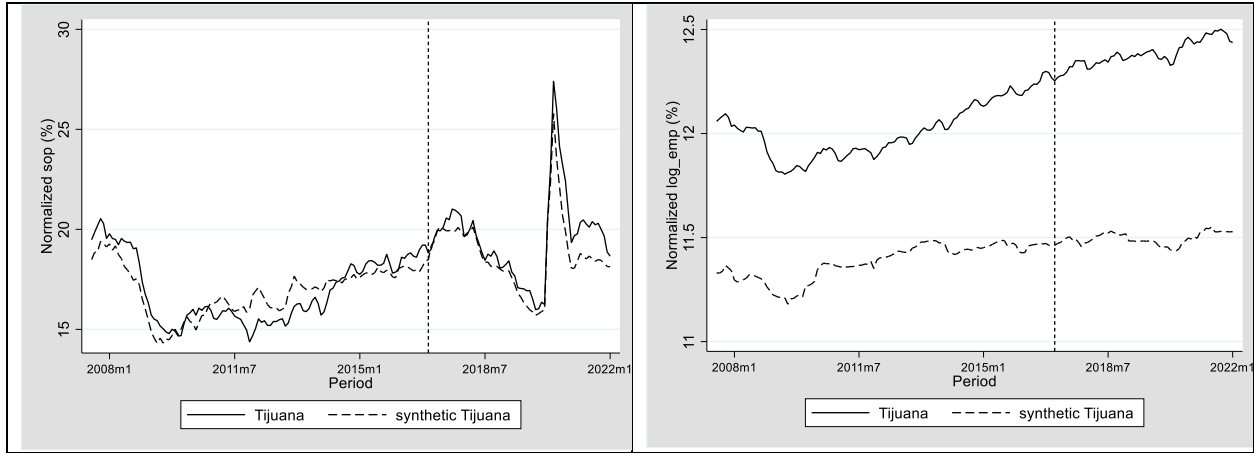


Figure A 26.-IMMEX Employment trends for all treated municipalities and the rest of Mexico

