Who pays for a Value Added Tax Hike at an International Border? Evidence from Mexico[*]

Emmanuel Chávez[†]   Cristobal Domínguez[‡]

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Abstract

This research studies the effects of a value added tax (VAT) reform at Mexico's international frontiers. The reform raised the VAT rate from 11 to 16 percent at localities close to the international borders. We use the traditional "static" difference-in-differences methodology as well as dynamic difference-in-differences. The treatment group is composed of municipalities in the area where the VAT increased, and the control group is composed of municipalities close to the treatment group. We find that the VAT hike had a positive effect on prices of around half the size of the full pass-through conterfactual. In addition, the reform had a negative effect on workers' wages and no effect on employment. The negative effect on workers' real incomes is not smoothed out with credits. We find evidence of a negative effect on consumption at Mexico's northern border due to the reform. However, we find no evidence of an increase in shopping at the United States side of the border.

Keywords: Value Added Tax, Tax Incidence, Cross-border Shopping.

JEL Codes: H22, H24, H73

[†]Corresponding author. PhD candidate at Paris School of Economics.
[‡]Researcher at Comisión Nacional Bancaria y de Valores.

1 Introduction

Who pays for taxes is a longstanding question in economic thought. There is a long tradition in research among public economists that aims to determine how the burden of a tax is allocated among consumers, workers or capital.[1] Consumption taxes are not exempt of this incidence analysis. Traditionally, research has focused on the effects of consumption taxes on consumers through the effects on prices (Creedy, 2002; Kaplanoglou, 2004; Warren et al., 2005; Barret and Wall, 2006; Garfinkel et al., 2006; Decoster et al., 2007; Warren, 2008; Gaarder, 2018; Mariscal and Werner, 2018). But recent studies on the incidence of consumption taxes find that they have direct impacts on outcomes that go beyond prices, such as profits (Kosonen, 2015; Harju et al., 2018; Benzarti and Carloni, 2019; Benzarti et al., 2020). Our research builds on this strand of literature by analyzing an unusual value added tax (VAT) reform. The reform took place in Mexico. It increased the VAT rate *only* at the international frontiers. Specifically, the reform increased the VAT rate in localities close to the borders from 11 to 16 percent in order to standardize the rate with that of the rest of the country. The examination of this natural experiment allows to fill a gap in the VAT incidence literature: what are the effects of raising the VAT if firms are exposed to competition from a jurisdiction that does not raise consumption taxes?

We obtain relevant findings that increase the current state of knowledge on the incidence of the value added tax. First, we find the VAT hike led prices to increase. However, the size of the effect is of around half the size of the full pass-through counterfactual. Prices do not catch-up with the full pass-through in the whole period we analyze. This is relevant, as many papers in this literaute find that VAT hikes are (at least) fully passed to consumers.[2] We argue that the relatively small pass-through we find is due to the context that we analyze: if a country raises the VAT rate in the whole territory, consumers have limited options to move and find better prices in case the hike is fully passed to the consumer. However, if the

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[1] A review of theoretical studies can be found in Kotlikoff and Summers (1987) and in Fullerton and Metcalf (2002)

[2] Benzarti and Carloni (2019) carry out an extensive analysis on the price incidence of VAT reforms in Europe. They find that VAT hikes are fully passed to consumers in three months following the reform.

VAT rate is raised at international borders, consumers have more opportunities to search for better prices. So, as firms are exposed to heavy competition at the border, they may refuse to fully pass the tax hike on consumers, since they could lose demand to foreign sellers.[3] Indeed, this was one of the main concerns of social demonstrations and political lobbying against the VAT reform of 2013.[4]

Our second key finding complements the first. We find that the VAT reform had a negative effect on wages of around 2.0 percent; with no effect on the level of employment.[5] To our knowledge, the causal effect of the VAT on wages is documented in just one previous study. Benzarti and Carloni (2019) show that workers' wages can benefit from VAT cuts. We are the first to show that the opposite is also true: workers' wages can be negatively affected by VAT hikes. Our findings on prices and wages are consistent with VAT incidence literature regarding how firms use VAT reforms to preserve or increase their profits.[6] In the context we study, firms are unable to pass the VAT hike fully on prices due to competition at the other side of the border. However, they can adjust on labor costs by taking a (counterfactual) bite on workers' wages.

Our third key finding is novel in the VAT incidence literature. We find that the VAT hike had a negative effect on the number of payroll credits granted to workers. These are credits whose payments are directly discounted from workers' payrolls. To our knowledge, this is the first paper that finds a causal effect of the VAT on the credit market. This extends the

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[3]Research by Carbonnier (2007, 2008) supports the view that the effect of VAT reforms on prices depends on the context. He finds that prices change differently according to the degree of competition in the market in response to changes in the VAT rate.

[4]We describe the context of the reform with more detail in Section 2.

[5]As point of reference, the average annual growth of the nominal minimum wage in Mexico in the 10 years previous to the reform was 4.5 percent. So, if typical wage growth in Mexico is taken into account, the size of the effect that we find is considerable.

[6]Kosonen (2015) finds that about half of a VAT cut in Finland was passed to prices, enabling firms to increase their profits after the tax cut. Benzarti and Carloni (2019) study a VAT cut in France and show that most of the gains from the tax cut were pocketed by employers, with a small part going to consumers and employees. Benzarti et al. (2020) analyze VAT increases in several European countries. They find that firms increase prices at a rate that exceeds that of the full pass-through, increasing their profits as a consequence. This finding is supported by research in Hungary by Ván and Oláh (2018). Harju et al. (2018) study restaurant VAT cuts in Finland and Sweden and find no reduction of prices in independent restaurants due to these cuts.

existing evidence on the set of outcomes that can be affected by the VAT. This finding is in line with the literature that finds that income shocks are not smoothed-out, which contradicts a key prediction of the standard consumption smoothing theory.[7]

In addition, we study the cross-border shopping dimension of the VAT reform at the international borders. We find evidence of a negative effect on demand at Mexico's side of the Mexico-United States border. We measure this effect with the number of credits specifically contracted to buy durable goods. However, we find no evidence that the reform had an effect on shopping at the US side of the border. We measure this with sales tax revenues in US cities close to the border, and with the number of land crossings from Mexico to the United States. Thus, our paper links the VAT incidence literature to literature on the effects of consumption taxes on cross-border shopping. The latter generally finds that raising taxes in a jurisdiction causes demand to increase in a neighboring jurisdiction. However, this effect is not universal. Changes in taxation induce consumers to cross jurisdictions as long as the tax savings compensate for the costs of crossing to the other jurisdiction.[8] In the case we study, the absence of consumption shifting to the US side of the border following the VAT hike, could be the result of the relatively small price increase by firms on the Mexican side.

Finally, our research expands previous knowledge on the effects of VAT rate changes in Mexico. Aportela and Werner (2002) and Mariscal and Werner (2018) study the effects of VAT hikes on inflation. They find that VAT hikes lead to positive but short-lived inflation-

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[7]Ganong and Noel (2019) and Olafsson and Pagel (2018) find that income shocks lead individuals to decrease consumption sharply even if income shocks can be foreseen. Hundtofte et al. (2019) find that negative income shocks due to unemployment do not lead households to increase their credit balances in Iceland and in the United States. Horvath et al. (2021) find that the negative income shocks due to the COVID-19 pandemic lead households in the United States to sharply decrease their consumer credit use. Our data does not allow us to conclude if the negative effect on payroll credits comes from a drop in demand (less credit applications by workers) or a drop in supply (banks restricting access to credit). Nonetheless, the result –the negative effect of a negative income shock on the number of payroll credits– is consistent with this recent literature.

[8]Walsh and Jones (1988) study a sales tax reduction in the US state of West Virginia. They find that the tax cut induces residents of counties adjacent to WV to cross state lines and purchase in WV. But there is no effect for counties that are relatively distant from the border. Asplund et al. (2007) analyze the changes in demand of alcoholic beverages in Sweden relative to the prices in neighboring countries. They find larger effects of changes in prices in Denmark than in Finland as the costs of traveling to Finland are larger. A summary of this literature is presented in Leal et al. (2010).

ary effects. We complement this literature by taking a different approach to measure the effect of the VAT hike on prices. Instead of taking general inflation as outcome, we focus on the prices of products and services that are treated by the reform, i.e. those that are subject to the VAT. With this approach, we find a positive and lasting effect on prices.[9] We use the same approach to analyze the effect of the VAT reform on labor outcomes. This appoarch allows to get a novel finding (the negavite effect of the reform on wages) for the VAT incidence literature in Mexico.[10]

To estimate the impacts of the VAT hike, we use two methods that are closely related: the traditional "static" difference-in-difference (DiD) methodology, and also dynamic difference-in-differences. The static DiD method gives a point estimate that we use to compare the effects of the reform with the full pass-through counterfactuals. The dynamic DiD gives an estimate for a given period of time that makes it possible to examine how the effect of the reform is distributed in different periods. The area subject to the VAT discounted rate of 11 percent before the 2013 reform is mostly a 20 kilometer strip from the international frontiers. The treatment group is composed of the municipalities where the majority of the population lives in the VAT discount area.[11] The control group is composed of the municipalities that are located inside States at the international borders, but outside the VAT discount area. In addition, as mentioned above, our estimation strategy takes into account the goods and economic sectors that are subject to the VAT to estimate more precisely the treatment effect on the treated.[12]

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[9]Our approach bears some resemblance to an estimation done by Campos-Vazquez and Esquivel (2020). They study a package of tax and wage policy changes at Mexico's northern border in 2018; among these, a VAT cut. They find that the policy package did not have an effect on general prices (inflation). However, the prices of groups of products prone to be taxed by the VAT were affected. Campos-Vazquez et al. (2020) study the same policy package and find a positive effect on wages. We build on this research by isolating the causal effect of the VAT on the Mexican labor market.

[10]By focusing on the treated sectors, we extend evidence provided by Núñez Joyo (2017) on the effect of the VAT hike on the labor market. Our research is in contrast with his findings as we find that the reform had a negative effect on wages with no effect on employment.

[11]We count with information at the municipality level for most outcomes. For estimation purposes, this poses a problem, as the area of most municipalities at the international borders is not completely covered by the 20 km strip. So, to define the treatment area, we analyze the geographic location of cities and rural areas in each municipality. More information on this is provided in Section 4.

[12]For the United States outcomes, we use the same difference-in-difference methodology, but we adapt the treatment and control groups to each outcome. We describe this in detail in Section 5.2.

The reminder of the paper is organized as follows: in Section 2, we describe the 2013 tax reform that included the VAT hike at the international borders; in Section 3, we describe the data sources for the Mexico and United States outcomes; Section 4 describes the methodology and the treatment and control groups we use in this study; Section 5 presents the results and robustness tests; finally, Section 6 concludes.

2   The Value Added Tax Reform

The value added tax (VAT) was introduced in Mexico in year 1979. Since its origin, policy makers contemplated that the tax should be adapted to the particular context at the borders, as it included a different rate in the localities at the frontiers (6 percent) and the rest of the country (10 percent). The VAT rate has gone through several rate changes since its creation.[13] In 2013, the general VAT rate stood at 16 percent, with a smaller rate of 11 percent in a geographic area that mostly comprised a 20 kilometer strip from the international borders. These rates were in effect since year 2010. In September 2013, the President presented a tax reform to Congress that increased the VAT rate at the 20 km strip to standardize the rate at 16 percent in all the country. This represents a 45 percent increase in the previously discounted areas. The reform was approved by Congress in October, and took effect in January 2014. It included several measures besides the VAT tax hike at the international borders.[14] All other measures were introduced in the whole country, so they should be accounted for in the estimation strategy that we explain in Section 4. The main justification the government used to introduce the 2013 tax reform was to increase tax collection, as Mexico's tax revenues are low, not only by OECD standards, but also compared to other Latin American countries.[15]

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[13]In 1983, the VAT rate was raised to 15 percent in the whole country. In 1991, it was cut to 10 percent. Then, in 1995 the VAT rate was raised to 15 percent but not at the international frontiers. For more information see Mariscal and Werner (2018).

[14]Among these are: measures to incorporate informal firms to the formal sector, a special tax on stock exchange transactions, a slight increase in the income tax for the top brackets, a special tax on revenues of mining companies.

[15]In 2010, tax collection in Mexico (not including oil revenues) stood at nearly 14.5 percent of GDP. The average in Latin America at that time was close to 19 percent of GDP. Meanwhile, the OECD average

Figure 1 shows the VAT rate discount area before the 2013 reform. The area included all localities situated at a distance of 20 kilometers or less from the international borders. However, in some places, the discount area reached beyond the 20 km limit. Some states –as well as some municipalities– were completely included in the VAT discount area.[16] Around 9.9 million people lived in the VAT discount zone in 2010, i.e. nearly 9 percent of the country's population at the time. The VAT hike was greatly contested by numerous groups at the international borders.[17] The most vocal groups were business owner associations and chambers of commerce. These groups organized demonstrations in bordering cities that at some point registered attendances by the thousands.[18] The main concern of these groups was the loss of competitiveness relative to businesses at the other side of the international borders. Specially in those of the US side, as the US sales tax in all bordering states stood below even the discounted 11 percent VAT rate. However, some other concerns were mentioned. The effects on inflation was one of these, but also the loss of employment. As firms would face more costly inputs and loss of demand due to higher prices, they could be forced to cut on employment. These concerns are outlined with detail in Fuentes et al. (2013). Despite the unrest caused by the proposed bill, the VAT hike at the international borders was approved by Congress without major changes.

3   Data

This research relies on multiple sources of administrative data collected both by Mexican and United States agencies. Most datasets are publicly available. However, the datasets collected by *Banco de México* and *Comisión Nacional Bancaria y de Valores* (CNBV) are not (more on this below). Let us start by describing the Mexican datasets in this research.

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stood at 26 percent (Clavellina-Miller et al., 2016). Arguably, the tax reform had some success in its goal to increase tax collection. Tax revenues increased from an average of 14.2 percent of GDP in the three years before the reform to an average of 17.3 percent of GDP in the three years after the reform (Clavellina-Miller and Villarreal-Páez, 2016).

[16]The exact locations subject to the discount zone are outlined in Cámara de Diputados del Congreso de la Unión (2009).

[17]https://elpais.com/internacional/2013/10/30/actualidad/1383116439_167910.html

[18]https://www.jornada.com.mx/2013/10/20/politica/004n2pol

Data on **prices** comes from the *Índice de Precios al Consumidor* dataset collected by *Instituto Nacional de Estadística y Geografía* (INEGI). This dataset contains monthly information on prices of nearly 300 different products and services from 46 different cities across Mexico. Of the Mexican datasets we use in this research, this is the only one that provides data at the *city* level. The other datasets provide information at the *municipality* level. We discuss the implications of this in Section 4. In addition, the prices dataset is the most geographical constrained dataset that we use. For the other Mexican datasets, we have information for most municipalities in the country.

Data on **labor** outcomes comes from the *Asegurados* datasets collected by *Instituto Mexicano del Seguro Social* (IMSS). This dataset contains monthly information on the universe of private employees in the formal sector at the municipality level. The dataset covers a wide set of variables. In this research we are interested specially on two: mean wages and employment level. A drawback of this dataset is that it only comprises the formal sector of the economy. Mexico's informal sector is quite large. It comprised about 60 percent of total employment in 2013 (OIT, 2014). Nonetheless, the informal sector accounted for just about 20 percent of GDP. Outcomes of the informal sector are usually analyzed with *Encuesta Nacional de Ocupación y Empleo* (ENOE), an employment survey collected by INEGI. However, this survey is not representative at the municipality level we use in this research.

Credit data comes from the datasets collected by *Banco de México* and shared with *Comisión Nacional Bancaria y de Valores* (CNBV), both are the main financial market regulators in the country. The datasets contain bimontly data on the universe of active non-revolving consumer credits granted by financial institutions (commercial banks and Sofomes R).[19] A municipality level dataset of these credits is built using geographic information

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[19]Sofomes *(Sociedades Financieras de Objeto Múltiple)* are a specific kind of financial entity in the Mexican financial regulation. These institutions are allowed to perform credit, leasing and factoring operations, but they are not allowed to take deposits from the general public. Regulated Sofomes, or Sofomes R, are those

collected in the administrative reports. This dataset includes bimonthly information on the number of new credits approved and the average interest rate of every approved credit weighted by the credit amount at municipality level. For this work, only credits approved during every two-month period are considered, as the conditions of credits active but approved before that period could be subject to different economic and financial contexts. In this research, we are interested particularly on two types of credits granted to individuals: 1) payroll credits, i.e. credits that are discounted directly from workers' payrolls, and 2) credits granted specifically to purchase durable goods (designated as ABCD credits in the Mexican context).[20]

Moving on to the United States datasets. First, we use annual data on **sales tax revenues** collected by the US Census Bureau. The data comes from the Annual Survey of State and Local Government Finances. The survey covers all sources of revenues at the state, county and city level. We use city level data. The survey covers all cities with population larger than 70,000 inhabitants. In addition, we use monthly data on **border crossings** collected by the Bureau of Transportation Statistics. The dataset contains information on all entries to the United States at the port of entry level.[21]

4 Methodology

We use two methodologies to study the effect of the VAT hike at Mexico's international borders. First, we use the standard difference-in-difference (DiD) methodology described by Angrist and Krueger (1999). We call this the "static" difference-in-difference. Second, we

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that 1) have business activities involving financial holding companies and credit institutions, 2) fund their securities operations using securities registered in the National Registry of Securities (RNV) kept by the CNBV, or 3) voluntarily seek approval by the CNBV to be regulated. Most of these institutions are owned or controlled by financial institutions.

[20]ABCD credits, or *Créditos para la Adquisión de Bienes de Consumo Duradero*, are credits approved by commercial banks and financial institutions with related retail stores which are granted the moment a durable good is purchased. A durable good is expected to have longer life span than the credit term. This commonly includes personal computers, televisions, and other household appliances.

[21]Apart from the datasets mentioned above, we use INEGI's *Marco Geoestadístico* and the US Census Bureau's TIGER/Line Shapefiles to create the treatment and control groups described in Section 4 and Section 5.2, as well as the maps included in this paper.

use the "dynamic" difference-in-difference methodology. The static DiD allows to get a point estimate of the effect the policy. We use this point estimate to compare the effect of the policy with the full-pass through counterfactual. The dynamic DiD shows the difference on the outcome between treatment and control groups at a given point in time. This is useful to examine if the policy has lasting effects in time and to confirm common trends prior to the time when the policy takes place. A crucial part of this study is the definition of the treatment and control groups, as both methodologies rely in defining a treatment group that is subject to the policy change (i.e. the tax hike); and a control group that is not subject to the policy change. Both groups must show common trends for the methodologies to be valid. We explain in detail below the process we use to define the groups.

The eligibility to the policy is conditioned to a geographic location. This location is defined in Mexico's value added tax law and shown in Figure 1.[22] Using the geographic delimitations in the law, we construct treatment and control geographic areas. The localities that lie inside those areas are the treatment and control geographical units that we use in our analysis. Most of the Mexican data we use in this analysis (except for prices) is provided at the municipality level. The 20 km strip where the VAT discount rate applied cuts through the area of most municipalities at the international borders. I.e. for most municipalities at the border, a part of the territory lies inside the discount area and other part lies outside. This brings particularities that must be treated carefully. If all the bordering municipalities are included in the treatment group, one risks to include as treatment large swats of economic activity that were not subject to the VAT discount before year 2014. This would underestimate the true effects of the tax hike. So, to form our treatment group, we keep the international bordering municipalities were the majority (50 percent or more) of the population lives inside the VAT discount zone.[23] These municipalities are shown in yellow in Figure 2.

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[22]Cámara de Diputados del Congreso de la Unión (2009).

[23]We use other population cut-offs for the treatment area: 1) municipalities where at least 75 percent of the population lives inside the VAT discount area, and 2) municipalities where at least 90 percent of the population lives inside that area. The population share in the VAT discount zone by municipality is shown in Figure A6. We describe these alternative treatment areas with more detail in Section 5.3

The definition of the control area is also subject to considerations. The difference-in-difference methodology is valid only if the treatment and control groups are in similar trajectories prior to the policy change. We expect common trends in places that are close to the treated municipalities. The area closest to the treated municipalities is composed of the municipalities that are its immediate neighbors. However, focusing on just the immediate neighbors for the control has some practical difficulties. As shown in Figure 2, the municipalities that are contiguous to the treated municipalities contain relatively small urban areas. Outcome information from these municipalities is sometimes absent and highly volatile, leading to imprecise estimates. To overcome this problem, we include municipalities with larger populations in our control. So, we extend the control area to all municipalities in states at the international frontiers where zero percent of the population lived at the VAT discount zone prior to the 2013 reform. The control municipalities are shown in orange in Figure 2.[24,25]

The static DiD equation we use to estimate the effect of the 2014 VAT tax hike is:

$$Y_{jt} = \alpha + \beta M_j + \gamma D_t + \delta M_j \cdot D_t + \kappa_t T_t + \Pi X_j \cdot T_t + \epsilon \tag{1}$$

where Y_{jt} is the selected outcome at municipality (or city for the price outcome) j and time t. $M = 1$ if municipality j is in the treated area and $M = 0$ if municipality j is in the control area shown in Figure 2. $D = 1$ if time $t \geq 2014$ (the VAT hike took effect in January 2014), and $D = 0$ otherwise. T_t are time dummies and X_j is a set of time-invariant municipality

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[24]Nonetheless, we estimate our regressions with two alternative control areas: 1) the municipalities that are contiguous the treated municipalities, i.e., the "first degree neighbors" in Figure A7; and 2) the second degree neighbors plus the first degree neighbors. We explain this with more detail in Section 5.3.

[25]Table 1 shows the number of municipalities that count with information for each of the outcomes that are related to workers' purchasing power. Panel A shows the municipalities in the treatment area and Panel B shows those of the control area. The price data is clearly the most restricted source of information that we use in this paper. In the treatment area, 8 municipalities (cities) count with price information. On the other hand, 65 municipalities have information on wages and employment. Nonetheless, the price data is more stable. All municipalities with price data have information for all the time periods in our sample. In the case of the labor outcomes, 90% (80%) of the municipalities with labor data in the treatment (control) area have information for all the time periods. The relative scarcity of price data is another reason to extend the control area to all municipalities in the States at the international borders (except for those at the VAT discont zone).

level controls interacted with time dummies. δ measures the effect of the VAT hike in the outcome Y. The estimator obtained from equation (1) allows to get a point estimate of the effect of the VAT hike on the outcomes we measure. In addition we use the following equation to get the dynamic DiD estimators:

$$Y_{jt} = \alpha + \beta M_j + \gamma_t T_t + + \sum_{t=2012}^{t=2015} \delta_t T_t \cdot M_j + \Pi X_j \cdot T_t + \epsilon_{jt} \tag{2}$$

where Y_{jt} is the outcome at municipality (city in case of prices) j and time t. $M = 1$ if municipality j is in the treated area. $M = 0$ if municipality j is in the control area. T_t are time dummies and X_j is a set of time-invariant municipality level controls interacted with time dummies. In this specification, coefficients δ_t capture the difference in the outcome between the treatment and control groups for a given time t.

The definitions mentioned above apply to all outcomes coming from Mexican data. The outcomes that come from United States datasets follow the difference-in-difference estimations of equations (1) and (2), but we define treatment and control groups with respect to the United States context. We explain those groups with more detail in Section 5.2. We estimate both the static and the dynamic DiD equations in the periods of time that comprise two years prior and after the VAT hike took place. The units of time differ across the outcomes we analyse. We describe units of time when we explain our results in Section 5.

5   Results

We divide our outcomes in two categories: 1) internal outcomes, and 2) cross border shopping outcomes. The internal outcomes comprise variables that affect workers' real purchasing power: prices, wages, employment and credits. For this set of outcomes, we analyze both of Mexico's international borders (in Mexico's side of the border), i.e. the Mexico-United States border and the Mexico-Guatemala/Belize border. The cross-border shopping outcomes comprise variables that reflect shifts in demand across both sides of a border. For

those outcomes, we focus only in the Mexico-US border (in both sides of the border) due to more data availability in the United States relative to Guatemala and Belize.

5.1 Internal outcomes

We start by describing the effect of the value added tax hike that took effect in January 2014 on prices. This estimation has been previously done by Mariscal and Werner (2018).[26] They estimate the effect of the 2014 VAT increase on the inflation rate. They find that the reform had a positive but short lived effect. We propose a different approach to study the effect of the VAT hike on prices as not all products and services in Mexico are subject to the VAT.[27] In general terms, the exemptions apply to food, non-alcoholic beverages, rent, mortgages, medicines, medical consultations, public transport, books and private schooling. So, taking the consumer price index (CPI) as outcome may underestimate the real effect of the tax hike.[28] To estimate the effect of the VAT increase on prices, our outcome is the average price of the products and services subject to the VAT in the CPI dataset.[29]

Figure 3 shows graphical evidence on the of the VAT hike on prices. Panel (a) shows the log change of the average price of goods subject to the VAT with respect to December 2013 –the period just before the VAT hike took place–. Before the reform, we see non statistically significant differences on the log change in cities in both the treatment and control areas. After the reform the log difference is clearly larger in treatment area compared to the control area. Figure 3 shows that this effect is lasting in time. In addition, the figure includes the estimate of δ from equation (1). The coefficient indicates that the VAT hike led to a 1.6 percent increase in prices as shown in column (1) of Table 2. The table shows estimates of

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[26]The control group in Mariscal and Werner (2018) is different than ours. We take as control the cities that are outside the VAT discount zone and inside states at the international borders. They take as controls all cities in Mexico that are outside the VAT discount zone.

[27]This approach has been also used by Campos-Vazquez and Esquivel (2020) to show that a mix of policies that included a VAT cut and minimum wage hikes in 2018 had an effect only on the prices of products subject to the VAT.

[28]Indeed, around 68% of the CPI is exempt of the VAT. This does not mean that 68% of the goods that compose the CPI are VAT exempt. Rather, it means that 68% of the goods' weights in the CPI are VAT exempt.

[29]The list of all products and services included in this average price is shown in Appendix B.

equation (1) under three specifications: 1) without time dummies and control variables, 2) with time dummies but no control variables, 3) with time dummies and control variables.[30] In all specifications the estimate of δ is positive and significant. In addition, the size of the effect is similar across specifications. Note that the VAT rate at the international borders went from 11 to 16 percent in January 2014. Hence, a full pass-through of the tax change on prices would amount to a price increase of about 3.6 percent.[31] So, the effect of the reform on prices is about half the size of the full counterfactual pass-through. This means that business owners passed some of the tax increase to consumers, but not all. In addition, we show the δ_t estimates from equation (2) in panel (b) of Figure 3. The figure shows that the coefficients are not statistically different to zero prior to the VAT hike of January 2014. After the reform takes place, the dynamic DiD estimates are positive and statistically different from zero. These estimations reaffirm that the reform had a positive effect on the prices of goods that are subject to the VAT.

For the labor outcomes, we carry an analysis similar to that of the price outcome. We take the workers in firms that are part of sectors whose final products and services are subject to the VAT.[32] We construct the mean wage and the mean employment level in the treatment and control municipalities from these sectors. Figure 4 shows graphical evidence on the effect of the VAT hike of January 2014 on wages. Panel (a) displays the log change with respect to December 2013. Before the reform, we see non statistically significant differences on the log change in municipalities in the treatment and control areas. After the reform, the log difference with respect to the December 2013 wage is larger in the control municipalities. This indicates a negative effect of the VAT hike on wages of workers in sectors subject to the VAT. The size of the effect from the static DiD estimator is around -2.0 percent as shown in column (2) of Table 2. All specifications in the column are negative, significant and similar

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[30]Municipality level control variables include: the unemployment rate, the percent of the total workforce employed in the formal sector, the total number of firms operating in a fixed address (public and private).

[31]Take y as the price including VAT and x as the non-VAT price. Take $t+1$ as the period after the VAT change and t the period before the change. Then $y_t = 1.11x$ and $t_{t+1} = 1.16x$. The percent change in y from period t to $t+1$ is $\Delta\%y = \frac{y_{t+1} - y_t}{y_t} \times 100 = \frac{1.16x - 1.11x}{1.11x} \times 100 \approx 3.6$.

[32]These sectors are listed in Appendix B.

in size.[33] Note that the negative effect on wages is not as big as to lead to a wage *decrease* in the treated areas. Rather, nominal wages increased, but more slowly than how they counterfactually would. In addition, panel (b) of Figure 4 shows the dynamic DiD estimates from equation (2). Prior to the reform the coefficients are not statistically different from zero, whereas in all periods after the reform the coefficients are negative. This evidence reinforces the negative effect of the VAT hike on wages.

Note that the VAT reform had an equalizing effect in terms of prices and wages across the treatment and control areas. Panel (a) of Figure 5 shows the logarithm of the mean price of goods subject to the VAT. After the VAT hike, mean prices in the treated cities start to catch up with those of the control cities. Panel (b) of Figure 5 shows the logarithm of mean wages of workers in sectors subject to the VAT. The figure shows that prior to the reform, mean wage in the control municipalities was lower than that of the treated municipalities. After the reform, wages in the control area raised more rapidly than those of the treatment area, to the point were wages across both areas were not statistically different. So, the reform appears to have erased the relative attractiveness of the border region in terms of prices and wages.

Moving to the employment outcome, Panel (a) of Figure 6 indicates no clear evidence on the effect of the reform on employment in sectors subject to the VAT. This is confirmed in the results from equation (1) as shown in column (3) of Table 2. All coefficients in the column are positive, but none is statistically significant. The series in Panel (a) of Figure 6 show large jumps in short periods of time, but the long term trends appear to move in parallel. To support the common trends assumption between the treatment and control groups, we include in Panel (b) of Figure 6 the coefficients from the dynamic DiD regressions. The figure shows that, before and after the reform, the DiD estimates are not statistically different from zero. I.e., there is no effect of the reform on employment.

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[33]For the wage and the employment outcomes, municipality level control variables are the same that we include in the price outcome. These are: the unemployment rate, the percent of the total workforce employed in the formal sector, the total number of firms operating in a fixed address (public and private).

Let us now discuss the findings on the price and labor outcomes that we have presented so far. There is previous evidence of a VAT rate change that had an effect on wages. Benzarti and Carloni (2019) find that a VAT cut in French sit down restaurants was shared with employees in the form of higher wages (although most of the VAT cut went to higher business profits). Our results support the finding that VAT rate changes have an effect on wages. However, we find that the effect can go in a different direction. In the case we study here, a VAT rate increase has a negative effect on workers wages. We do not think that this effect is driven by workers moving between the treatment and control areas due to the reform. As seen in Figure 6, the reform does not have an effect on the level of employment. In addition, as shown in Panel (b) of Figure 4, mean wages are higher in the treatment areas compared to the control areas before and after the reform. So, there is no wage incentive on workers in the treatment areas to cross to the control areas around the time that the VAT reform took place. Unfortunately, we do not count with information on profits to investigate the effect of the VAT hike on that variable. However, evidence from previous literature shows that businesses use prices to preserve or increase their profits when they face changes in the VAT rate. In the context of our research, firms appear unwilling to increase prices to fully compensate for the VAT rate hike. Likely, the reason being that they may lose demand to firms at the other side of the international borders. Thus, in this context, firms appear to adjust a part of the VAT hike (positively) on prices and another part (negatively) on wages.[34]

To complete our analysis on the effect of the VAT tax on workers' purchasing power, we estimate the effect of the VAT increase on payroll credits. These are credits that are discounted directly from the workers' payrolls. These credits are only granted to workers employed in the formal sector, as banks link their collection to an official payroll. In the CNBV datasets we cannot identify the economic sector of the firm where the credited worker

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[34]Note that wages did not nominally decrease. Rather, they did not increase as much as they would have without the reform. This may have made it easier for firms to adjust on wages than to adjust on the level of employment. Meaning that, firms continued to hire as they would have without the VAT reform, but paying smaller wages than they counterfactually would.

is employed. Thus, our treatment group is the payroll credits awarded in the treated municipalities *regardless* of the worker's economic sector of employment. Table 3 shows the estimates of parameter δ for the static DiD model of equation (1). Column (1) shows the the effect of the VAT hike on the number of new awarded payroll credits. The effect is negative and significant in all specifications of the equation (1). Column (2) shows the effect of the VAT hike on the average amount of these credits. All specifications are not statistically different from zero. Finally, column (3) shows that the VAT hike did not have an effect on the interest rate of these credits. Thus, according to these estimations, the reform had a negative effect on the number of credits that workers contracted through their payrolls. Although the average amount of the credits appears not to have changed. The negative effect on the number of new payroll credits granted is not driven by changes in the nominal interest rate. Figure 7 shows the estimates from the dynamic DiD model of equation (2). Panel (a) shows these estimates on the number of new payroll credits granted. The figure clearly shows that prior to the reform the DiD estimates are not statistically different from zero. After the reform takes place, these estimates become negative. Panels (b) and (c) show no effect of the reform on the average amount of these credits or on their interest rate.

To sum up this set of outcomes. The positive and lasting effect on prices indicates that workers face higher prices due to the VAT reform –although these are smaller than the full conterfactual pass-through–. In addition, workers have smaller wages than they counterfactually would have had without the reform. On top of this, less credits are granted to smooth out the harsher conditions brought by the reform. Our data does not allow to tell if the negative effect on the number contracted credits is due to less credit applications by workers or by more strict conditions to grant credits by banks. Nonetheless, the final equilibrium result remains: workers face less opportunities to smooth out consumption in face of the negative income shock caused by the VAT hike.[35]

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[35]In addition to payroll credits, workers can access credits through the regular "personal credits" granted by Mexico's financial institutions. Payment of these credits is not discounted from workers' payrolls. These credits are not only granted to workers; any adult individual can demand or be offered these credits. Panel B of Table 3 shows the static DiD estimates on personal credits. The parameters are not significant either for the number, the amount or the interest rate of personal credits. Figure A1 plots the dynamic DiD estimates.

5.2 Cross-border shopping

The 2014 VAT hike in Mexico's cities close to international borders may have encouraged consumers to travel to neighboring countries where consumption taxation is lower. In this section we analyze these cross-border shifts in demand. We focus on the Mexico-United States border due to more data availability to study changes in demand in the United States side of the border, compared to the two neighboring countries of Mexico's southern border: Guatemala and Belize. Consumption taxes in the United States are collected via the sales tax. This tax is set at the state and city level. The average sales tax rate in the four US states that neighbor the Mexico's northern border was lower than the 11 percent VAT rate charged at Mexico's side before the VAT reform.[36]

Let us start by studying changes in demand in Mexico's side of the Mexico-US border. The data we count with to analyze this is far from ideal, as we do not have information on all consumption spending in the municipalities located in the treatment and control areas shown in Figure 2. Instead, we count with a proxy of consumption via the number of new credits granted specifically to purchase durable goods. These are credits that may be contracted directly at the store where the durable good is purchased at the moment of the purchase. In Mexico, all durable goods are subject to the value added tax. So, the VAT hike directly affected all the goods that are purchased with these credits. Panel (a) in Figure 8 shows the log change of the number of new credits granted to purchase durable goods in Mexico's northern border, both in the treatment and control municipalities. The figure indicates that the VAT hike had a negative effect on the acquisition of these credits by consumers. This is confirmed in panel (b) of figure 8 that shows the dynamic DiD estimates from equation (2). Table 4 shows the static DiD estimates from equation (1). Column (1) shows that the VAT

The figure confirms that the reform does not have an effect on these credits. This means that the effect of the reform on credits came from the payroll credits, i.e., those that just the workers on the formal sector can be awarded with.

[36]In year 2013, the average combined state and city sales tax rate in the four Mexico-US bordering states was: 8.41 percent in California, 8.16 percent in Arizona, 7.26 percent in New Mexico and 8.15 percent in Texas. In no city the combined state and city sales tax rate was equal or larger to the 11 percent VAT rate charged at Mexico's side of the border at that time. To this day, the combined state and city sales tax rates in California, Arizona, New Mexico and Texas are lower than 11 percent.

hike had a negative effect on the number of credits awarded to but durable goods. Columns
(2) and (3) show that there is no effect on the average amount of these credits or on their
interest rates.[37] Thus, we find some evidence that of VAT hike having a negative effect on
the consumption of durable goods at Mexico's side of the border. At least, on the durable
goods that are bought with credits.

We now study if some demand moved to the United States side of the border due to
the VAT hike. To do this, we use the same specification of equations (1) and (2), but with
different treatment and control groups. We start by studying the effect on sales tax collec-
tion in US cities. We analyze this outcome as changes in consumption in the US side of
the border should be reflected in the revenue collected from the sales tax. Figure 9 shows
the treatment and control groups for this outcome. The treatment group is composed of US
cities that lie at a distance smaller than 40 kilometers from the international border. The
40 km distance that we choose for the treatment area is set according to the distance that
Mexican nationals can travel into the United States with a Border Crossing Card (BCC).
BCC's are special travel documents granted to Mexican nationals that reside near to the
border. The BCC allows its holder to visit US areas close to the border for up to 30 days
with no need to present a passport.[38] The control group is composed of cities that lie in the
area that goes from a distance of 40 km from the border to 400 km. We take this distance
so that it resembles to the average distance of the control group in our Mexico's outcomes
estimations.[39]

Panel (a) of Figure 10 shows graphical evidence on the effect of the VAT reform on sales
tax revenues in the US side of the border. In particular, it shows the logarithm of the mean
sales tax revenues in cities in the treatment and control areas. The figure shows no jumps

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[37]Dynamic DiD coefficents for these outcomes are shown in Figure A2.

[38]Mexican nationals must apply for a visa in US consulates in order to visit the United States. Applicants
to US tourists visas must satisfy requirements that show their likeliness of not staying permanently in the
United States.

[39]We use two alternative treatment areas: 1) US cities that are placed at the international frontier line,
and 2) US cities in the 40 km area that have a population of less than half the size of the closer Mexican
city at Mexico's side of the border. More information on this is provided in Section 5.3.

around the date the VAT hike took place. This depiction suggest that the reform had no effect on sales tax collection. Panel (b) plots the dynamic DiD estimates from equation (2). The plot shows no evidence of the the VAT hike having an effect on sales tax collection in the Southern border of the United States. Static DiD estimates are shown in column (1) of Table 5. All coefficients are not statistically significant. So, the analysis of sales tax revenues in the United States indicates that the VAT reform did not lead to consumption shifting to that country. Nonetheless, there is a number of problems with this variable. First, sales tax revenues do not measure consumption directly, it is just a proxy of it to the extent that sales tax collection moves in the same manner as overall consumption. Second, the variable is collected in an annual basis. So, we cannot detect changes over smaller periods of time that the reform may have had. Third, consumption of Mexicans in the US bordering cities may be a very small share of overall consumption. So, our regressions may not be able to detect changes in consumption by Mexicans if the outcome we use is related to overall consumption. To reinforce our analysis on consumption in the US side of the border, we use an additional outcome: land border crossings from Mexico to the United States. If the VAT hike pushed Mexico's residents at the border to buy more in the United States side, then we may expect to see a higher number of crossings from Mexico to the US. The treatment group that we use to study this outcome is the number of passengers that crossed the border using private vehicles. Crossings for shopping purposes are registered in this category. The control group is the number of containers that crossed to the US from Mexico by trucks.[40] Panel (a) of Figure 11 shows the log of the mean number of crossings in ports of entry at the Mexico-US border. The figure shows no unusual jumps in the treatment or control group around the time the VAT hike took effect. Panel (b) of this figure shows the dynamic DiD estimates. The estimates are not statistically different from zero in all periods of time. This indicates that the VAT reform did not have an effect on border crossings from Mexico to the United States. The static DiD coefficients in column (2) of Table 5 is in line with this result.

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[40]We use additional treatment and control groups to study this outcome. We describe them with detail in Section 5.3.

Thus, from the outcomes we analyze in this paper, we find no evidence of the VAT reform having an effect on consumption at the US side of the border. The absence of consumption shifting to the United States could be due to legal barriers imposed on Mexicans in the form of travel documentation requirements to cross the border. Indeed, Mexicans that reside at the border can be denied of a Border Crossing Card (or a tourist visa) in the basis of income or work status, among others. However, there is no evidence that restrictions on Mexicans to cross to the US side where different before and after the reform. There may be legal restrictions to cross the border, but a large number of Mexican nationals count with US travel documents that allow a high degree of mobility across the border. So, other reasons may explain the lack of evidence of increased shopping at the US side. From our analysis in the internal outcomes in Mexico, we showed that the reform led prices to increase but only by less than half of the full pass though counterfactual. So, prices increased after the VAT hike but not by much. This small price increase may not have been enough to push Mexican consumers to shift part of their consumption to the United States. In the cross-border shopping literature this situation would be in line with a price increase in a jurisdiction not being high enough to compensate for the costs of crossing to the neighboring jurisdiction. If this was the case, we could deduce that firms at the Mexican side of the border saw a menace in rising prices by a larger measure than they did, as the threat of loosing consumption to the United States side is always looming.

5.3   Robustness

We begin by describing the robustness tests that we perform on the outcomes related to workers' purchasing power. First, we test if the VAT hike had an effect on prices and labor outcomes in the sectors that are not subject to the VAT. These sectors do not receive the treatment in both the treatment and control areas. So, they resemble a placebo group that serves as a point of comparison with the treated group. Panel (a) of Figure A3 shows graphical evidence on the effect of the VAT hike on prices of goods in these sectors. The figure shows that the percent changes of prices among the treatment and controls areas are similar

before and after the reform, i.e., there is no jump in the log change in the treatment area at the time the reform takes place. This indicates that the reform did not have an effect on the prices of goods that are not subject to the VAT. Panel (b) of Figure A3 plots the δ_t parameters from the dynamic DiD. The figure confirms that the reform did not have an effect on these prices, as the coefficients are not statistically different from zero before and after the reform. In addition, Figure A4 shows that the VAT hike did not have an effect on the wages of workers employed in these sectors. The same is true for the level of employment, as shown in Figure A5. The static DiD estimates of these three outcomes are shown in Table A1. Coefficients in all specifications are not statistically different from zero. The results from these placebo tests give empirical support to the choice of our treatment and control areas under the difference-in-difference empirical strategy. In Panels (a) of Figure A3 (non treated prices) and Figure A4 (non treated wages) we see that, in the absence of treatment, the pre-treatment and the post-treatment differences are the same. So, the common trends assumption in which the difference-in-difference estimation relies is empirically supported. The extra post-treatment difference that we see in Panels (a) of Figure 3 (treated prices) and Figure 4 (treated wages) is caused by the VAT reform.

We also perform robustness tests with different treatment areas. In addition to our pre-ferred treatment area,[41] we perform the regressions with the following treatment areas: 1) municipalities where 75 percent or more of the population lives in the VAT discount zone, 2) municipalities where 95 percent or more of the population lives in this zone, 3) municipalities where 50 percent or more of the population lives in this zone, but excluding those where the majority of the population is located at a distance larger than 20 kilometers from the international frontiers. The first two groups are included to check if the population share cut-off that we choose affects our results.[42] The purpose of the third group is to exclude the places far from the international borders where the VAT had a discounted rate prior to 2014. As seen in Figure 1, some States where included completely in the VAT discount zone.

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[41]That is, municipalities where 50 percent or more of the population lives in the VAT discount zone, as in Figure 2.

[42]The municipalities included in each population share cut-off are shown in Figure A6.

Some municipalities in these States had a VAT discount rate, but were located far from the borders. The estimates from the static DiD equation (1) are shown in Table A2. Panel A shows our baseline treatment area. Panels B, C and D show the alternative treatment areas. The table shows that estimates of the effect of the VAT hike in the alternative treatment areas, do not differ significantly from our baseline treatment. This is true for all outcomes shown in the table: prices, wages, employment and payroll credits[43] Thus, our results are robust to different definitions of the treatment.

A different set of tests is related to the control area. We define two alternative control areas: 1) the municipalities that are "first degree neighbors" of the municipalities in the treatment area, i.e., the municipalities that are contiguous to those of the treatment area; 2) the municipalities that are "second degree neighbors" (those are contiguous to the first degree neighbors) plus the first degree neighbors. These areas are shown in Figure A7. The results from the static DiD estimator are shown in Table A3.[44] Panel A shows our baseline control area.[45] Panel B shows the results with the first alternative control area. The estimate of the effect on wages of workers employed in sectors subject to the VAT is negative but not statistically significant. Panel C shows the results with the second alternative control area. The wage estimate here remains negative and turns statistically significant at a 95 percent confidence level, but not at the 99 percent confidence level of our baseline control area. As shown in Figure A7, a large share of the municipalities that are adjacent to the treated municipalities have relatively small urban areas. Information from these sparsely populated municipalities tends to show large variations and missing observations, and this limits our ability to detect statistically significant effects.[46] This problem can be seen in

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[43]Panels B and C in Column (1) show no information because all the cities for which we have information on prices are located in municipalities where nearly all the population lives in the VAT hike area. So, estimates from Panel B and C are the same of Panel A.

[44]We focus on the labor outcomes for these robustness test because the cities for which we have price data are two few to divide among alternative control areas. This can be seen in Table A4. Panel B shows that no municipality in the first alternative control area has price information. Panel C shows that just four municipalities in the second alternative control area count with price information. On the other hand, as shown in Panel A, eleven municipalities in our baseline control area count with price information.

[45]That is, all municipalities in States at the international borders where zero percent of the population lives in the VAT discount zone, as shown in Figure 2.

[46]Table A4 shows the number of observations by outcome under our baseline control area and the alter-

Figure A8. The figure shows graphical evidence on the effect of the VAT hike on wages in sectors subject to the VAT under the alternative control groups. Panel (a) shows the evidence under the first alternative control area. The trends in the control area seem similar to that of the treatment area. However, they are quite jumpy and their confidence intervals are large. Panel (b) shows the graphical evidence under the second alternative control area. As the second degree neighbors are included, larger urban centers are included. Data from the large urban populations is more reliable, so the percent changes in Panel (b) are less volatile. Thus, the two alternative control areas appear to show common trends with the treatment area. However, data becomes more stable as we extend our control area to cover more municipalities in the States at the international borders. Indeed, when we include all municipalities in these States in the control (except for those in the VAT discount zone), we get the most stable data. Hence, we choose this latter set of municipalities as our preferred control area.

In addition, we perform robustness tests on the cross-border shopping side of our analysis. We start with the robustness tests on the sales tax revenues outcome. We use two alternative treatment areas for this outcome. First, we focus on the US cities that are directly placed at the international frontier. That is, we drop US cities that are in the 40 km BCC area but do not touch the international border. We do this to examine if the cross-border shopping effects are concentrated in the cities that lie directly at the border. Mexican shoppers may prefer to restrict their shopping to the US cities that lie at the border and not go further than that into the United States. Panel (a) of Figure A9 shows mean sales tax revenues across cities in this alternative treatment area compared to the control. We see no jumps around the time the reform took place. This coincides with the plot in panel (a) of Figure 10.[47] The

native control areas. Panel B shows the first alternative control area. Information for all outcomes is greatly reduced in this area. The number of municipalities with data are considerably smaller than those of Panel A, our baseline control specification. In addition, the data is less stable, as a grater share of municipalities count with information for less than half of the time periods we analyze. Panel C shows information under the second alternative control group. Compared to Panel B, the number of municipalities with data increases and they are more stable. However, data in the second control area is scarcer compared to our baseline control area in Panel A.

[47]Column (1) in Table A6 shows the static DiD estimates under this alternative treatment area. The coefficients are in all cases not statistically significant

second alternative treatment group is composed of the US cities in the 40 km BCC area that have a population of less than half the size of the closer Mexican city at Mexico's side of the border. We use this alternative treatment group to account for the fact that the US is a richer country than Mexico. So, we may not be able to detect the additional consumption of Mexican consumers in US cities due to the VAT hike due to the relatively larger size of consumption in the United States by US consumers. Focusing in relatively small US cities may solve this situation. Panel (b) of Figure A9 shows the mean sales tax revenues under this treatment group. Again, we do not see a jump around the reform took place.[48] So, the alternative treatment areas reinforce the lack of evidence of the VAT reform on sales tax revenues at the United States.

We also perform robustness tests on the land crossings outcome. We use different treatment groups to find if the result we get with our main treatment group (passengers that crossed the border by private vehicles) is maintained. The alternative treatment groups we chose may capture other channels through which Mexican shoppers cross to the United States. The first alternative treatment group is the number of passengers that crossed from Mexico to the United States by bus. The second alternative treatment group is the number of pedestrians that cross the border from Mexico into the United States. The third group is the number of vehicles that crossed into the US. Panels (a), (b) and (c) of Figure A10 show the dynamic DiD estimates from equation (2) under these alternative treatment groups, respectively. The results under the three groups resemble what we found with the baseline treatment group: the estimates are not statistically different form zero before or after the reform.[49]

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[48]Column (2) in Table A6 shows that the static DiD coefficients are in all cases not statistically significant.

[49]Table A7 shows the static DiD coefficients from equation (1). All coeffients are not statistically different from zero.

6 Conclusion

Let us close this research commenting on the main concerns of the groups that were against the VAT reform of 2013, and let us contrast these concerns with the findings in our research. First, probably the largest concern was the loss of demand the other side of the borders. In this research we have seen that there is no evidence of increased shopping on the United States' side of the border. So, it appears that this concern did not end up taking place. Most likely, the absence of cross-border shopping is related in part to Mexican firms' decision to limit the raise in prices. This brings us to another concern; the increase in inflation. In this research, we show that, if we focus on the goods subject to the VAT, the effect of the reform on prices is lasting. Prices do not return to their pre-reform conterfactual, at least in the two years that follow the reform. However, the increase of prices does not reach a complete pass-through. The size of the effect is about 1.6 percent. As point of comparison, the average growth of the CPI in the ten years prior to the reform was 4.2 percent. So the effect of the reform is about one third of the regular rate of growth of the CPI (but just in the goods that pay the VAT). This is probably not extremely worrying, but not insignificant. Finally, another big concern was related to the loss of employment. In this research we have seen that, although the reform had no effect on employment, it did have a negative effect on wages. The average annual growth of the nominal minimum wage in the ten years before the reform was 4.5 percent. Our estimates indicate that the effect of the reform was about minus two percent, i.e., half of the typical annual growth of the minimum wage. This is not a small amount.

So, our research supports previous literature with regards to the VAT having a casual effect on outcomes beyond prices. Labor outcomes and access to credit can also be affected by VAT reforms. Hence, increased revenues from VAT hikes should be weighted against pernicious effects on different social groups. In particular, in the context we study, we have shown that workers carried many negative consequences. We argue that this is likely due to the high degree of competition that firms at the border face vis-a-vis the neighboring jurisdiction. Evidently, under other contexts, the effects may have been distributed differently.

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Tables

Table 1: Number of municipalities with information in the treatment and control areas (by outcome)

	Share of time periods with non-missing obs.			Total
	<50 %	>50% & <100%	100 %	
	(1)	(2)	(3)	(4)
Panel A: Treatment Area				
Prices	0	0	8	8
	0%	*0%*	*100%*	*100%*
Labor outcomes	2	3	60	65
	3%	*5%*	*92%*	*100%*
Payroll credits				
Panel B: Control Area				
Prices	0	0	11	11
	0%	*0%*	*100%*	*100%*
Labor outcomes	29	57	337	423
	7%	*13%*	*80%*	*100%*
Payroll credits				

Note: This table shows the number of municipalities that have information for each of the following outcomes: prices, labor outcomes (wages and employment) and payroll credits. Column (1) shows the number of municipalities that have non-missing observations in less than half of the time periods in our sample. Column (2) shows the number of municipalities that have non-missing observations in more than half of the time periods. Column (3) shows the number of municipalities that have non-missing observations in all time periods. Column (4) shows the number of municipalities that have a non-missing observation in at least one time period, i.e., the sum of (1), (2) and (3). In column (1), the numbers in *italics* show the municipalities that have non-missing observations in less than half of the time periods, as a share of the municipalities that have a non-missing observation in at least one time period, i.e., (1)/(4). The same reasoning applies to numbers in *italics* in columns (2), (3) and (4). The municipalities in the treatment and control areas are shown in Figure 2.

Table 2: Effect of the VAT hike on prices and labor outcomes – Static difference-in-differences

outcome in logs...	Prices	Wages	Employment
	(1)	(2)	(3)
Without time dummies and controls			
Coefficient	0.016***	-0.021***	0.007
	(0.003)	(0.007)	(0.025)
	0.009 - 0.022	-0.035 - -0.006	-0.042 - 0.055
Including time dummies			
Coefficient	0.016***	-0.021***	0.007
	(0.003)	(0.007)	(0.025)
	0.009 - 0.023	-0.035 - -0.006	-0.042 - 0.055
Including time dummies and controls			
Coefficient	0.016***	-0.019***	0.011
	(0.003)	(0.006)	(0.016)
	0.009 - 0.023	-0.032 - -0.006	-0.020 - 0.043
Observations	304	7,299	7,299

Note: This table shows δ estimates from equation (1) for the price and labor outcomes. Column (1) refers to the mean price of goods subject to the VAT. Column (2) refers to the mean wage of workers in sectors whose final goods are subject to the VAT. Column (3) refers to the level of employment in in sectors whose final goods are subject to the VAT. Municipality level control variables are: the unemployment rate, the percent of the total workforce employed in the formal sector, the total number of firms operating in a fixed address (public and private). The treatment and control groups are those that are shown in Figure 2. Standard errors shown in brackets. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Table 3: Effect of the VAT hike on credits – Static difference-in-differences

outcome in logs...	Number of Credits (1)	Avg. Amount of Credits (2)	Interest Rate (3)
Panel A: Payroll Credits			
Without time dummies and controls			
Coefficient	-0.111***	-0.011	0.002
	(0.015)	(0.010)	(0.004)
	-0.141 - -0.082	-0.030 - 0.008	-0.006 - 0.010
Including time dummies			
Coefficient	-0.153***	0.003	0.002
	(0.022)	(0.013)	(0.004)
	-0.196 - -0.110	-0.022 - 0.028	-0.005 - 0.010
Including time dummies and controls			
Coefficient	-0.111***	-0.006	0.000
	(0.022)	(0.015)	(0.006)
	-0.154 - -0.068	-0.035 - 0.023	-0.012 - 0.013
Observations	7,236	7,236	7,236
Panel B: Personal Credits			
Including time dummies and controls			
Coefficient	0.082	-0.070	-0.027
	(0.085)	(0.048)	(0.024)
	-0.086 - 0.250	-0.164 - 0.023	-0.073 - 0.020
Observations	7,192	7,192	7,192

Note: This table shows δ estimates from equation (1) for the price and labor outcomes. Column (1) refers to the number of new payroll credits. Column (2) refers to the interest rate of new payroll credits. Column (3) refers to the average amount of the new payroll credits. Panel A refers to payroll credits, i.e. credits whose payments are discounted directly from workers' payrolls. Panel B refers to personal credits, i.e. credits granted to individuals by financial institutions whose payments are not discounted from a worker's payroll. Municipality level control variables are: the unemployment rate, the percent of the total workforce employed in the formal sector, the total number of firms operating in a fixed address (public and private), the number of branches of financial institutions, the number of active credit cards. The treatment and control groups are those that are shown in Figure 2. Standard errors shown in brackets. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Table 4: Effect of the VAT hike on durable goods credits – Static difference-in-differences

outcome in logs...	Number of Credits (1)	Avg. Amount of Credits (2)	Interest Rate (3)
Without time dummies and controls			
Coefficient	-0.119***	-0.033	0.000
	(0.045)	(0.026)	(0.008)
	-0.207 - -0.030	-0.085 - 0.018	-0.015 - 0.015
Including time dummies			
Coefficient	-0.178***	-0.012	-0.013
	(0.064)	(0.036)	(0.017)
	-0.305 - -0.051	-0.083 - 0.059	-0.046 - 0.020
Including time dummies and controls			
Coefficient	-0.191**	-0.044	-0.006
	(0.074)	(0.036)	(0.017)
	-0.338 - -0.044	-0.115 - 0.026	-0.039 - 0.028
Observations	1,754	1,754	1,754

Note: This table shows δ estimates from equation (1) for durable goods credits, i.e., credits that are awarded with the specific purpose to buy durable goods. Column (1) refers to the number of new durable goods credits. Column (2) refers to the interest rate of new durable goods credits. Column (3) refers to the average amount of the new durable goods credits. Municipality level control variables are: the unemployment rate, the percent of the total workforce employed in the formal sector, the total number of firms operating in a fixed address (public and private), the number of branches of financial institutions, the number of active credit cards. The treatment and control groups are those that are shown in Figure 2. Standard errors shown in brackets. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Table 5: Effect of the VAT hike on sales tax revenues and border crossings – Static difference-in-differences

outcome in logs...	Sales Tax Revenues (1)	Border Crossings (2)
Without time dummies		
Coefficient	0.319	-0.136
	(0.308)	(0.117)
	-0.286 - 0.924	-0.378 - 0.107
Including time dummies		
Coefficient	0.171	-0.136
	(0.302)	(0.118)
	-0.422 - 0.765	-0.378 - 0.107
Observations	2,064	2,169

Note: This table shows δ estimates from equation (1) for the United States outcomes. Column (1) refers to the mean sales tax revenues in the United States southern border. Column (2) refers to land crossings from Mexico to the United States. The treatment and control groups for the sales tax revenues outcome is shown in Figure 9. For the land crossings outcome, the treatment group is the number of passengers that crossed by private vehicles. The control group is the number of containers that crossed by tucks. Standard errors shown in brackets. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Figures

Figure 1: VAT discount area on year 2013

Note: This figure shows the geographic areas subject to the VAT discount rate on year 2013.
Sources: Value Added Tax Law (last reform: December 7th, 2009), and *Marco Geoestadístico* from *Instituto Nacional de Estadística y Geografía* (INEGI).

Figure 2: Treatment and control areas

Note: This figure shows the treatment an control municipalities in our estimation strategy.
Sources: *Marco Geoestadístico* from *Instituto Nacional de Estadística y Geografía* (INEGI).

Figure 3: Graphical evidence on the effect of the Value Added Tax hike on prices of goods subject to the VAT
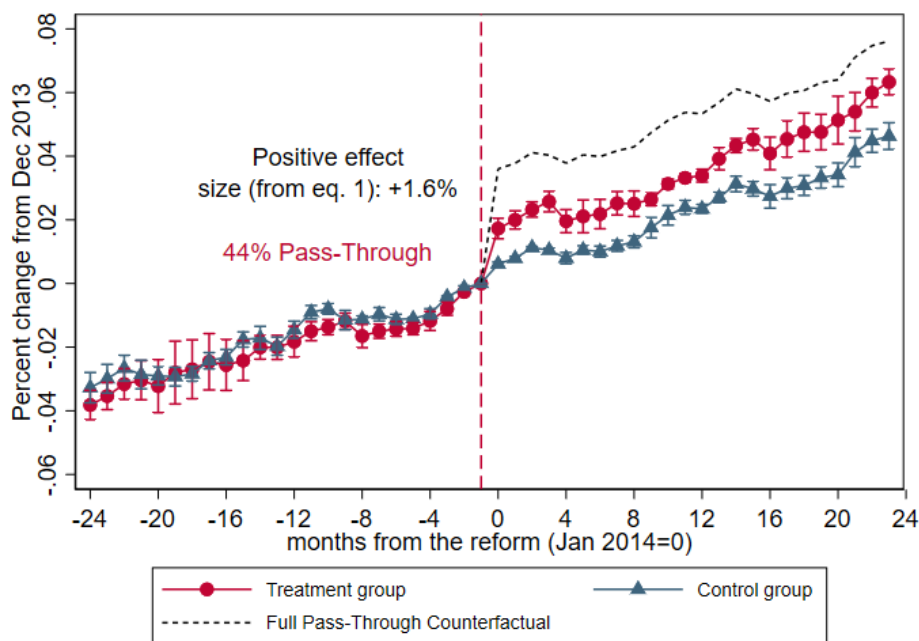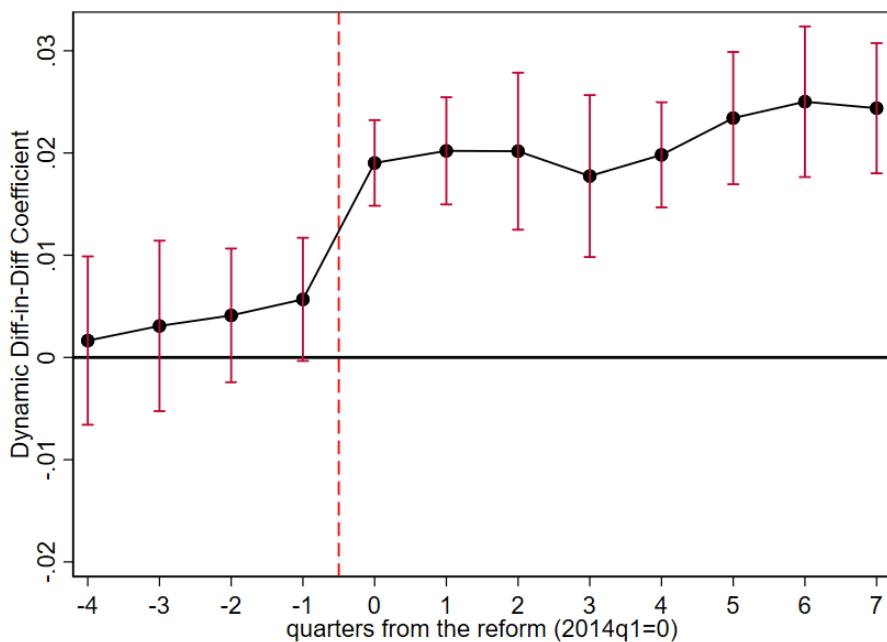
(a) Log change

(b) Dynamic DiD

Note: Panel (a) of this figure shows the log difference of the mean price of products and services subject to the VAT. The difference is taken with respect to December 2013, i.e., the last period before the VAT hike took place. The means are taken at the municipality level across treatment and control areas. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the mean price of goods and products subject to the VAT at the municipality level. Treatment and control areas are shown in Figure 2.

Sources: *Índice Nacional de Precios al Consumidor* database collected by *Instituto Nacional de Estadística y Geografía* (INEGI).

Figure 4: Graphical evidence on the effect of the VAT hike on wages in sectors subject to the VAT

(a) Log change

(b) Dynamic DiD


Note: Panel (a) of this figure shows the log difference of the mean wage of workers in sectors whose final products are subject to the VAT. The difference is taken with respect to December 2013, i.e., the last period before the VAT hike took place. The means are taken at the municipality level across treatment and control areas. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the mean wage of workers in sectors whose final products are subject to the VAT at the municipality level. Treatment and control areas are shown in Figure 2.

Sources: *Asegurados* database collected by *Instituto Mexicano del Seguro Social (IMSS)*.

Figure 5: Price and wage across treatment and control areas

(a) Prices
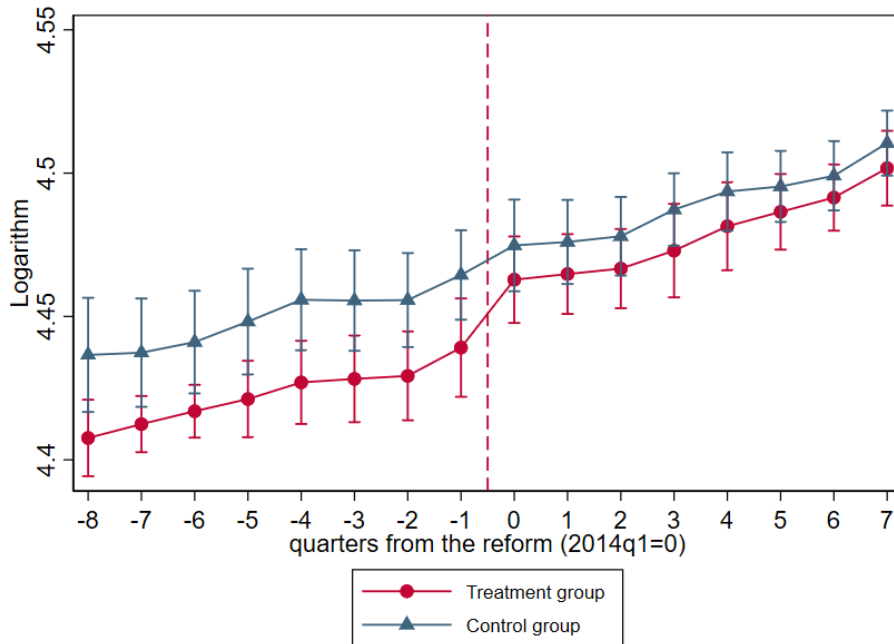
(b) Wages
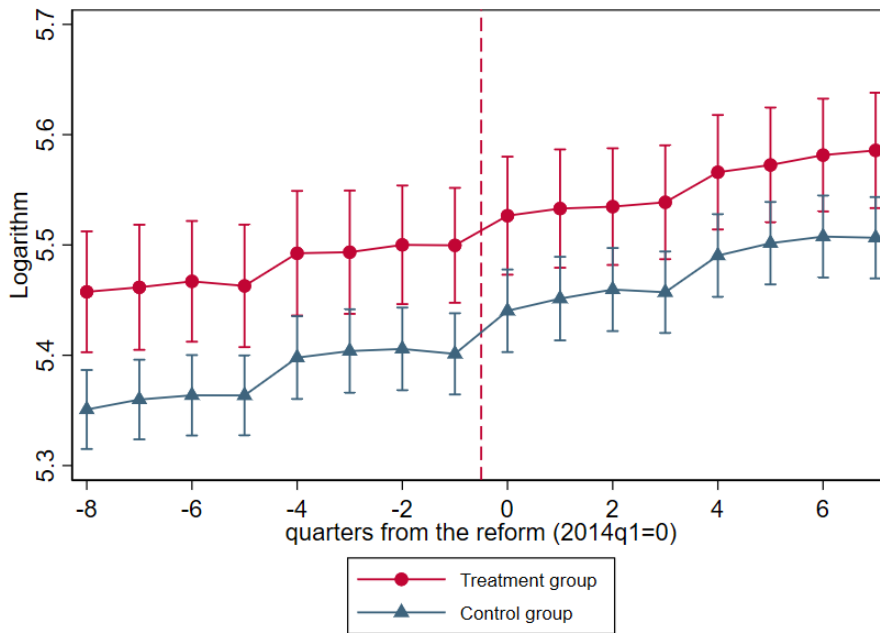
Note: Panel (a) shows logarithm of the mean price of products and services subject to the VAT. Panel (a) shows logarithm of the mean wage of workers employed in sectors whose final products are subject to the VAT. The means are taken at the municipality level across treatment and control areas. Treatment and control areas are shown in Figure 2.

Sources: *Índice Nacional de Precios al Consumidor* database collected by *Instituto Nacional de Estadística y Geografía* (INEGI).

Figure 6: Effect of the VAT hike on employment in sectors subject to the VAT

(a) Log change
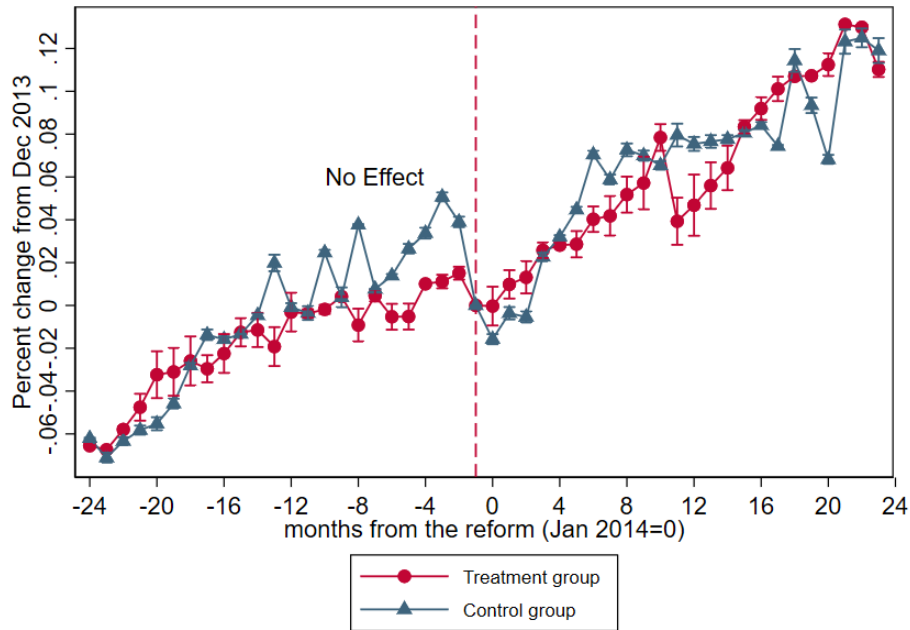
(b) Dynamic DiD

Note: Note: Panel (a) of this figure shows the log difference of the mean number of employees in sectors whose final products are subject to the VAT. The difference is taken with respect to December 2013, i.e., the last period before the VAT hike took place. The means are taken at the municipality level across treatment and control areas. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the mean number of employees in sectors whose final products are subject to the VAT at the municipality level. Treatment and control areas are shown in Figure 2.

Sources: *Asegurados* database collected by *Instituto Mexicano del Seguro Social (IMSS)*.

Figure 7: Effect of the VAT hike on new payroll credits

(a) Number of credits
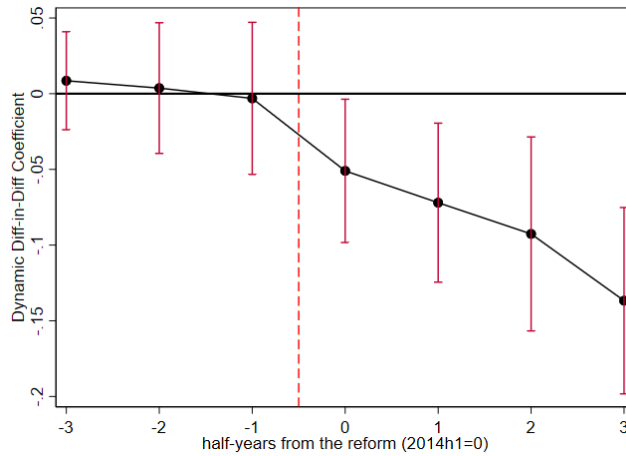
(b) Average credit amount
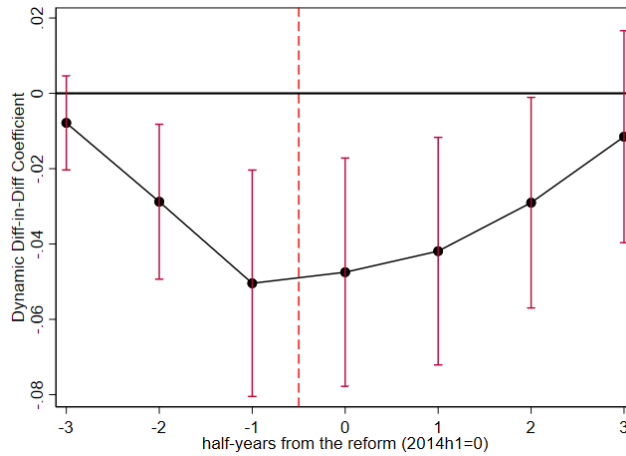
(c) Average credit interest rate
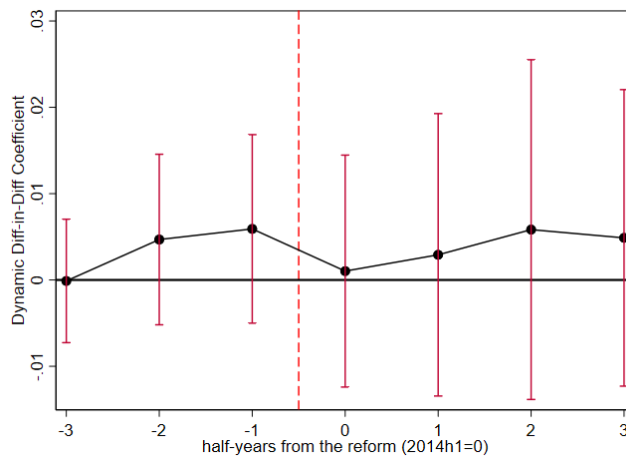
Note: This figure plots the estimates of parameters δ_t from equation (2). The outcomes are the logarithm of: (a) the mean new number of payroll credits granted in period t, (b) the mean average amount of the new payroll credits granted in period t, and (c) the mean interest rate of the new payroll credits granted in period t. Means are taken at the municipality level. Treatment and control areas are shown in Figure 2. Sources: *Créditos al Consumo no Revolvente* database collected by *Comisión Nacional Bancaria y de Valores* (CNBV).

Figure 8: Effect of the VAT hike on the number of credits to purchase durable goods at Mexico's northern border
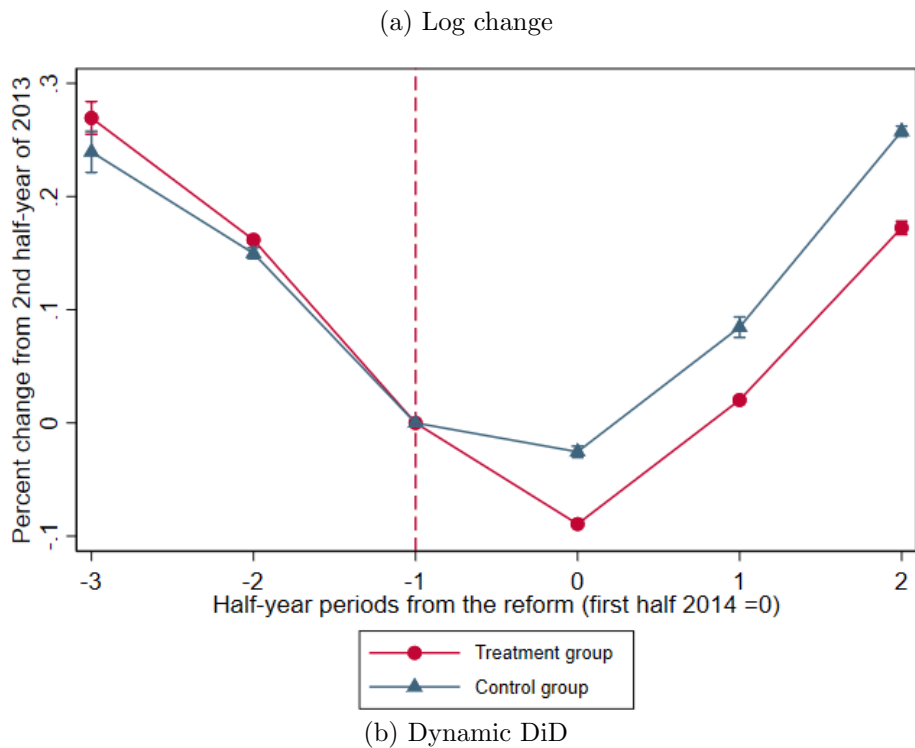
(a) Log change

(b) Dynamic DiD

Note: Panel (a) of this figure shows the log difference of the mean number of new credits granted to buy durable goods at period t. The difference is taken with respect to the second half-year of 2013, i.e., the last period before the VAT hike took place. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the mean number of new credits granted to buy durable goods at period t at the municipality level. Treatment and control areas are shown in Figure 2.

Sources: *Créditos al Consumo no Revolvente* database collected by *Comisión Nacional Bancaria y de Valores* (CNBV).
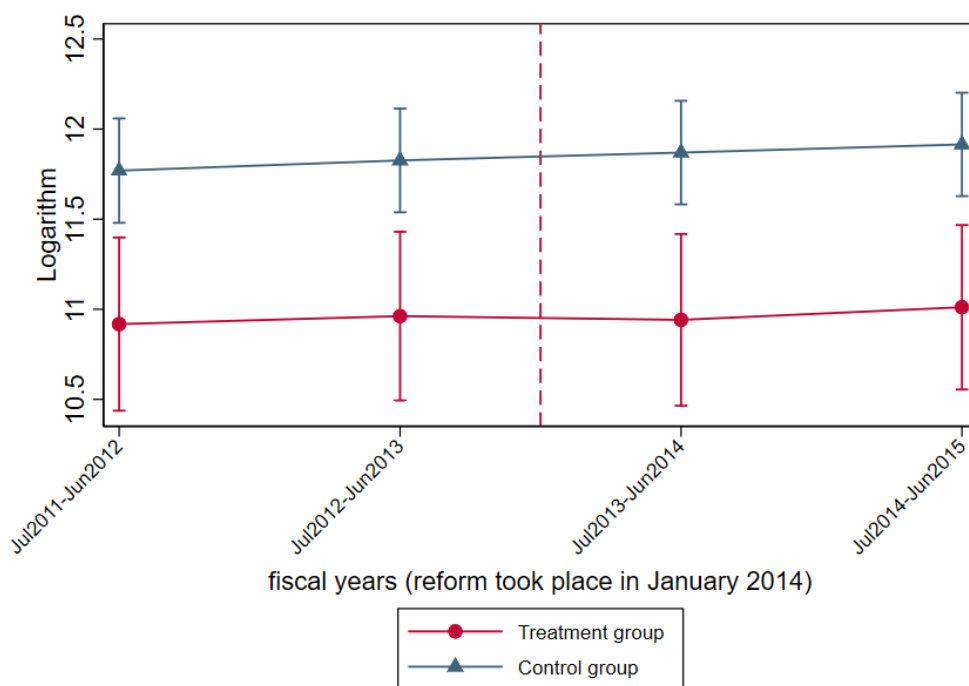
Figure 9: Treatment and control areas - sales tax revenues outcome (United States)
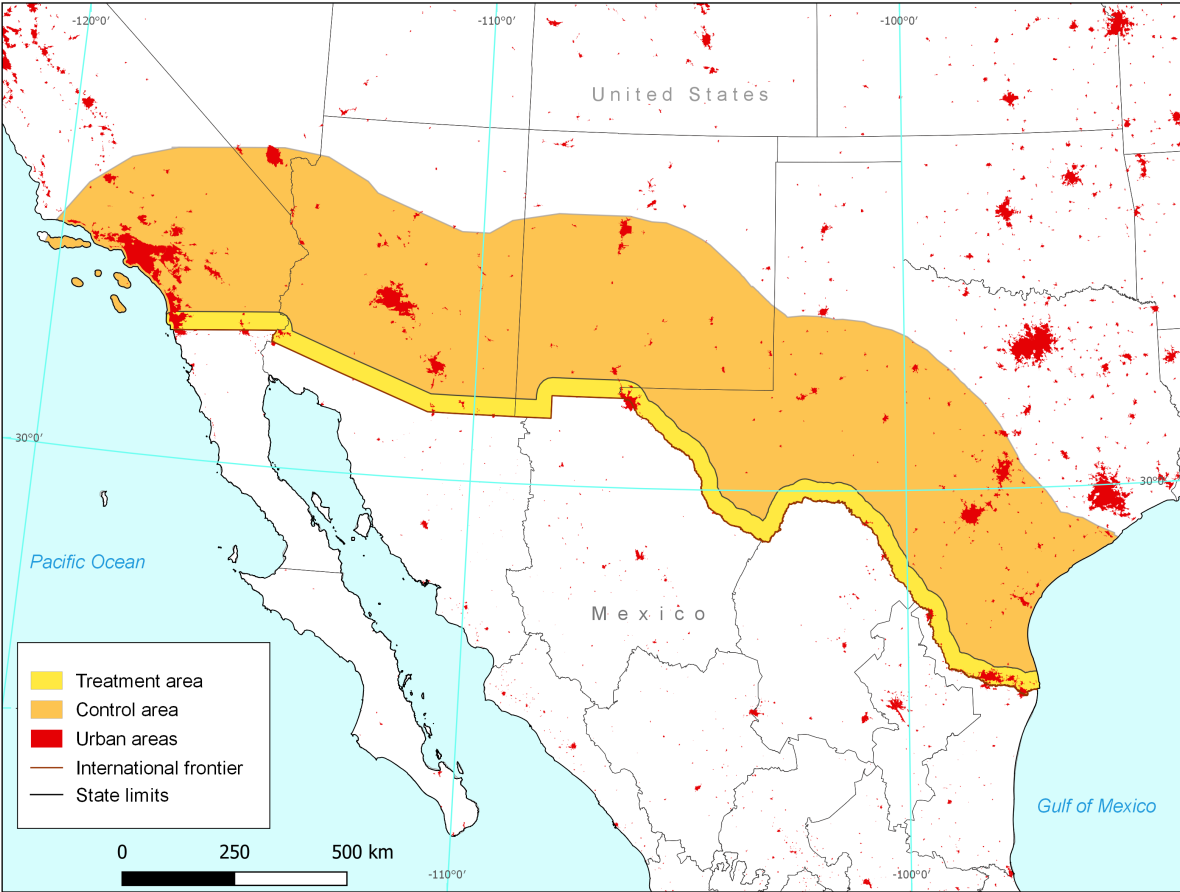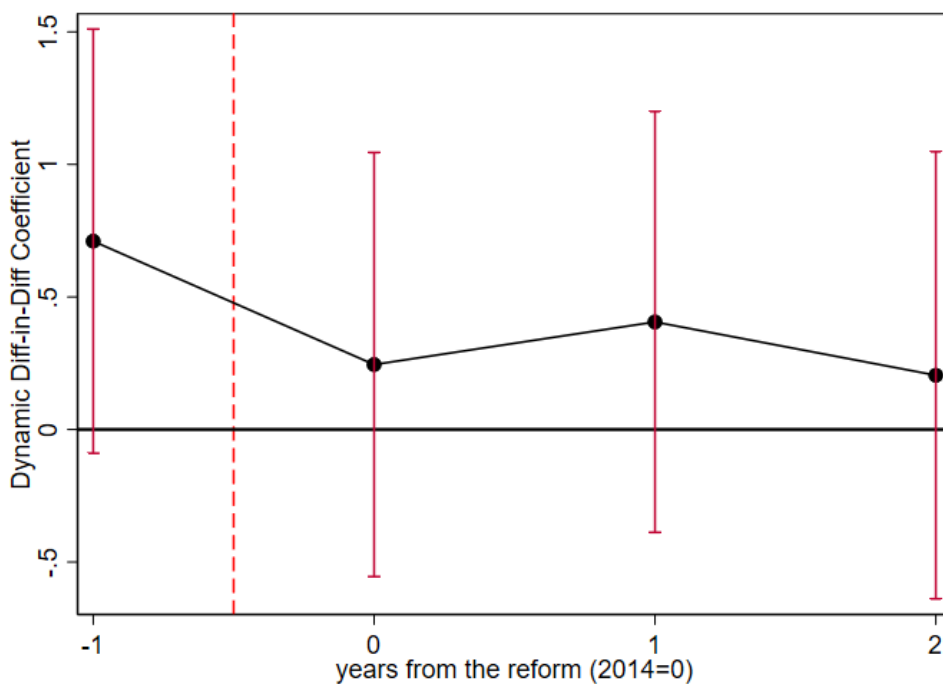

Note: This figure shows the treatment and control areas that we use to analyze the sales tax revenues outcome at the United States.
Sources: TIGER/Line Shapefiles from United States Census Bureau.

Figure 10: Effect of the VAT hike on sales tax revenues at the United States' southern border

(a) Logarithm

fiscal years (reform took place in January 2014)

● — Treatment group
▲ — Control group

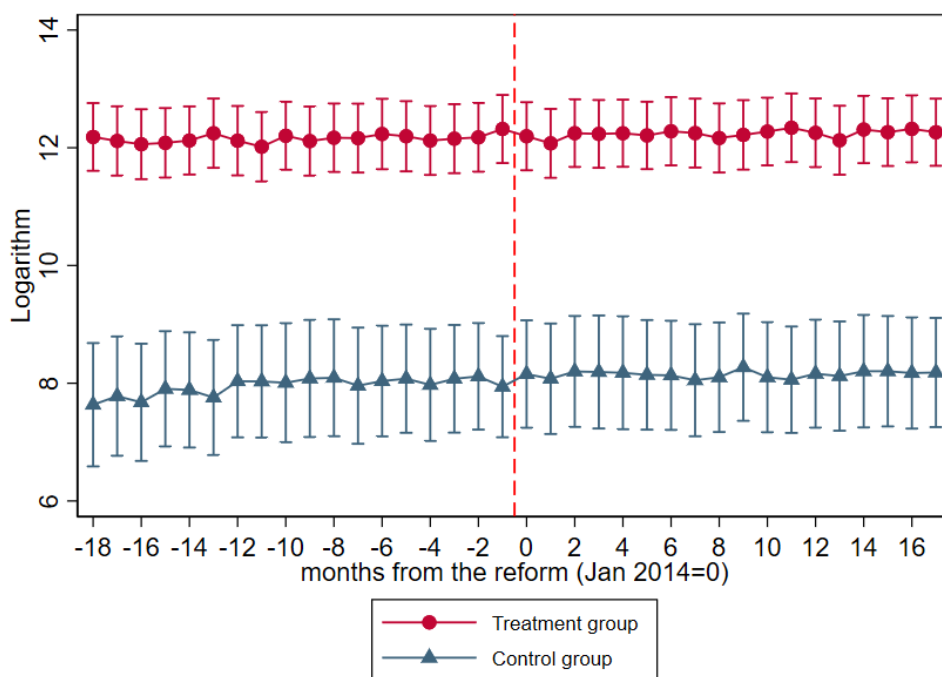(b) Dynamic DiD

years from the reform (2014=0)

Note: Panel (a) of this figure shows the logarithm of the mean sales tax revenues at the United States southern border. The means are taken at the city level across treatment and control areas. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the mean sales tax revenues at the city level. Treatment and control areas are shown in Figure 9.
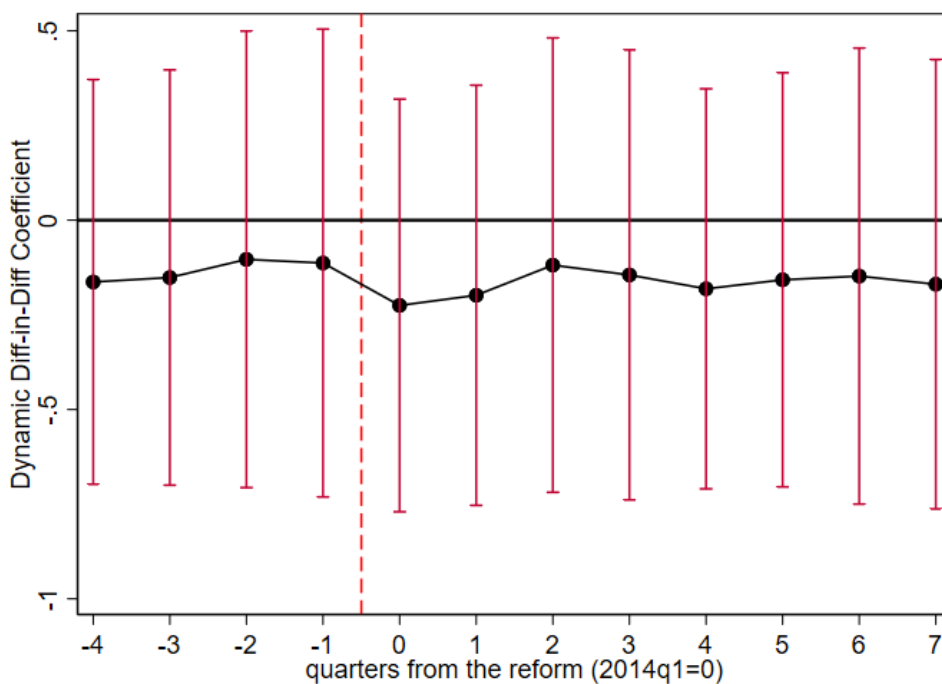Sources: Annual Survey of State and Local Government Finances dataset from the United States Census Bureau.

Figure 11: Effect of the VAT hike on land border crossings from Mexico to the United States

(a) Logarithm

(b) Dynamic DiD

Note: Panel (a) of this figure shows the logarithm of the mean land crossings from Mexico to the United States. The means are taken at the port of entry level. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the mean land crossings from Mexico to the United States at the port of entry level. The treatment group is the number of passengers that crossed by private vehicles. The control group is the number of containers that crossed by tucks.

Sources: Border Crossing/Entry dataset from the Bureau of Transportation Statistics.

A   Appendix: Additional Tables and Graphs

Table A1: Effect of the VAT hike on prices and labor outcomes in sectors that are not subject to the VAT – Static difference-in-differences

outcome in logs...	Prices (1)	Wages (2)	Employment (3)
Without time dummies and controls			
Coefficient	0.001	-0.005	0.024
	(0.004)	(0.009)	(0.023)
	-0.007 - 0.010	-0.022 - 0.012	-0.021 - 0.068
Including time dummies			
Coefficient	0.001	-0.005	0.024
	(0.004)	(0.009)	(0.023)
	-0.008 - 0.010	-0.022 - 0.012	-0.021 - 0.068
Inlcuding time dummies and controls			
Coefficient	0.002	-0.002	0.004
	(0.004)	(0.009)	(0.016)
	-0.007 - 0.010	-0.020 - 0.016	-0.026 - 0.035
Observations	304	6,680	6,680

Note: This table shows δ estimates from equation (1) for the price and labor outcomes. Column (1) refers to the mean price of goods not subject to the VAT. Column (2) refers to the mean wage of workers in sectors whose final goods are not subject to the VAT. Column (3) refers to the level of employment in in sectors whose final goods are not subject to the VAT. Municipality level control variables are: the unemployment rate, the percent of the total workforce employed in the formal sector, the total number of firms operating in a fixed address (public and private). The treatment and control groups are those that are shown in Figure 2. Standard errors shown in brackets. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Table A2: Alternative treatment areas – Static difference-in-differences

outcome in logs...	Prices (1)	Wages (2)	Employment (3)	Payroll Credits (4)
Panel A. >=50% pop share in VAT discount zone				
Coefficient	0.016***	-0.019***	0.011	-0.111***
	(0.003)	(0.006)	(0.016)	(0.022)
	0.009 - 0.023	-0.032 - -0.006	-0.020 - 0.043	-0.154 - -0.068
Observations	304	7,299	7,299	7,236
Panel B. >=75% pop share in VAT discount zone				
Coefficient		-0.021***	0.011	-0.112***
		(0.006)	(0.016)	(0.022)
		-0.033 - -0.008	-0.020 - 0.042	-0.155 - -0.069
Observations		7,204	7,204	7,166
Panel C. >=95% pop share in VAT discount zone				
Coefficient		-0.023***	0.021	-0.115***
		(0.006)	(0.015)	(0.023)
		-0.035 - -0.011	-0.009 - 0.050	-0.161 - -0.070
Observations		7,093	7,093	7,068
Panel D. >=50% pop share in 20 km strip				
Coefficient	0.018***	-0.021***	0.007	-0.108***
	(0.003)	(0.007)	(0.018)	(0.025)
	0.012 - 0.024	-0.035 - -0.007	-0.029 - 0.044	-0.156 - -0.059
Observations	288	7,012	7,012	6,998

Note: This table shows δ estimates from equation (1) under the specification that includes time dummies and controls. Panel A shows estimates from our baseline treatment area, i.e. municipalities where 50% of the population or more lives in the VAT discount zone. Panel B includes municipalities where 75% of the population or more lives in the VAT discount zone. Panel C includes municipalities where 95% of the population or more lives in the VAT discount zone. Panel D includes municipalities where 50% of the population lives at a distance of less than 20 km from the international borders. Column (1) refers to the mean price of goods subject to the VAT. Column (2) refers to the mean wage of workers in sectors whose final goods are subject to the VAT. Column (3) refers to the level of employment in in sectors whose final goods are subject to the VAT. Column (4) refers to the number of new payroll credits. Municipality level control variables are: the unemployment rate, the percent of the total workforce employed in the formal sector, the total number of firms operating in a fixed address (public and private); and in the case of payroll credits the former plus: the number of branches of financial institutions, the number of active credit cards. The control area is the one shown in Figure 2. Standard errors shown in brackets. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Table A3: Alternative control areas – Static difference-in-differences

outcome in logs...	Wages (1)	Employment (2)
Panel A. Municipalities in States at the int. borders (except for the treated)		
Coefficient	-0.021***	0.007
	(0.007)	(0.025)
	-0.035 - -0.006	-0.042 - 0.055
Observations	7,299	7,299
Panel B. 1st degree neighbors of the treated municipalities		
Coefficient	-0.013	-0.017
	(0.028)	(0.067)
	-0.068 - 0.043	-0.149 - 0.116
Observations	1,596	1,596
Panel C. 1st and 2nd degree neighbors of the treated municipalities		
Coefficient	-0.024**	0.049
	(0.011)	(0.036)
	-0.047 - -0.002	-0.021 - 0.120
Observations	2,620	2,620

Note: This table shows δ estimates from equation (1). Panel A shows estimates from our baseline control area, i.e. al municipalities in States at the international borders where 0% of the population lives in the VAT discount zone. Panel B includes the "1st degree neighbors", i.e. the municipalities contiguous those of the treatment area. Panel C includes the "2nd degree neighbors" (municipalities contiguous to the 1st degree neighbors) plus the 1st degree neighbors. Column (1) refers to the mean wage of workers in sectors whose final goods are subject to the VAT. Column (2) refers to the level of employment in in sectors whose final goods are subject to the VAT. The treatment area is the one shown in Figure 2. Standard errors shown in brackets. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Table A4: Number of municipalities with information in the alternative control areas (by outcome)

	Share of time periods with non-missing obs.			Total
	<50 %	>50% & <100%	100 %	
	(1)	(2)	(3)	(4)
Panel A: Municipalities in States at int borders (except treated)				
Prices	0	0	11	11
	0%	*0%*	*100%*	*100%*
Labor outcomes	29	57	337	423
	7%	*13%*	*80%*	*100%*
Payroll credits				
Panel B: 1st degree neighbors of treated municipalities				
Prices	0	0	0	0
	0%	*0%*	*0%*	*0%*
Labor outcomes	5	3	33	41
	12%	*7%*	*80%*	*100%*
Payroll credits				
Panel C: 1st and 2nd degree neighbors of treated municipalities				
Prices	0	0	4	4
	0%	*0%*	*100%*	*100%*
Labor outcomes	10	12	88	110
	9%	*11%*	*80%*	*100%*
Payroll credits				

Note: This table shows the number of municipalities that have information for each of the following outcomes: prices, labor outcomes (wages and employment) and payroll credits. Column (1) shows the number of municipalities that have non-missing observations in less than half of the time periods in our sample. Column (2) shows the number of municipalities that have non-missing observations in more than half of the time periods. Column (3) shows the number of municipalities that have non-missing observations in all time periods. Column (4) shows the number of municipalities that have a non-missing observation in at least one time period, i.e., the sum of (1), (2) and (3). In column (1), the numbers in *italics* show the municipalities that have non-missing observations in less than half of the time periods, as a share of the municipalities that have a non-missing observation in at least one time period, i.e., (1)/(4). The same reasoning applies to numbers in *italics* in columns (2), (3) and (4). Panel A shows our baseline control area (shown in Figure 2). Panels B and C show the municipalities in the alternative control areas (shown in Figure A7).

Table A5: Number of municipalities with information in the northern and southern borders (by outcome)

	Share of time periods with non-missing obs.			Total	Share of time periods with non-missing obs.			Total
	<50%	>50% & <100%	100%		<50%	>50% & <100%	100%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:								
Northern Border	**Treatment Area**				**Control Area**			
Prices	0	0	6	6	0	0	8	8
	0%	*0%*	*100%*	*100%*	*0%*	*0%*	*100%*	*100%*
Labor outcomes	0	0	37	37	10	18	184	212
	0%	*0%*	*100%*	*100%*	*5%*	*8%*	*87%*	*100%*
Payroll credits								
Panel B:								
Southern Border	**Treatment Area**				**Control Area**			
Prices	0	0	2	2	0	0	3	3
	0%	*0%*	*100%*	*100%*	*0%*	*0%*	*100%*	*100%*
Labor outcomes	2	3	23	28	19	39	153	211
	7%	*11%*	*82%*	*100%*	*9%*	*18%*	*73%*	*100%*
Payroll credits								

Note: This table shows the number of municipalities that have information for each of the following outcomes: prices, labor outcomes (wages and employment) and payroll credits. Columns (1) and (5) show the number of municipalities that have non-missing observations in less than half of the time periods in our sample. Columns (2) and (6) show the number of municipalities that have non-missing observations in more than half of the time periods. Columns (3) and (7) show the number of municipalities that have non-missing observations in all time periods. Columns (4) and (8) show the number of municipalities that have a non-missing observation in at least one time period, i.e., the sum of (1), (2) and (3), or (5), (6) and (7), respectively. In columns (1) and (5), the numbers in *italics* show the municipalities that have non-missing observations in less than half of the time periods, as a share of the municipalities that have a non-missing observation in at least one time period, i.e., (1)/(4) or (5)/(8). The same reasoning applies to numbers in *italics* in columns (2), (3), (4), (6), (7) and (8). Panel A concerns the municipalities in the northern border, and Panel B concerns those of the southern border as shown in Figure 2.

Table A6: Alternative treatment areas for the sales tax revenues outcome – Static difference-in-differences

outcome in logs...	Cities at the Border (1)	Small Cities (2)
Without time dummies		
Coefficient	-0.936	-0.958
	(0.580)	(0.615)
	-2.074 - 0.201	-2.164 - 0.248
Including time dummies		
Coefficient	-0.942	-0.944
	(0.582)	(0.620)
	-2.083 - 0.198	-2.160 - 0.273
Observations	1,942	1,895

Note: This table shows δ estimates from equation (1) for the sales tax revenues at the United States outcome under alternative treatment groups. In column (1), the treatment group is composed of US cities that lie directly at the Mexico-US international border. In column (2) the treatment group is composed of US cities located as less than 40km from the international border that are less than half the size of the closest Mexican city across the border. The control group is shown in Figure 9. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Table A7: Alternative treatment areas for the border crossings outcome – Static difference-in-differences

	Bus Passengers	Pedestrians	Vehicles
outcome in logs...			
	(1)	(2)	(3)
Without time dummies			
Coefficient	-0.292	-0.232	-0.142
	(0.253)	(0.141)	(0.116)
	-0.817 - 0.232	-0.522 - 0.058	-0.382 - 0.098
Including time dummies			
Coefficient	-0.293	-0.232	-0.142
	(0.254)	(0.141)	(0.116)
	-0.819 - 0.233	-0.523 - 0.058	-0.382 - 0.099
Observations	1,804	2,177	2,169

Note: This table shows δ estimates from equation (1) for the border crossings outcome under alternative treatment groups. In column (1) the treatment group is the number of passengers that crossed by bus. In column (2) the treatment group is the number of pedestrians that crossed the border. In column (3) the treatment group is the number of vehicles that crossed the border. The control group in all cases is the number of containers that crossed by tucks. Confidence intervals shown below standard errors. Stars show significance at the ***1% and **5% levels.

Figure A1: Effect of the VAT hike on new personal credits

(a) Number of credits
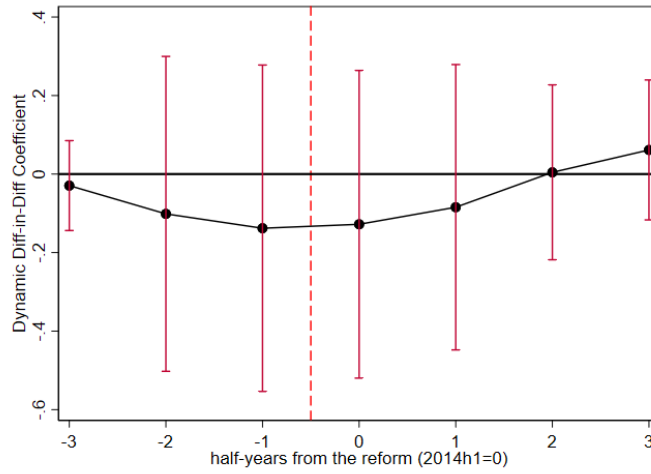
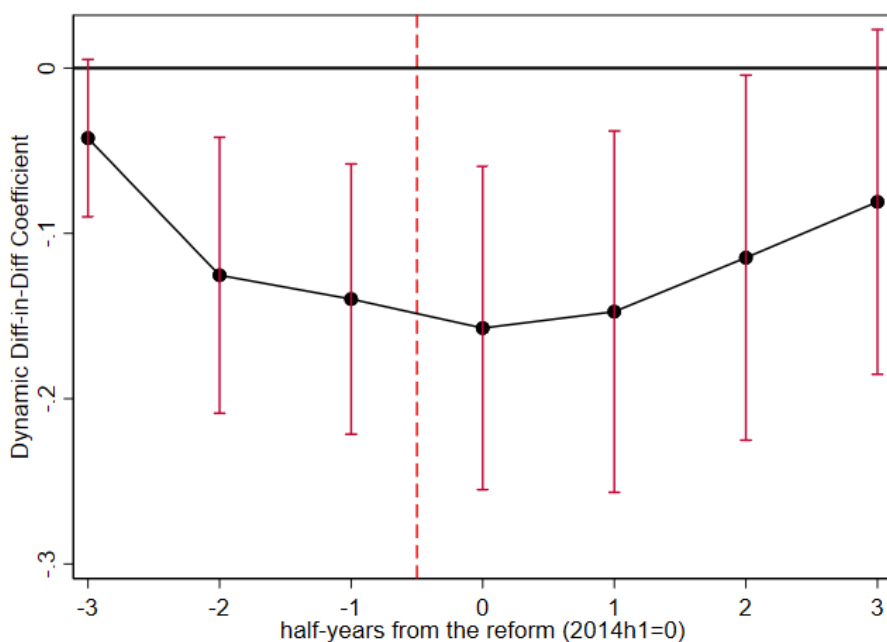(b) Average amount of the credits
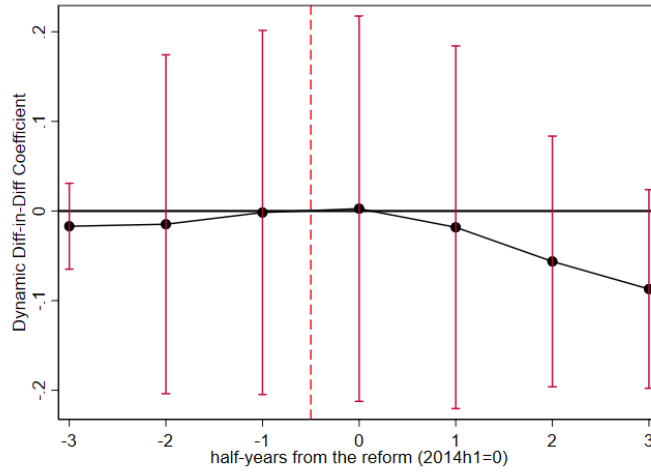
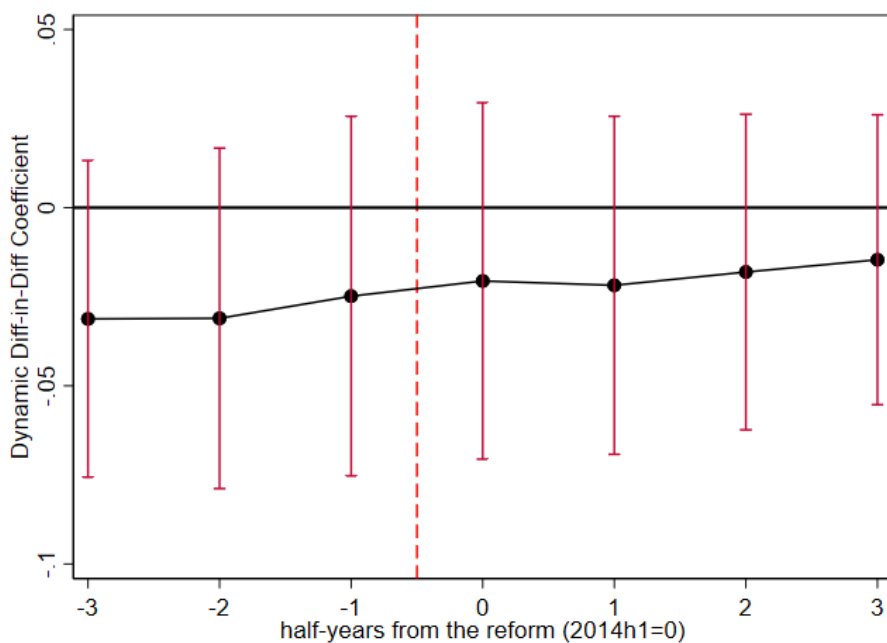(c) Average interest rate of the credits
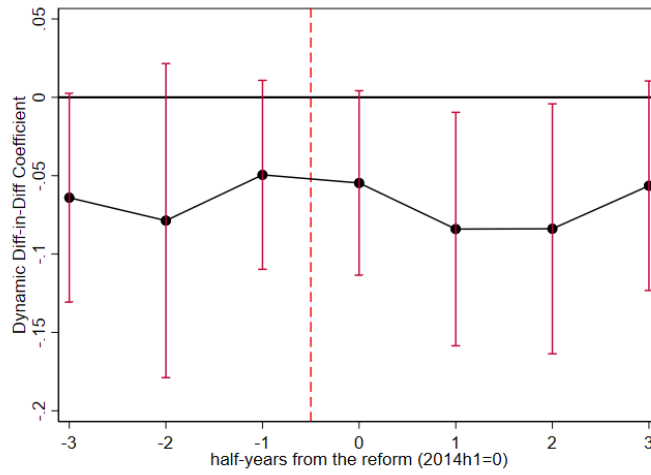
Note: This figure shows the effect of the VAT hike that took place in January 2014 on new personal credits. The figure plots the estimates of parameters δ_t from equation (2) for a given time t.
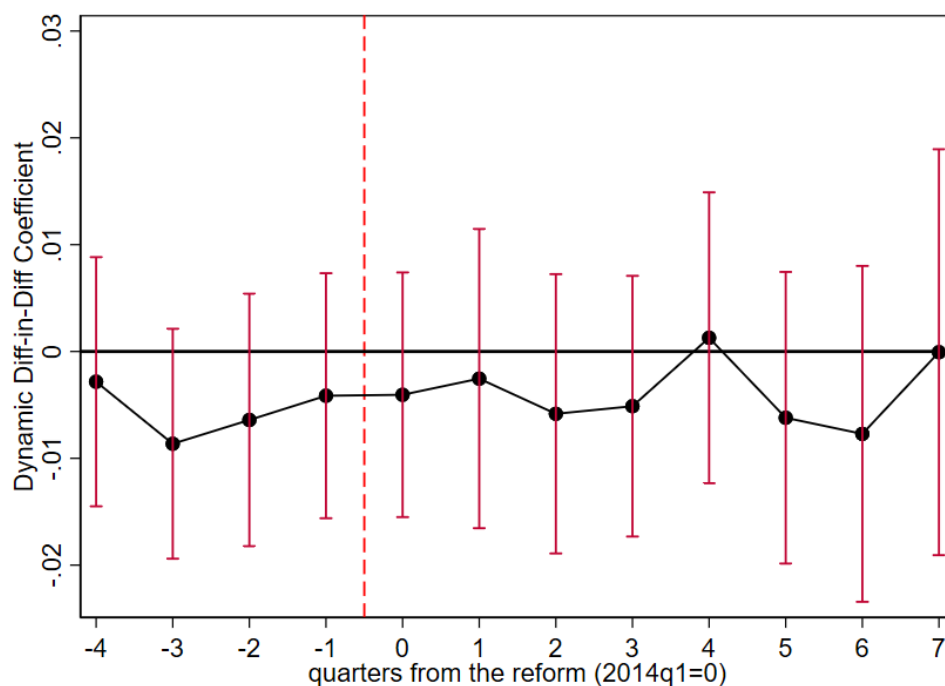Sources: *Créditos al Consumo no Revolvente* database collected by *Comisión Nacional Bancaria y de Valores* (CNBV).

Figure A2: Effect of the VAT hike on credits to purchase durable goods (additional graphs)

(a) Average credit amount

(b) Average credit interest rate

Note: This figure plots the estimates of parameters δ_t from equation (2). The outcomes are the logarithm of: (a) the mean average amount of the new durable goods credits granted in period t, and (c) the mean interest rate of the new durable goods credits granted in period t. Means are taken at the municipality level. Treatment and control areas are shown in Figure 2.
Sources: *Créditos al Consumo no Revolvente* database collected by *Comisión Nacional Bancaria y de Valores* (CNBV).

Figure A3: Effect of the VAT hike on prices of goods not subject to the VAT

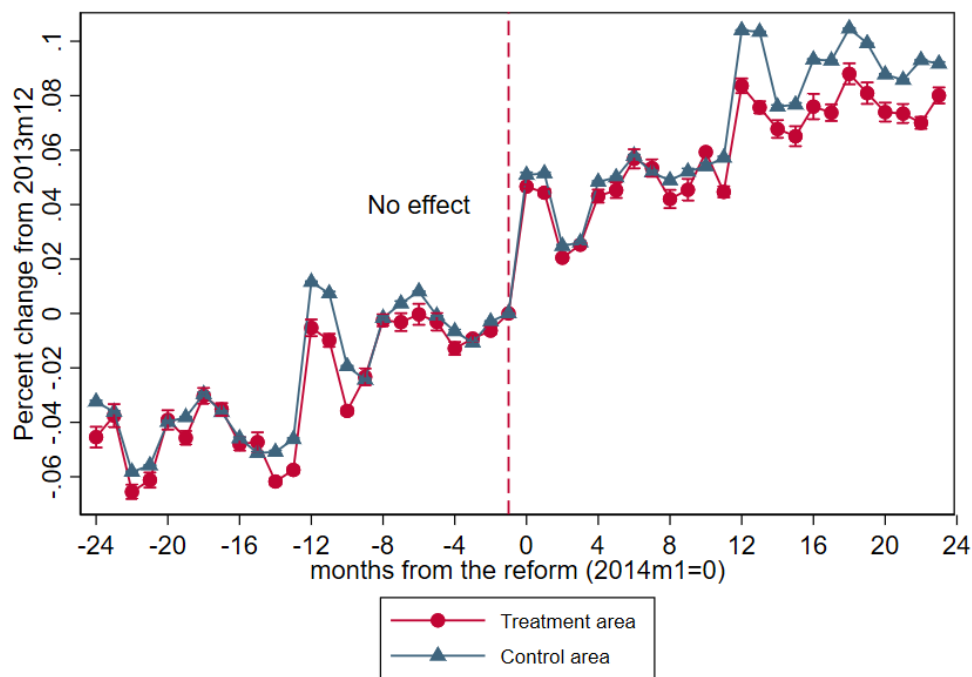## (a) Log change

(b) Dynamic DiD

Note: Panel (a) of this figure shows the log difference of the mean price of products and services not subject to the VAT. The difference is taken with respect to December 2013, i.e., the last period before the VAT hike took place. The means are taken at the municipality level across treatment and control areas. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the mean price of products and services not subject to the VAT at the municipality level. Treatment and control areas are shown in Figure 2.
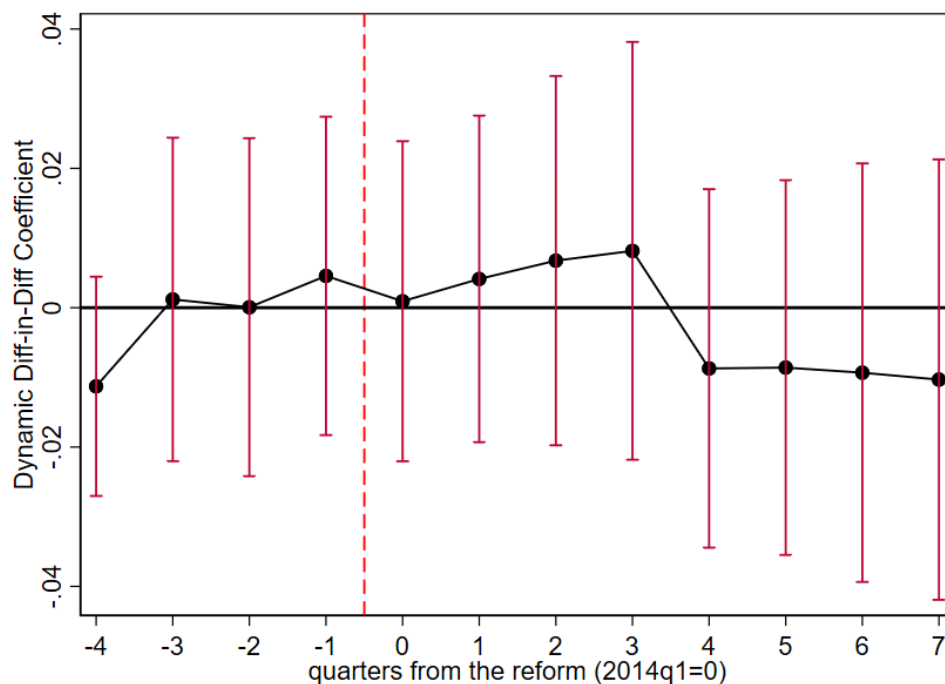
Sources: *Índice Nacional de Precios al Consumidor* database collected by *Instituto Nacional de Estadística y Geografía* (INEGI).

Figure A4: Effect of the VAT hike on wages of workers in sectors not subject to the VAT
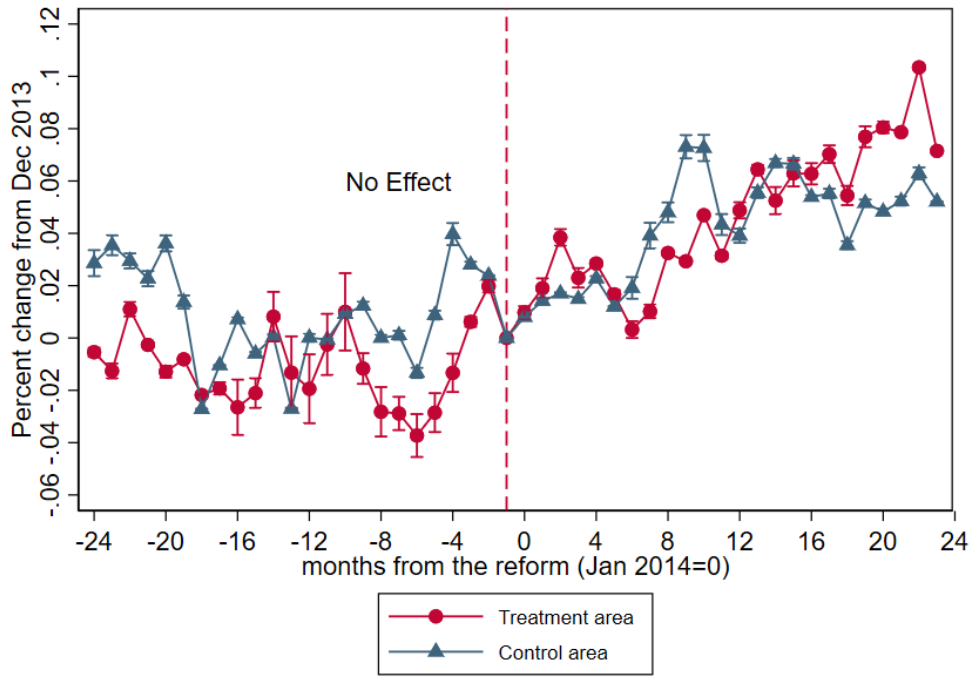
(a) Log change

(b) Dynamic DiD

Note: Panel (a) of this figure shows the log difference of the mean wage of workers in sectors whose final products are not subject to the VAT. The difference is taken with respect to December 2013, i.e., the last period before the VAT hike took place. The means are taken at the municipality level across treatment and control areas. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the wage of workers in sectors whose final products are not subject to the VAT at the municipality level. Treatment and control areas are shown in Figure 2.
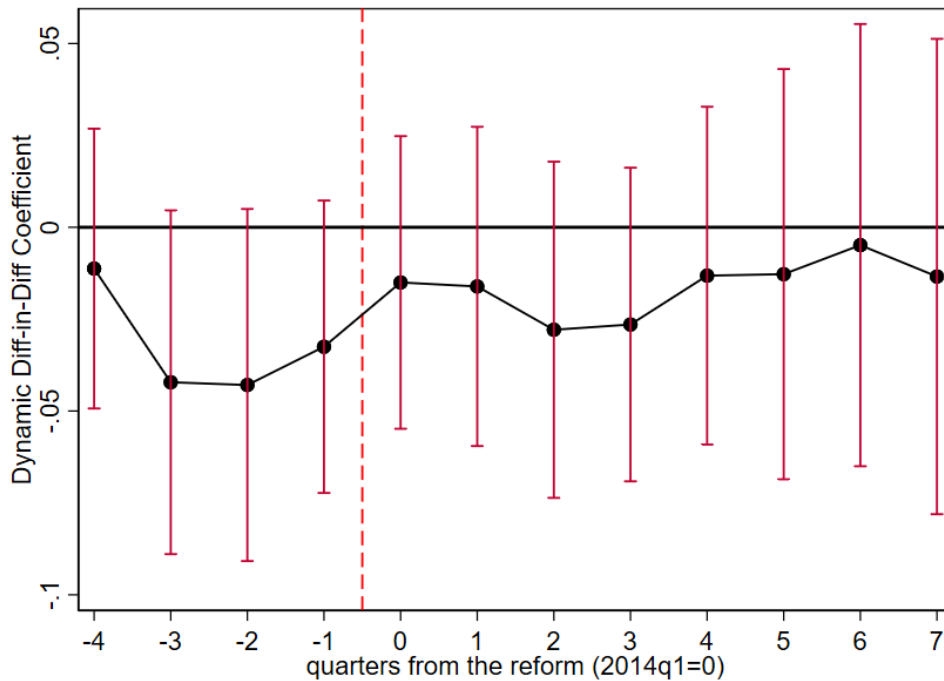
Sources: *Asegurados* database collected by *Instituto Mexicano del Seguro Social (IMSS)*.

Figure A5: Effect of the VAT hike on employment in sectors not subject to the VAT

(a) Log change

(b) Dynamic DiD

Note: Panel (a) of this figure shows the log difference of the mean number of employees in sectors whose final products are not subject to the VAT. The difference is taken with respect to December 2013, i.e., the last period before the VAT hike took place. The means are taken at the municipality level across treatment and control areas. Panel (b) plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the wage mean number of employees in sectors whose final products are not subject to the VAT at the municipality level. Treatment and control areas are shown in Figure 2.

Sources: *Asegurados* database collected by *Instituto Mexicano del Seguro Social (IMSS)*.

Figure A6: Share of municipality population in the VAT discount zone
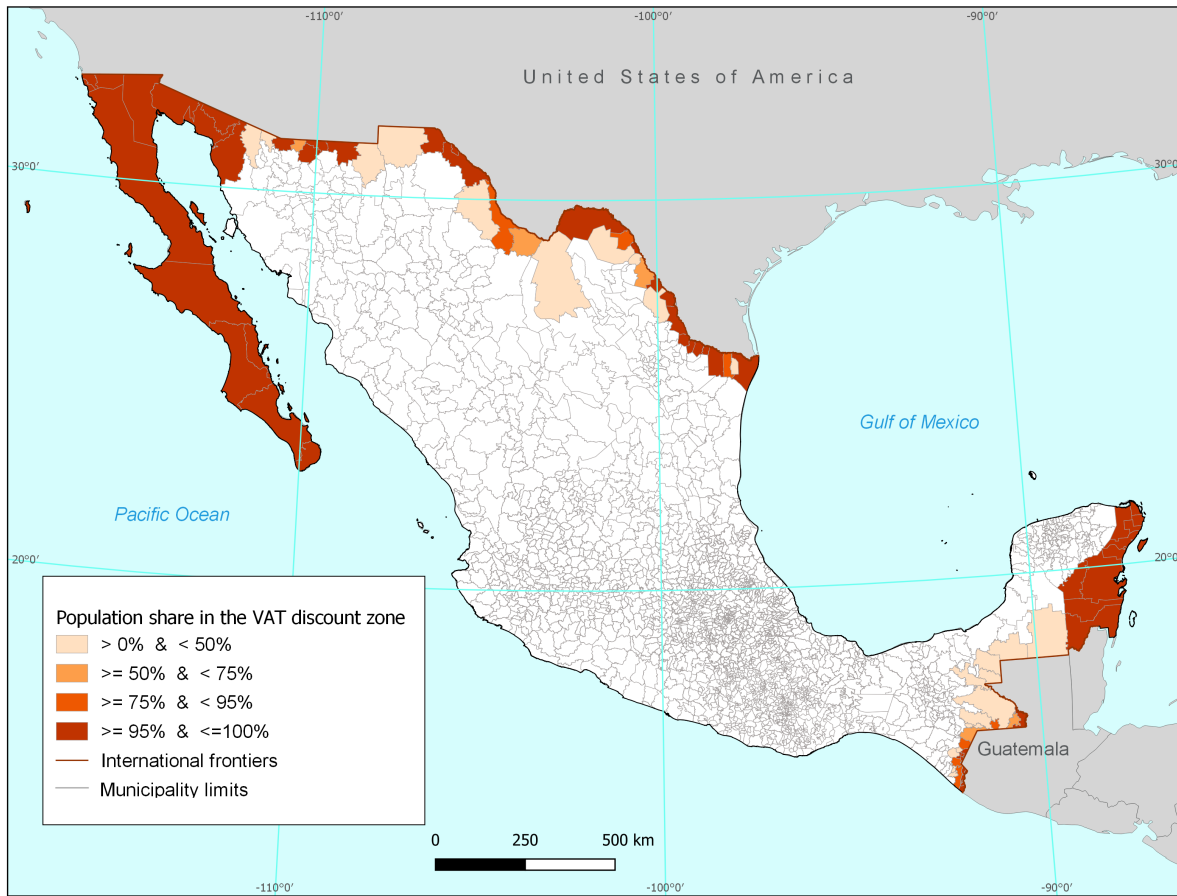
Note: This figure shows the share of the population by municipality that lived in the VAT discount area prior to the 2013 reform.
Sources: *Marco Geoestadístico* from *Instituto Nacional de Estadística y Geografía* (INEGI).
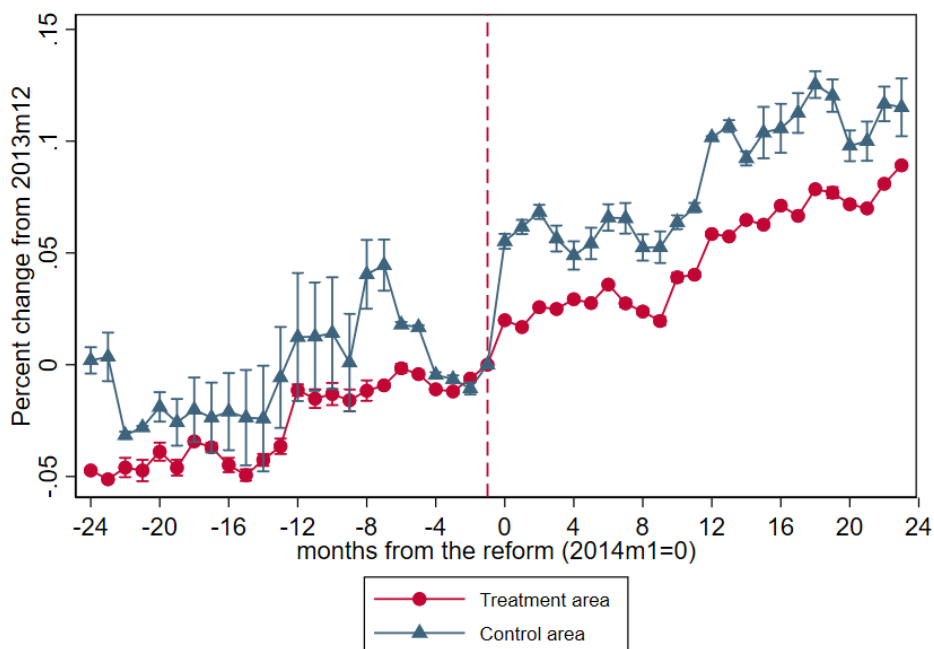
Figure A7: Alternative control municipalities

Note: This figure shows alternative control municipalities. The "1st degree neighbors" are the municipalities contiguous those of the treatment area. The "2nd degree neighbors" are the municipalities contiguous to the 1st degree neighbors.
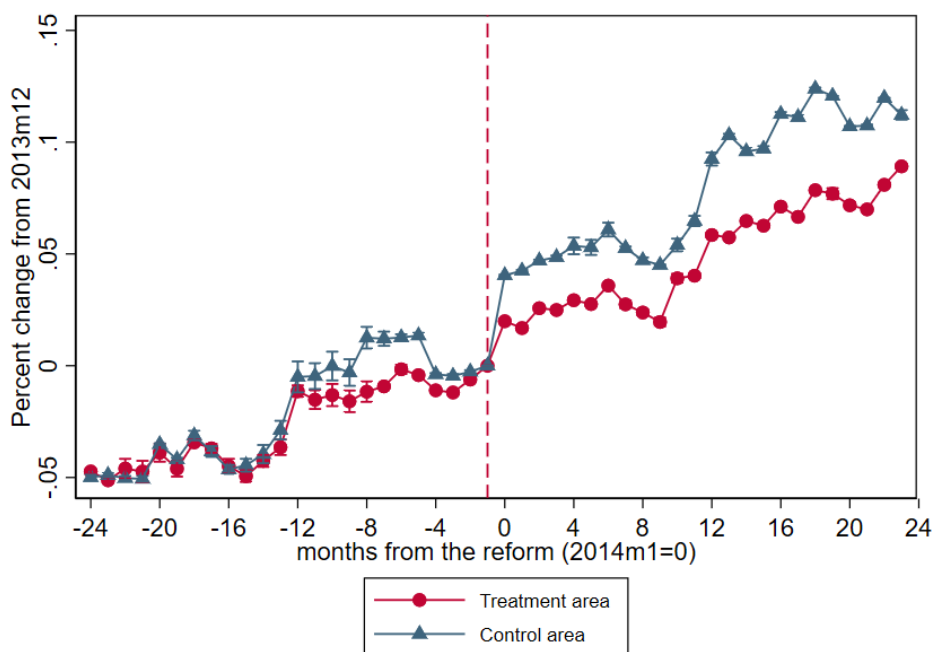
Sources: *Marco Geoestadístico* from *Instituto Nacional de Estadística y Geografía* (INEGI).

Figure A8: Graphical evidence on the effect of the VAT hike on wages in sectors subject to the VAT under alternative control areas

(a) 1st degree neighbors

(b) 1st degree neighbors plus 2nd degree neighbors

Note: this figure shows the log difference of the mean wage of workers in sectors whose final products are subject to the VAT. The difference is taken with respect to December 2013, i.e., the last period before the VAT hike took place. The means are taken at the municipality level across treatment and control areas. The control area in Panel (a) includes the "1st degree neighbors", i.e., the municipalities contigous to those of the treatment area. The control area in Panel (b) includes the "2nd degree neighbors" (municipalities contiguous to the 1st degree neighbors) plus the 1st degree neighbors. These alternative control areas are shown in Figure A7.
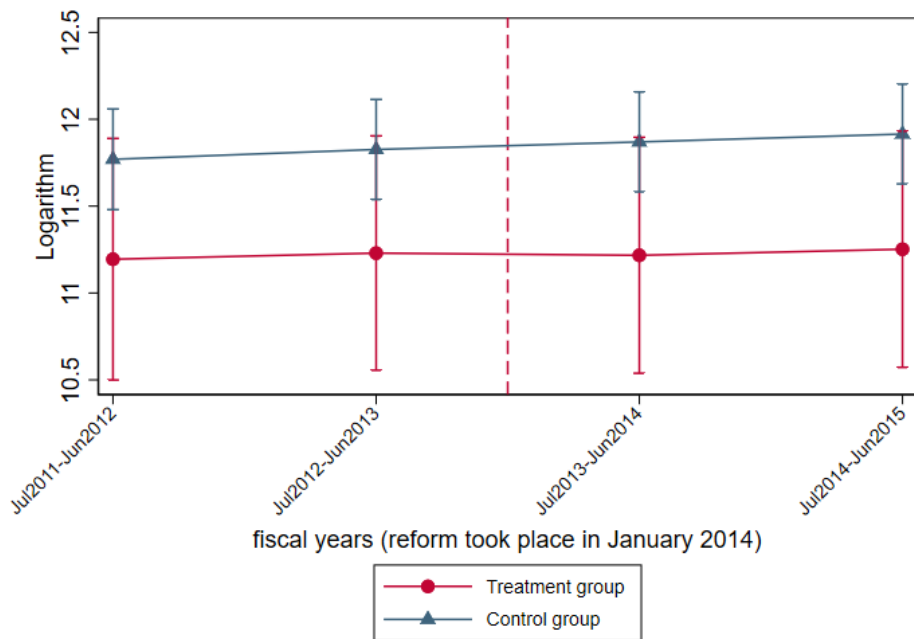
Sources: *Asegurados* database collected by *Instituto Mexicano del Seguro Social (IMSS)*.

Figure A9: Graphical evidence on the effect of the VAT hike on sales tax revenues at the United States - alternative treatment groups

(a) Cities directly at the border
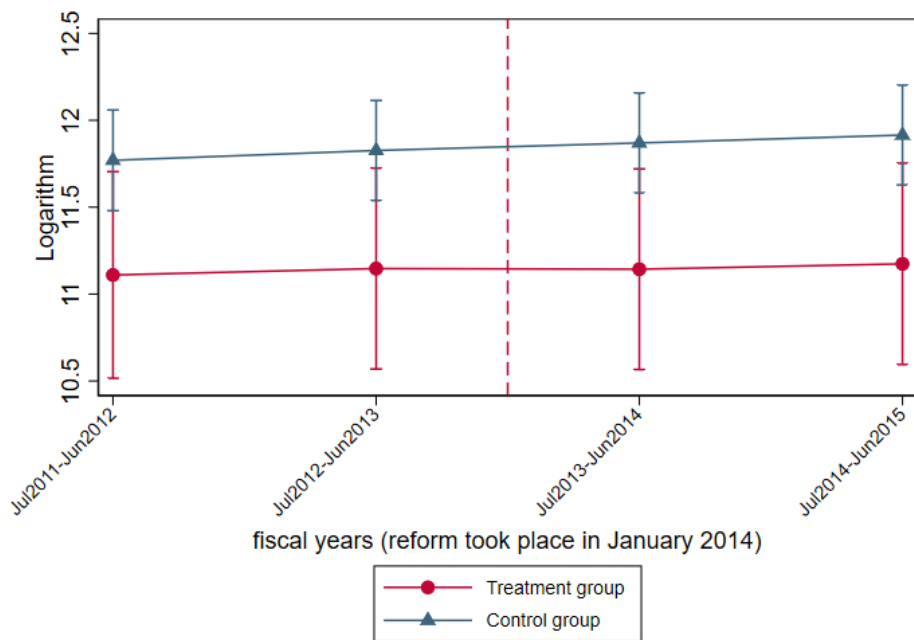
(b) Relatively small cities

Note: This figure shows the logarithm of the mean sales tax revenues at the United States southern border. The means are taken at the city level across treatment and control groups. In panel (a), the treatment group is composed of US cities that lie directly at the Mexico-US international border. In panel (b) the treatment group is composed of US cities located as less than 40km from the international border that are less than half the size of the closest Mexican city across the border. The control area is shown in Figure 9.

Sources: Annual Survey of State and Local Government Finances dataset from the United States Census Bureau.

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Figure A10: Effect of the VAT hike on crossings from Mexico to the United States - alternative treatment groups
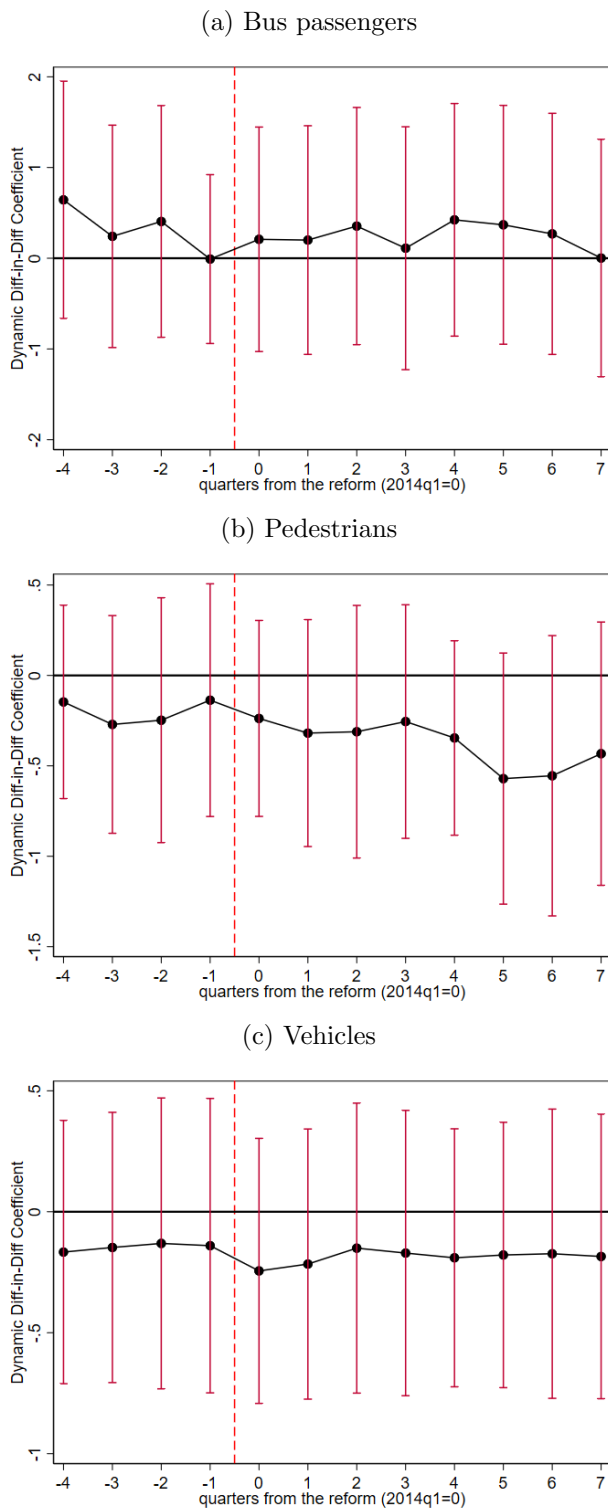
(a) Bus passengers

(b) Pedestrians

(c) Vehicles

Note: This figure plots the estimates of parameters δ_t from equation (2). The outcome is the logarithm of the mean land crossings from Mexico to the United States at the port of entry level. In panel (a) the treatment group is the number of passengers that crossed by bus. In panel (b) the treatment group is the number of pedestrians that crossed the border. In panel (c) the treatment group is the number of vehicles that crossed the border. The control group in all cases is the number of containers that crossed by tucks. Sources: Border Crossing/Entry dataset from the Bureau of Transportation Statistics.

B   Appendix: Products, Services and Sectors Subject to the Value Added Tax (VAT) in Mexico

List of Products and Services Subject to the VAT

Agua embotellada, Refrescos envasados, Chocolate líquido y para preparar bebida, Concentrados para refrescos, Barbacoa o birria, Carnitas, Pizzas, Pollos rostizados, Otros alimentos cocinados, Cerveza, Brandy, Ron, Tequila, Vino de mesa, Otros licores, Cigarrillos, Calcetines y calcetas para hombre, Camisas y playeras para hombre, Ropa interior para hombre, Pantalones para hombre, Traje para hombre, Otras prendas de vestir para hombre, Blusas y playeras para mujer, Calcetas, medias y pantimedias, Ropa interior para mujer, Pantalones para mujer, Vestidos y faldas para mujer, Otras prendas de vestir para mujer, Calcetines y calcetas para niños, Camisas y playeras para niños, Pantalones para niño, Ropa interior para infantes, Vestidos, faldas y pantalones para niñas, Camisetas para bebés, Ropa para bebés, Ropa de abrigo, Uniformes escolares, Zapatos de material sintético, Zapatos para hombre, Zapatos para mujer, Zapatos para niños y niñas, Zapatos tenis, Servicios y artículos para el calzado, Servicio de lavandería, Servicio de tintorería, Relojes, joyas y bisutería, Bolsas, maletas y cinturones, Productos para reparación menor de la vivienda, Electricidad, Gas doméstico LP, Gas doméstico natural, Servicio de telefonía móvil, Servicios de telefonía fija, Servicio doméstico, Otros servicios para el hogar, Muebles para cocina, Estufas, Colchones, Comedores y antecomedores, Muebles diversos para el hogar, Recámaras, Salas, Lámparas, Aparatos de aire acondicionado, Aspiradoras y otros aparatos para el hogar, Horno de microondas, Lavadoras de ropa, Refrigeradores, Cafeteras, tostadoras, ventiladores y otros electrodomésticos pequeños, Licuadoras, Planchas eléctricas, Equipo terminal de comunicación, Aparatos eléctricos para el cuidado personal, Navajas y máquinas de afeitar, Equipos y reproductores de audio, Reproductores de video, Televisores, Computadoras, Herramientas y equipo grande para el hogar, Focos, Herramientas pequeñas y accesorios diversos, Pilas, Artículos desechables y no duraderos, Cerillos, Velas y veladoras, Artículos y utensilios para el hogar, Baterías de cocina, Loza, cristalería y cubiertos, Objetos ornamentales y decorativos, Utensilios de plástico para el hogar, Escobas, fibras y estropajos, Alfombras y otros materiales para pisos, Blancos y otros textiles para el hogar, Colchas y cobijas, Cortinas, Sábanas, Toallas, Blanqueadores, Desodorantes ambientales, Detergentes, Jabón para lavar, Plaguicidas, Suavizantes y limpiadores, Medicamentos Nutricionales, Material de curación, Lentes, aparatos para sordera y ortopédicos, Análisis clínicos, Atención médica durante el parto, Hospitalización general, Hospitalización parto, Operación quirúrgica, Corte de cabello, Sala de belleza y masajes, Artículos de maquillaje, Crema y productos para higiene dental, Cremas para la piel, Desodorantes personales, Jabón de tocador, Lociones y perfumes, Productos para el cabello, Otros artículos de tocador, Servilletas de papel, Pañales, Papel

higiénico y pañuelos desechables, Toallas sanitarias, Transporte aéreo, Automóviles, Motocicletas, Bicicletas, Aceites lubricantes, Gasolina de alto octanaje, Gasolina de bajo octanaje, Acumuladores, Neumáticos, Partes, accesorios y otras refacciones para vehículos, Lavado y engrasado de automóvil, Mantenimiento de automóvil, Reparación de automóvil, Cuotas de autopistas, Estacionamiento, Trámites vehiculares, Seguro de automóvil, Guarderías y estancias infantiles, Material escolar, Servicios turísticos en paquete, Hoteles, Paquetes de internet, telefonía y televisión de paga, Servicio de internet, Servicios para mascotas, Club deportivo, Cine, Servicio de televisión de paga, Centro nocturno, Otros servicios culturales, diversiones y espectáculos deportivos, Material y aparatos fotográficos, Películas y música, Instrumentos musicales, Juegos electrónicos; consola, cartuchos y discos para videojuegos, Juguetes y juegos de mesa, Artículos deportivos, Alimento para mascotas, Restaurantes y similares, Loncherías, fondas, torterías y taquerías, Servicios profesionales, Paquetería, Expedición de documentos del sector público, Servicios funerarios.

List of Sectors Whose Final Products are Subject to the VAT

Trabajos de buceo, Extracción y beneficio de carbón mineral, grafito y minerales no metálicos en minas de profundidad, Beneficio de minerales no metálicos, Extracción y beneficio de azufre, Extracción y beneficio de minerales no metálicos, en minas a cielo abierto, Exploración y extracción de petróleo crudo y gas natural, Extracción y beneficio de minerales metálicos, en minas de profundidad, Beneficio de minerales metálicos, Extracción y beneficio de minerales metálicos, en minas a cielo abierto, Elaboración y/o envase de bebidas alcohólicas, Elaboración de cerveza y malta, Elaboración y/o envase de refrescos, aguas gaseosas y purificadas, Beneficio y/o fabricación de productos de tabaco, Fabricación, preparación, hilado, tejido y acabado de textiles de fibras blandas, Trabajos de blanqueo, teñido, estampado, impermeabilizado y acabado de hilados y tejidos de fibras blandas, Fabricación de tejidos y artículos de punto, Fabricación, preparación, hilado, tejido y acabado de textiles de fibras duras, Trabajos de hilados y/o tejidos sin maquinaria ni equipo motorizado, Fabricación de tejidos de fibras blandas con telares automáticos sin lanzadera, Fabricación de hilados con máquinas de turbina, Confección de prendas de vestir a la medida, Confección de prendas de vestir, Otros artículos confeccionados con textiles y materiales diversos, Fabricación de calzado, con maquinaria y/o equipo motorizado, Fabricación de calzado, sin maquinaria ni equipo motorizado, Curtido y acabado de cuero y piel, Manufactura de artículos de cuero, piel y sucedáneos, en forma artesanal, Fabricación de artículos de cuero, piel y sucedáneos, Curtido y acabado de cuero y piel, con uso exclusivo de maquinaria y/o equipo motorizado, Fabricación de productos de aserradero, Fabricación de artículos y accesorios de madera,

Manufactura de artículos de corcho, palma, vara, carrizo y mimbre, Fabricación de artículos de corcho, palma, vara, carrizo y mimbre, Fabricación y/o reparación de muebles de madera y sus partes, Fabricación de papel y/o cartón y sus derivados, Fabricación de artículos a base de papel y/o cartón, Fabricación de sustancias químicas e industriales; excepto abonos, Fabricación de resinas sintéticas y plastificantes, Industria de las pinturas, Fabricación de productos químicos para limpieza y aromatizantes ambientales, Fabricación de perfumes y cosméticos, Fabricación de aceites y grasas vegetales y animales no comestibles, para usos industriales, Fabricación de velas, veladoras y similares, Fabricación de cerillos, Fabricación de explosivos y fuegos artificiales, Otros productos de las industrias químicas conexas, Fabricación de fibras artificiales y sintéticas, Refinación del petróleo crudo y petroquímica básica, Fabricación de lubricantes y aditivos, Fabricación de productos a base de asfalto y sus mezclas, Fabricación de productos de hule, Fabricación de productos de plástico, Fabricación de productos de látex, Manufactura de artículos de alfarería y cerámica, Fabricación de muebles sanitarios, loza, porcelana y artículos refractarios, Fabricación de vidrio y/o productos de vidrio, Fabricación de productos de arcilla para la construcción, Fabricación de cal y yeso, Fabricación de productos a base de asbesto, Fabricación de productos abrasivos, Fabricación de granito artificial, productos de mármol y otras piedras, Fabricación de productos y partes preconstruidas de concreto, Fabricación de azulejos, con procesos continuos automatizados, Fabricación de vidrio y/o productos de vidrio, con procesos continuos automatizados, Fabricación de productos de asbesto-cemento, Fabricación de cemento, Fabricación de concreto premezclado, Industrias básicas del hierro, acero y metales no ferrosos, Industrias básicas del hierro, acero y metales no ferrosos, con procesos automatizados, Fabricación y/o reparación de puertas, ventanas, cortinas metálicas y otros trabajos de herrería, Fabricación, ensamble y/o reparación de muebles metálicos y sus partes, Fabricación y/o reparación de estructuras metálicas, tanques, calderas y similares, Fabricación de envases metálicos, corcholatas y tapas, Fabricación de alambres y otros productos de alambre, Trabajos de tratamientos térmicos y galvanoplastia, Fabricación de agujas, alfileres, cierres, botones y navajas para rasurar, Fabricación de baterías de cocina, cucharas, cuchillos y tenedores, Fabricación de otros productos metálicos maquinados, Tratamientos térmicos y galvanoplastia, con procesos continuos automatizados, Fabricación y/o ensamble de maquinaria, equipo e implementos para las industrias de alimentos, bebidas, tabacalera, textil, calzado, madera, cuero, impresión, hule, plástico, productos de minerales no metálicos (excepto cemento), metal mecánica y maquinar, Fabricación y/o ensamble de maquinaria, equipo e implementos para las industrias de la construcción, extractivas, papel, cemento, petroquímica básica, química; metálicas básicas del hierro, del acero y de metales no ferrosos, Fabricación y/o ensamble de máquinas de coser, oficina, cómputo y sus partes, Reparación y ensamble de máquinas de coser y de oficina, Fabricación de partes y piezas sueltas, para maquinaria y equipo en general, Reparación y/o mantenimiento de maquinaria y equipo en general, Fabricación y/o

ensamble de maquinaria y equipo para generación y transformación de energía eléctrica, Fabricación y/o ensamble de equipo y aparatos de radio, televisión y comunicaciones, Fabricación y/o grabado de discos y cintas magnéticas para sonidos, imágenes y datos, Fabricación y/o ensamble de aparatos eléctricos y sus partes para uso doméstico, Fabricación, reconstrucción y/o ensamble de acumuladores eléctricos, Fabricación y/o ensamble de pilas (secas), componentes eléctricos y electrónicos diversos, Fabricación y/o ensamble de lámparas (focos) y tubos al vacío para alumbrado eléctrico, Fabricación de conductores eléctricos, Fabricación y/o ensamble de aparatos, accesorios eléctricos o electrónicos, para empalme, corte, protección y conexión, Fabricación de luminarias y anuncios luminosos, Fabricación en serie o con procesos continuos de acumuladores eléctricos, Fabricación y/o ensamble de refrigeradores, estufas, lavadoras, secadoras y otros aparatos de línea blanca, Fabricación y/o ensamble de aeronaves, Fabricación y/o ensamble de carrocerías para vehículos de transporte, Fabricación y/o ensamble de partes y accesorios para automóviles, autobuses, camiones, motocicletas y bicicletas, Fabricación y/o ensamble de partes para el sistema eléctrico de vehículos automóviles, Fabricación y/o ensamble de bicicletas y otros vehículos de pedal, Fabricación, ensamble y/o reparación de carros de ferrocarril, equipo ferroviario y sus partes, Fabricación, ensamble y/o reparación de embarcaciones, Fabricación y/o ensamble de automóviles, autobuses, camiones y motocicletas, Fabricación y/o ensamble de motores para automóviles, autobuses y camiones, Fabricación de conjuntos mecánicos y sus partes para automóviles, autobuses, camiones y motocicletas, Fabricación, ensamble y/o reparación de equipos, aparatos científicos y profesionales e instrumentos de medida y control, Fabricación, ensamble y/o reparación de aparatos, instrumentos y accesorios de óptica y fotografía, Fabricación, montaje y/o ensamble de relojes, joyas, artículos de orfebrería y fantasía, Fabricación y/o ensamble de instrumentos musicales, paraguas, juguetes y artículos deportivos, con maquinaria y/o equipo motorizado, Fabricación y/o ensamble de instrumentos musicales, paraguas, juguetes y artículos deportivos, sin maquinaria ni equipo motorizado, Fabricación de lápices, gomas, plumas y bolígrafos, Talleres de mecánica dental, Fabricación y/o ensamble de armas de fuego portátiles, cartuchos, municiones y accesorios, Fabricación, ensamble y/o reparación de otros artículos manufacturados no clasificados anteriormente, sin maquinaria ni equipo motorizado, Fabricación, ensamble y/o reparación de otros artículos manufacturados no clasificados anteriormente, con maquinaria y/o equipo motorizado, Construcción de edificaciones; excepto obra pública, Construcciones de obras de infraestructura y edificaciones en obra pública, Instalaciones sanitarias, eléctricas, de gas y de aire acondicionado, Instalación y reparación de ascensores, escaleras electromecánicas y otros equipos para transportación, Instalación de ventanería, herrería, cancelería, vidrios y cristales, Otros servicios de instalación vinculados al acabado o remodelación de obras de construcción, Generación, transmisión y distribución de energía eléctrica, Expendios de ventas al menudeo de prendas y accesorios de vestir y artículos para su confección, Compraventa de prendas y

accesorios de vestir y artículos para su confección, sin transporte, Compraventa de prendas y accesorios de vestir y artículos para su confección, con transporte, Expendios de ventas al menudeo de artículos de uso personal, Compraventa de artículos de uso personal, sin transporte, Compraventa de artículos de uso personal, con transporte, Expendios de ventas al menudeo de máquinas, muebles, aparatos e instrumentos para el hogar, sus refacciones y accesorios, Compraventa de máquinas, muebles, aparatos e instrumentos para el hogar, sus refacciones y accesorios, sin transporte, Compraventa de máquinas, muebles, aparatos e instrumentos para el hogar, sus refacciones y accesorios, con transporte y/o servicios de instalación, Expendios de ventas al menudeo de otros artículos para el hogar, Compraventa de otros artículos para el hogar, sin transporte, Compraventa de otros artículos para el hogar, con transporte y/o servicios de instalación, Supermercados, tiendas de autoservicio y de departamentos especializados por línea de mercancías, Compraventa, envasado y/o distribución de gases para uso doméstico, industrial y medicinal, Compraventa de lubricantes y aditivos, sin transporte, Estaciones de venta de gasolina, diesel y compraventa de lubricantes y aditivos, con transporte, Compraventa de materiales para construcción, tales como madera, aceros y productos de ferretería, sin transporte, ni preparación de mercancías, Compraventa de materiales para construcción tales como: madera, aceros y productos de ferretería, con transporte y/o preparación de mercancías, Compraventa de material eléctrico, pinturas y productos de tlapalería, sin transporte, Compraventa de material eléctrico, pinturas y productos de tlapalería, con transporte, Compraventa de vidrio plano, cristales, espejos y lunas, sin transporte ni servicios de instalación, Compraventa de vidrio plano, cristales, espejos y lunas, con transporte y/o servicios de instalación, Compraventa de pieles, cueros curtidos y otros artículos de peletería, sin transporte, Compraventa de pieles, cueros curtidos y otros artículos de peletería, con transporte, Compraventa de papel y cartón nuevos, sin transporte, Compraventa de papel y cartón nuevos, con transporte, Compraventa de chatarra, fierro viejo, partes o mecanismos usados y desperdicios en general, Compraventa de explosivos y productos de pirotecnia, Expendio de ventas al menudeo de refacciones y accesorios para maquinaria y/o equipo para la producción de bienes, Compraventa de maquinaria, equipo y sus refacciones y/o accesorios para la producción de bienes, sin transporte, Compraventa de maquinaria, equipo y sus refacciones y/o accesorios para la producción de bienes, con transporte y/o servicios de reparación o mantenimiento, Compraventa de maquinaria, equipo y sus refacciones y/o accesorios para la producción de bienes, con servicios de instalación, Expendios de ventas al menudeo de equipo, mobiliario, sus partes y/o accesorios para la prestación de servicios y el comercio, Compraventa de equipo, mobiliario, sus partes y/o accesorios para la prestación de servicios y el comercio, sin transporte, Compraventa de equipo, mobiliario, sus partes y/o accesorios para la prestación de servicios y el comercio, con transporte y/o servicios de instalación, reparación y mantenimiento, Expendios de ventas al menudeo de aparatos e instrumentos de medición, precisión, cirugía, laboratorio y otros

usos científicos, Compraventa de aparatos e instrumentos de medición, precisión, cirugía, laboratorio y otros usos científicos, sin transporte, Compraventa de aparatos e instrumentos de medición, precisión, cirugía, laboratorio y otros usos científicos, con transporte y/o servicios de instalación, reparación o mantenimiento, Compraventa de equipo de cómputo o de procesamiento electrónico de datos y sus periféricos, con servicios de instalación, reparación y/o mantenimiento, Expendios de ventas al menudeo de refacciones, accesorios y/o partes para equipo de transporte, Compraventa de equipo de transporte, sus refacciones, accesorios y/o partes, sin transporte, Compraventa de equipo de transporte, sus refacciones, accesorios y/o partes, con transporte y/o servicios de instalación, reparación o mantenimiento, Compraventa de bienes inmuebles, Expendios de ventas al menudeo de artículos diversos no clasificados, Compraventa de artículos diversos no clasificados, sin transporte, Compraventa de artículos diversos no clasificados, con transporte y/o servicios de instalación, reparación o mantenimiento, Transporte de carga, Transporte ferroviario y eléctrico, Transporte marítimo y de navegación interior y servicios diversos a bordo y/o en plataformas marinas, Servicios directamente vinculados con el transporte por agua y/o servicios de supervisión y mantenimiento en plataformas marinas, Transporte aéreo, Administración de vías de comunicación, terminales y servicios auxiliares, Servicios de almacenamiento y/o refrigeración, Servicios sin transporte de agencias de gestión aduanal, de equipajes, viajes y turísticas, Servicios de grúa y emergencia para vehículos, Servicios de alquiler de aeronaves, carros de ferrocarril y transportes acuáticos, Servicios con transporte de agencias de gestión aduanal, de mensajería y paquetería, de equipajes, viajes, turísticas y otras actividades relacionadas con los transportes en general, Comunicaciones, Instituciones de crédito, seguros y fianzas, Servicios colaterales a las instituciones financieras y de seguros, Servicios relacionados con inmuebles, Servicios profesionales y técnicos, Servicios de instalación de maquinaria y equipo en general, Servicios de protección y custodia, Servicios de laboratorio para la industria en general, Servicios de alquiler de maquinaria y equipo para la construcción con operadores, Servicios de alquiler de maquinaria y equipo para la construcción sin operadores, Servicios de alquiler de equipo y mobiliario a empresas, Servicios de alquiler para el público en general, Servicios de alquiler o renta de automóviles, bicicletas y motocicletas, Servicios de alojamiento temporal, Preparación y servicio de alimentos, Preparación y servicio de bebidas alcohólicas, Servicios recreativos, Servicios de esparcimiento, Hipódromos, galgódromos, lienzos charros, palenques y promoción y presentación de espectáculos taurinos, Servicios de centros nocturnos, salones de baile y casinos, Circos y juegos electromecánicos, Servicios de reparación, lavado, engrasado, verificación de emisión de contaminantes y estacionamiento de vehículos con servicios mecánicos y/o de hojalatería, Servicios de reparación de artículos de uso doméstico y personal, sin maquinaria ni equipo motorizado, Servicios de reparación de artículos de uso doméstico y personal, con maquinaria y/o equipo motorizado, Servicios para el aseo personal y sanitarios, Servicios de peluquería y salones de belleza, Servicios de aseo y limpieza,

sin maquinaria ni equipo motorizado, Servicios de aseo y limpieza, con maquinaria y/o equipo motorizado, Servicios de limpieza de ventanas y fachadas, Servicios de fumigación, desinfección y control de plagas, Servicios de revelado fotográfico, Inhumaciones y servicios conexos, Servicios domésticos, Servicios de estacionamiento y/o pensión para vehículos, Servicios veterinarios y auxiliares, Servicios generales de la administración pública, Seguridad pública, Seguridad social.