

Bank Account Ownership by Microentrepreneurs in Mexico

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Abstract

This paper evaluates the impact of a value-added tax (VAT) rate increase on bank account ownership by Mexican microentrepreneurs considering informality as the main channel of this effect. Using two rounds of a cross-section survey aimed at understanding financial inclusion in Mexico and a difference-in-difference strategy, results indicate that an increase in the VAT rate negatively affects the probability of microentrepreneurs having a bank account in northern municipalities where the tax rate increased from 11% to 16%. In particular, financial inclusion of microentrepreneurs at the northern border decreased to a statistically significant effect, whereas financial inclusion of formal and informal salaried workers at the northern border did not change, as their fiscal obligations remained the same with the VAT amendment.

Keywords: informal economy, tax legislation, microentrepreneurs, financial inclusion.

JEL classification: K34, L26, E26.

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1. INTRODUCTION

There are abundant studies on the determinants and consequences of informality.¹ Multiple papers focus on the consequences of informal status on firms' outcomes, such as profits, productivity, employment, and investment. However, less extensive literature exists on the effects of informality on the financial inclusion of firms.² One characteristic that most of these studies share is that they primarily use credit access or credit use as measures of financial inclusion. Focusing on credit access or use is important since many firms achieve growth through loans.³ However, savings account ownership or deposits are equally relevant, as each often acts as an entrance point to the use of other financial services such as banking credit.⁴ Moreover, numerous studies regarding financial inclusion have established the benefits of owning a bank account. Specifically, having a bank account protects deposits against loss or theft, facilitates other financial transactions such as payments and money transfers, alleviates the establishment of creditworthiness, and promotes savings, asset, and wealth accumulation, among other benefits.⁵ For these reasons, the present paper uses a natural experiment to examine the role of informality on a microentrepreneur's decision to own a bank account.

More specifically, this paper analyzes the effect of an increase in value-added tax (VAT) on the probability of having a bank account, considering informality as the main channel of this effect. We hypothesize that an increase in the VAT rate increases the benefits of being informal, which in turn decreases the probability that a microentrepreneur will have a bank account in order to avoid inspections. As De Paula and Scheinkman (2010) show, VAT has a role in

¹ In this paper, informality refers to none or partial tax compliance.

² The most influential papers on this topic include the works of Monteiro and Assunção (2006), Dabla-Norris and Koeda (2008), Gatti and Honorati (2008), Fajnzylber et al. (2009), McKenzie and Sakho (2010), McCulloch et al. (2010), and De Mel et al. (2013).

³ Massenot and Straub (2016) and Araujo and Rodrigues (2016).

⁴ Botello Peñaloza (2015) shows that having a savings account significantly increases the probability of having credit.

⁵ See, for example, Aportela (1999), Rhine and Greene (2006), Rhine et al. (2006), Dupas and Robinson (2013), Ashraf et al. (2010), and McKenzie and Woodruff (2008).

transmitting informality through its credit scheme. Therefore, when the VAT rate increases, prices of goods and services in the formal relative to the informal sector increase, and the demand for goods and services in the informal sector, where no VAT applies, increases as well. Under the hypothesis, this has a significant effect on both informal and formal microentrepreneurs. The income of informal firms increases, with the probability that these firms will open a bank account decreasing in order to keep undetected from the fiscal authority. For formal firms, the demand for goods and services without a formal invoice, where no VAT is applied, also increases. This income is not reported, neither for VAT purposes nor for revenue tax purposes. Therefore, to maintain consistency between income reported to the fiscal authority and income entered in the financial system, formal firms keep unreported income out of the financial system. As deposits decrease, the benefits of having a bank account are lower relative to the costs, to such an extent that formal microentrepreneurs that were previously indifferent to financial exclusion or inclusion are now less likely to have bank accounts.

The present paper relies on a difference-in-differences approach based on a legislation change that took place in Mexico in 2014. Before 2014, there were two different VAT rates: an 11% rate that applied to southern and northern border fringes and a 16% rate that applied to the rest of the country. In 2014, the rate that applied at the border fringes increased to 16%. This tax amendment represents a natural experiment to evaluate an exogenous increase in the benefits of being informal on the probability of owning a bank account by comparing microentrepreneurs located in areas affected by the tax amendment to microentrepreneurs in other locations, before and after the reform.

Using two rounds of the Financial Inclusion National Survey (ENIF), the results suggest that an increase in the VAT rate negatively affects the financial inclusion decision of microentrepreneurs. In particular, results indicate that the probability of having a bank account decreases for microentrepreneurs, but not for salaried workers, as they cannot credit VAT tax payments.

The organization of the paper is as follows. Section 2 gives a review of previous literature published on the subject in Mexico and other countries. Section 3 explains some of the characteristics and specific details of the fiscal reform that took place in 2014 to explain the identification strategy used in the paper. Section 4 introduces

the National Financial Inclusion Survey used for this study, together with definitions of certain variables and a summary of the statistics of the data. Section 5 includes a description of the methodology and Section 6 details the results. Section 7 articulates the concluding remarks and potential areas of study to pursue in the future.

2. LITERATURE REVIEW

From a microperspective, the most influential papers in economics that specifically address the effects of informality on financial inclusion outcomes include Monteiro and Assunção (2006), Dabla-Norris and Koeda (2008), Gatti and Honorati (2008), Fajnzylber et al. (2009), McKenzie and Sakho (2010), and De Mel et al. (2013). Monteiro and Assunção (2012) evaluated the impact of a Brazilian registration simplification and tax reduction program on the formality of firms and its consequences on investment and credit access. Using firm-level data from a survey, they found that the program increased the formalization of firms and had a positive, statistically significant effect of formality on investment and credit access using instrumental variables (IV) regression. In a study on the same Brazilian program using firm-level data from a nationally representative survey, Fajnzylber et al. (2009) found similar results—a positive and significant effect of the program on the levels of registration that subsequently led to an increase in revenues, employment, and profits, but not credit access. Their econometric strategy relied on regression discontinuity techniques. In addition, by using firm-level data from 26 economies and a fixed-effects estimation, Dabla-Norris and Koeda (2008), whose results relied on IV regressions to solve potential endogeneity issues, found that informality lowers the access and use of bank credit and increases the use of informal sources of credit. The study also found evidence that the negative relationship between informality and access to credit is stronger in countries with weak tax administrations and high tax compliance costs. Using firm-level data from a survey applied in 49 countries, Gatti and Honorati (2008) found that more tax compliance, defined as the percentage of sales that firms report to the tax authority, increases access to credit; the effect of this was statistically significant according to both ordinary least squares (OLS) and fixed effects (FE) estimates. Using survey data at the firm-level from Bolivia, McKenzie and Sakho (2010)

found large effects of formalization on the profits of firms; however, they also found that formalization did not have a significant effect on the use of trade credit or on the likelihood of having a bank loan. They based their measure of formality on the distance to the tax office: the closer the firm to the tax office, the more likely it was to be formal. Lastly, by means of an experiment implemented in Sri Lanka, De Mel et al. (2013) found that information and reimbursement of registration costs are only effective when bundled together. They also found that formalization increases profits, advertisement expenses, and the use of receipt books, although the likelihood of having a bank account or a bank loan did not increase.

The present paper contributes to this literature by exploring the effect of formalization on the probability of owning a bank account, as in De Mel et al. (2013), as opposed to its effect on credit use or credit access, which is a topic other academic papers have studied more thoroughly. Focusing on bank account ownership is important for two reasons. First, there are numerous benefits to owning a bank account. According to Aportela (1999), Rhine and Greene (2006), Rhine et al. (2006), McKenzie and Woodruff (2008), Ashraf et al. (2010), and Dupas and Robinson (2013), among others, having a bank account protects deposits against loss or theft, facilitates other financial transactions such as payments, purchases and money transfers, aids establishing credit-worthiness, and promotes savings, assets, and wealth accumulation. Second, as demonstrated by Botello Peñaloza (2015), having a bank account significantly increases the probability of obtaining a bank loan; in other words, having a bank account facilitates access to other financial services, crucial for growth, efficiency, and survival.

The present paper also makes an important contribution to the literature of financial inclusion. One of the most important stylized facts in the literature on financial inclusion is that lack of income is a main determinant of financial exclusion (see for example, Peña et al., 2014; Aguilar and Valles, 2015; Bosch et al., 2015; Vázquez, 2015; and Allen et al., 2016; among others). However, financial exclusion in Mexico among adults who receive earnings is high. According to my own calculations with ENIF (2015), 47.11% of adults between 18 and 65 years old who work and earn money do not have a bank account; probably because of this Mexico is well below the expected level of financial inclusion according to income per capita (Consejo Nacional de Inclusión Financiera, Conaif, 2016). Thus, because

lack of income does not completely explain the low levels of financial inclusion in Mexico, there must be additional factors that lead to Mexico's lack of financial inclusion.

Another critical determinant could be the informal sector, as previous literature has pointed out. For example, Aguilar and Valles (2015) demonstrated that Mexican households in which the head has a formal job were positively affected, increasing the amount of household savings. In addition, Vázquez (2015), using Mexican survey data, found that people with a formal job are more likely to have a bank account. Moreover, financial inclusion among salaried workers presents additional evidence in favor of this argument, according to the survey data used here. The percentage of formal salaried workers who do not have a bank account is only 21.07%; meanwhile, the percentage of informal salaried workers (i.e., those who do not have social security benefits) who do not have a bank account is 67.78 percent.

With respect to microentrepreneurs, the percentage of those without a bank account is 65.58%—very similar to workers in the informal labor market. Although informality could potentially be a critical determinant of financial exclusion among microentrepreneurs, proving this claim can be difficult because the decision to open a bank account and formality status are possibly endogenous. On the one hand, a microentrepreneur who owns a bank account is less likely to suffer money theft or loss and is more likely to save and accumulate wealth. The benefits of participating in the financial system thereby support the survival and growth of microentrepreneurs, increasing the likelihood of formalization as a result. On the other hand, a formal microentrepreneur is more likely to own a bank account because it is easier for formal firms to reap the benefits of the financial system, such as credit access, as they have official documents to prove income and collateral requirements.

Various econometric techniques can account for such endogeneity. One method is by means of an experiment design, as demonstrated in De Mel et al. (2013). Another possible approach is by using regression discontinuity as in Fajnzylber et al. (2009). One of the most frequently used methodologies is instrumental variable estimation, examples of which are illustrated in Monteiro and Assunção (2006), Dabla-Norris and Koeda (2008), McCulloch et al. (2010) and McKenzie and Sakho (2010). In contrast to previous literature, however, this paper relies on a difference-in-difference approach to identify

the effect of formality on bank account ownership among microentrepreneurs. This methodology best suits the natural experiment and survey data that I use in the paper. It provides data before and after the treatment, and an exogenous source of variation to specify treatment and control groups.

A key assumption in this paper is that fiscal authority crosschecks information from different sources, for example from the financial system to detect tax evasion, of which microentrepreneurs are aware. This is a plausible assumption, as developments in communications and data-gathering technologies allow different enforcement agencies to more effectively use information to detect illegal practices such as tax avoidance (see Catão et al., 2009). Moreover, since 2009, the Mexican fiscal authority has had access to information in the financial system by law, increasing the ability to detect tax evasion.

This paper also contributes to academia in terms of the characteristics of the natural experiment. In most previous papers, formality is defined in terms of tax registration (see Dabla-Norris and Koeda, 2008; Gatti and Honorati, 2008; McKenzie and Sakho, 2010; and De Mel et al., 2013). Focusing on tax registration changes is important, as previous literature has argued that registration burden could prevent firms from formalizing. However, another concern among firms deciding whether to formalize is tax payments. The only two papers that analyze a change in tax payments on credit access are Fajnzylber et al. (2009), and Monteiro and Assunção (2012). However, they cannot solely attribute their results to tax reduction since the program they analyzed also included registration simplification measures. In contrast, the present paper can focus not only on tax payment changes but also on a tax rate increase that augments the benefits of being informal. Finally, results from the present paper support the hypothesis studied by De Paula and Scheinkman (2010), which centers on the informality chain effects of VAT since the natural experiment is based on the VAT rate change.

3. IDENTIFICATION STRATEGY

3.1 2014 Fiscal Reform

At the end of 2013, the Mexican Congress approved various tax amendments, which went into effect on January 1, 2014. Such tax amendments

were aimed at boosting tax revenue. This reform included changes to income tax law (LISR) for businesses and individuals, excise tax law (LIEPS), Value Added Tax Law (LIVA), and to the federal tax code. For the purpose of this paper, however, the following tax amendments are the most important: With respect to VAT, operations conducted in the border fringes, which prior to the reform had an 11% VAT rate, are now subject to the general 16% rate as of 2014. In addition, financial institutions must still submit annual reports on cash deposits (except electronic money transfers) received by taxpayers in their financial accounts when the total amount exceeds 15,000 pesos per month. Before the reform, these obligations were included in the cash deposit law (LIDE), but are now included in the LISR.

Three characteristics of this reform will be important for identification strategy. First, the reform took place in 2014, which occurred in the timeframe between the two years from which the cross-section survey rounds used in this paper were taken. Therefore, the first round corresponds to the period before the reform was enacted, whereas the second round corresponds to the period after the reform occurred. Second, the amendments to the VAT Law provide location variation to identify the effect of an increase in VAT on the use of bank accounts by household businesses. Before the amendments to the VAT Law in 2014, the *border fringe*, for which VAT was 11%, was the whole territory of the states of Baja California, Baja California Sur, and Quintana Roo. In addition, it included a 20-kilometer fringe from the border of the states of Sonora, Chihuahua, Coahuila, Nuevo León, and Tamaulipas in the north, and a 20-kilometer fringe from the border of the states of Chiapas, Tabasco, and Campeche in the south. The law also specified that some specific localities of Sonora would also be considered as *border fringe* (see Figure 1). After the fiscal reform of 2014, the VAT rate increased from 11% to 16% in all these areas. Finally, the third important characteristic of the reform is that, at all times, financial institutions have an obligation to report cash operations to the fiscal authority, a mandate that did not change with the reform. This was key to tax on cash deposits collection, therefore signaling to banking sector users that this aspect of the law increased tax avoidance detection effectively. According to the central hypothesis described above, this is the reason why microentrepreneurs are more likely to keep their operations away from the financial system when the VAT tax rate increased.

Figure 1

ZONES AFFECTED BY THE 2014 VAT REFORM



Notes: The gray area and the dotted line correspond to the border fringes.
Source: Own. elaboration according to Value Added Tax Law.

3.2 Identification Strategy

This paper aims to evaluate the effect of an increase in the benefits of being informal, derived from a VAT rate increase, on financial inclusion (measured by bank account ownership) of microentrepreneurs.⁶ The outcome variable takes value one if the individual possesses a bank account and value zero otherwise.

Since the VAT change occurred only in specific localities at the northern and southern border, I first used individuals in municipalities located within the 20-kilometer border fringe or those in

⁶ In this paper, we are using the definition of financial inclusion use as stated by the National Banking and Securities Commission (CNBV): Financial inclusion consists of acquiring one or more formal financial products or services, such as a bank account, and the frequency with which they are used.

the states of Baja California, Baja California Sur, and Quintana Roo as the treatment group. Second, as robustness test estimations, I utilized the following treatment group definition: all individuals located in states along the borders. In other words, this group includes border localities both affected and not affected by the tax amendment, but in an affected border state. Although this second treatment group presumably has identification problems, the gains of using it are in terms of sample size were such that I was able to divide the sample in microentrepreneurs, formal salaried workers and informal salaried workers and show that only the former were affected by the VAT rate change. If people in a border state but not in the border fringe benefited from the preferential VAT rate by having their fiscal address in the border fringe while their commercial operations took place somewhere else, the treatment group based on border states is well specified. The control group in all cases is composed of all individuals in localities outside the states that had regions with a preferential VAT rate before 2014; that is, it only includes non-border states (see Figure 2).

Ideally, I would have liked to use panel data to observe the effect of the change in VAT rate from 11% to 16% on the same individuals to control for idiosyncratic characteristics that are otherwise omitted variables. Instead, the time dimension comes from the differing dates from which the two cross-section survey rounds used in this study were taken, the first of which took place before the tax reform (2012) and the second of which was conducted after the tax reform (2015). The underlying assumptions are: 1) individuals in the treatment and control groups share the same aggregate shocks affecting their decision to have a bank account; 2) there are common time trends across groups; and 3) there are no systematic changes within groups. In order to ensure these assumptions hold, this study implements the following precautions: 1) the estimation includes control variables to avoid possible cofounder effects; and 2) the treatment group differentiates between northern and southern microentrepreneurs because significant observed and unobserved differences may exist between the north and south of Mexico.

In other words, results are based on a difference-in-difference strategy in which I compare individuals living in border fringe municipalities with individuals living in non-border states where the VAT rate did not change before and after the tax reform took place.

Figure 2

TREATMENT AND CONTROL GROUPS

TREATMENT GROUP AT THE MUNICIPAL LEVEL



TREATMENT GROUP AT THE STATE LEVEL



Notes: The dark gray area corresponds to the control group. It includes only non-border states. The light gray area and the dotted lines correspond to the treatment group defined at the municipal level or the state level.

Source: Own elaboration.

Then, I compare microentrepreneurs living in border states with microentrepreneurs living in non-border states.

As in most cases, some caveats apply. First, this paper focuses only on microentrepreneurs or household businesses, as it relies on a household survey. The term microentrepreneurs refers to self-employed individuals and business owners with one employee or more. Although in theory this definition includes all types of firms, data is most likely concentrated on smaller firms since households rather than firms are the units of observation. This bias may be insignificant, however, since smaller firms are more likely to be informal than bigger firms. Moreover, focusing on household businesses is valuable since numerous studies focus on understanding why microenterprises lack credit access and on this phenomenon's possible relation to the low productivity of small firms (McKenzie and Sakho, 2010; McCulloch et al., 2010). Another concern is that firm characteristics such as size or age, which are potentially important for determining the probability of owning a bank account, were not included in the estimation due to the design of the survey used in this study. Third, given that the treatment group consists of microentrepreneurs located in three whole states and the 20-kilometers-wide fringe of both the north and south border, there are very few observations in the sample from these areas. Therefore, results rely on two treatment group definitions, one at the municipality level and another at the state level. Since the latter is a less precise definition of the treatment group, the results obtained from this approach are useful for indicating the direction and significance of the effects on microentrepreneurs relative to salaried workers but are less accurate on magnitude.

4. DATA

4.1 National Financial Inclusion Survey

The data used in this paper comes from The National Financial Inclusion Survey (ENIF). The ENIF is a cross-section survey at the household level designed to obtain information regarding financial inclusion and its barriers in Mexico. In particular, it contains information about the use of and access to financial products and services by Mexicans. The Comisión Nacional Bancaria y de Valores

(banking and securities supervisor, CNBV) and the Instituto Nacional de Estadística y Geografía (national statistics agency, Inegi) implemented the two rounds of the survey used in this study in 2012 and 2015, each of which corresponds to a different cross-section. The population of interest is individuals aged between 18 and 70 years old that permanently reside in the national territory of Mexico. The gathered information is representative at the national level, by sex, and for localities, according to whether they have more or less than 15,000 inhabitants.

In the 2012 round, the date of each interview corresponds to a time between May 3 and May 31. In the 2015 round, the interviews took place between July 20 and August 28 <www.inegi.gob.mx>. In each survey, the number of observations is around 7,000 households, although main sections of the questionnaire correspond to specific household member. The 2015 questionnaire survey was a modified version of the one used in the previous round and aimed to collect information on subjects not previously studied. In particular, the survey includes questions related to property ownership and protection of financial users. When I compared both questionnaires, I also detected some changes to the order of the questions and to the sets of possible answers. In order to minimize the effect of inconsistent question design on my results, I attempted to keep definitions as similar as possible between both surveys.

In both surveys, the sample used for estimation corresponds to the adult population between 18 and 65 years old who work and receive a monetary income as either a salaried worker or a microentrepreneur. The intention is to focus only on those individuals who work and earn money. The sample size is 3,354 and 3,570 observations for the 2012 and 2015 rounds, respectively.

4.2 Definitions

In this paper, individuals with bank accounts are those who claimed to own either a savings account, checking account, fixed-term deposit account, payroll account, or investment fund account. Microentrepreneurs are those who identified themselves to be self-employed or business owners with one employee or more. Informal salaried workers are participants who answered that they were in employment during the last month and either have the right to medical attention at private institutions or at the Seguro Popular (government

insurance), do not have access to any medical attention service, or do not know. Formal salaried workers are defined as survey participants that claimed to be in employment during the previous month and have right to medical attention at Instituto Mexicano de Seguridad Social (IMSS), Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE), Petróleos Mexicanos (Pemex), or Secretaría de la Defensa Nacional (Sedena).

4.3 Summary Statistics

Table 1 shows descriptive statistics on the observable characteristics of treated and non-treated individuals. Here, the treatment group is defined at the municipality level. Both groups are very similar with respect to age, number of children and elderly in the household, number of adults in the household, years of education, marital status, percentage of people uninterested in access to financial institutions, percentage of people who do not trust in financial institutions, and percentage of people who claim the bank branch is far away. However, the groups demonstrate apparent differences in earnings, percentage of men, percentage of people who are head of the household, percentage of people who are salaried workers, percentage of people who are microentrepreneurs, percentage of people who do not have the necessary documentation to have a bank account, and percentage of people who save informally. Interestingly, on average, the control group is poorer than the treatment group, and given that schooling is very similar between groups, this phenomenon seems to relate to the fact that the control group has fewer formal salaried workers, but a higher number of informal salaried workers and microentrepreneurs than the treatment group.

Table 1

SUMMARY STATISTICS FOR THE COMPLETE SAMPLE

	<i>Treatment group (North and South fringe)</i>	<i>Treatment group (North fringe)</i>	<i>Treatment group (South fringe)</i>	<i>Control group</i>
	<i>Mean</i>			
Age	37.7	38.2	36.4	38.1
Number of children and elderly in the household	1.2	1.2	1.1	1.4
Number of adults in the household	2.3	2.3	2.4	2.5
Years of education	10.0	10.0	9.9	9.9
	<i>Percentage of the sample</i>			
Men	58.37	58.35	58.43	53.39
Married	61.20	62.39	58.43	61.45
Head of the household	60.14	59.02	62.75	55.97
Formal salaried worker	49.76	50.08	49.02	38.08
Informal salaries worker	23.70	23.61	23.92	30.18
Business owner	26.53	26.31	27.06	31.74
State level labor market formality	42.31	42.46	41.97	30.70
State level poverty	32.89	30.89	37.54	47.02
Earnings of less than MXN 3,000	24.29	22.77	27.84	40.54
Earnings from MXN 3,000 to MXN 4,999	29.83	30.02	29.41	29.91

	<i>Treatment group (North and South fringe)</i>	<i>Treatment group (North fringe)</i>	<i>Treatment group (South fringe)</i>	<i>Control group</i>
	<i>Percentage of the sample</i>			
Earnings from MXN 5,000 to MXN 7,999	22.88	22.60	23.53	17.26
Earnings from MXN 8,000 to MXN 12,999	15.09	15.85	13.33	7.76
Earnings from MXN 13,000 to MXN 20,000	5.54	5.56	5.49	2.99
Earnings above MXN 20,000	2.36	3.20	0.39	1.54
Not interested in access to financial institutions	38.80	40.47	34.90	40.02
Do not trust in financial institutions	17.81	16.86	20.00	18.48
Do not have the necessary documentation	25.71	23.95	29.80	27.69
Do save informally	56.37	51.77	67.06	57.33
The bank is far away	1.89	1.69	2.35	1.76
Localities of 100,000 residents or more	59.43	54.97	69.80	46.83
Localities from 15,000 to 99,999 residents	18.28	23.10	7.06	16.72
Localities from 2,500 to 14,999 residents	10.97	10.62	11.76	16.56
Localities of less than 2,500 residents	11.32	11.30	11.37	19.89
N	848	593	255	4,420

Note: For 2012 the sample size is 3,354 observations and for 2015 the sample size is 3,570 observations. In this table, the treatment group is defined at the municipal level. North fringe includes Baja California, Baja California Sur and the 20-kilometer fringe from the border of Sonora, Chihuahua, Coahuila, Nuevo León, and Tamaulipas. South fringe includes Quintana Roo and the 20-kilometer fringe from the border of Chiapas, Tabasco, and Campeche. All other municipalities in the country are the control group. Earnings are deflated to make them comparable; May 2012=100.

Source: Own calculations with data from ENIF 2012 and 2015.

5. METHODOLOGY

5.1 Unconditional Analysis

As a first approximation of the data, Table 2 provides some statistics with respect to bank account ownership for the control and treatment groups. The control group is the row named non-border states. The other four rows refer to the treatment groups at the state level (named border states) and at the municipal level (named border fringe). Data in Table 2 shows the percentage of individuals with bank accounts for each of the aforementioned groups. At the border fringe, our main group of interest, the percentage of people with bank accounts increased 6.1 percentage points from 2012 to 2015. For non-border states, the percentage of people with bank account increased 8.6 percentage points between 2012 and 2015. Therefore, this unconditional analysis indicates that the new legislation regarding VAT decreased bank account ownership by 2.5 percentage points ($6.1 - 8.6 = -2.5$) on average. When only considering microentrepreneurs, the VAT rate change reduced bank account ownership by 2.1 percentage points.

The only difference between border states and border fringe is that the former includes all individuals in states in which at least one municipality was affected by the VAT rate decrease, meaning treatment is at the state level. The main benefit of using this other definition of treatment is that the sample size is greater, which is useful for estimations based on granular groups of interest. According to this other treatment group, the VAT tax rate increased bank account ownership by 0.36 percentage points on average and decreased bank account ownership by an average of nine percentage points among microentrepreneurs.

5.2 Difference-in-Differences

The results from Table 2 could be the result of differences in terms of characteristics between treatment and control groups. To account for such variations, I run the following difference-in-difference equation with OLS:⁷

⁷ In other words, I estimate a linear probability model since the difference-in-differences straightforward interpretation using a linear model does not hold in a non-linear model like the probit or logit models.

Table 2
PERCENTAGE OF INDIVIDUALS WITH BANK ACCOUNT

	2012			2015				
	<i>Total</i>	<i>Formal-salaried</i>	<i>Informal-salaried</i>	<i>Micro-entrepreneurs</i>	<i>Total</i>	<i>Formal-salaried</i>	<i>Informal-salaried</i>	<i>Micro-entrepreneurs</i>
Non-border states N	42.27 2,134	73.70 772	22.12 624	26.42 738	50.92 2,286	78.84 893	30.36 728	35.94 665
Border states N	47.38 1,220	74.75 499	24.91 285	30.73 436	56.39 1,284	79.06 640	36.42 324	31.25 320
Border fringe N	50.76 396	76.47 187	25.25 99	30.00 110	56.86 452	79.11 225	32.14 112	37.39 115
North border Fringe N	55.40 278	81.48 135	25.35 71	36.11 72	54.60 315	74.03 154	32.47 77	39.29 84
South border Fringe N	39.83 118	63.46 52	25.00 28	18.42 38	62.04 137	90.14 71	31.43 35	32.26 31

Note: Border fringe refers to the treatment group based on municipalities that were affected by the VAT rate change; it includes those at the north and the south. Non-border states refer to the control group.

Source: Own calculations with data from ENIF 2012 and 2015.

$$\begin{aligned}
 \text{1 } P(Y_{ims} = 1) = & Z_{im}\beta + \delta_1 \text{Northern}_{im} + \delta_2 \text{Southern}_{im} + \\
 & + \delta_3 D2015_i + \delta_4 D2015_i * \text{Northern}_{im} + \\
 & + \delta_5 D2015_i * \text{Southern}_{im} + \theta_s + \varepsilon_{is}.
 \end{aligned}$$

Y_{ims} is equal to 1 if person i who lives in municipality m and state s has a bank account, zero otherwise. Z_{im} is a vector of control variables that includes the demographic characteristics of the individual (age, age squared, years of schooling, sex, marital status, head of household indicator, real income) and the characteristics of the household (number of children and elderly in the household, number of adults in the household). It also includes the self-reported barriers to enter the financial system (informal savings indicator, not interested in financial system indicator, no trust in financial institutions indicator, do not have the necessary documentation indicator, the bank branch is far away indicator). Finally, it includes the characteristics of the municipality m (locality size indicator, state level labor market formality, and state level poverty). Northern_{im} is equal to one if person i lives in a northern border municipality m , zero otherwise. Southern_{im} is equal to 1 if person i resides in a southern border municipality m , zero otherwise. Finally, $D2015_i$ is equal to 1 if person i was interviewed in 2015; and θ_s is a vector of state fixed effects.

The coefficients of interest are δ_4 and δ_5 . I expect these coefficients to be negative and significant. That is, the probability of having a bank account decreased after the 2014 Fiscal Reform, but only in the municipalities that experienced a change in the VAT rate.

To check that only microentrepreneurs decreased their likelihood of having a bank account due to the reform, running the same regression but dividing the sample into formal salaried workers, informal salaried workers, and microentrepreneurs would have been optimal for this study's purposes. However, this was not possible due to sample size limitations. Therefore, I chose to run same regression as in Equation 1, but used the definition of the treatment group at the state level as follows.

$$\begin{aligned}
 \text{2 } P(Y_{is} = 1) = & Z_i\beta + \delta_1 \text{Northern}_i + \delta_2 \text{Southern}_i + \delta_3 D2015_i + \\
 & + \delta_4 D2015_i * \text{Northern}_i + \delta_5 D2015_i * \text{Southern}_i + \theta_s + \varepsilon_{is}.
 \end{aligned}$$

In this case, subscript i refers to the individual and s refers to the state the individual lives in. Definitions of variables are the same as above.

In both specifications 1 and 2, state indicators and locality size indicators proxy for the costs of opening a bank account which in principle could be different according to location (Allen et al., 2016). In addition, both specifications control for the level of formality in the labor market (i.e., share of labor force registered at IMSS per state) and for the level of poverty (i.e., share of the population who lives in poverty per state). These controls are important, as various government programs have improved financial inclusion of populations in poverty and in the informal labor market during the period of analysis. Furthermore, at the individual level, it is essential to control for income, sex, education, and age, as Allen et al. (2016) found that there are important differences in financial inclusion related to these characteristics. It is also critical to control for marital status since married persons are less likely to have a bank account if their partners own one. Finally, following this argument, whether the individual is head of the household or not is important because heads of households are usually also the main earners of the family and, therefore perhaps more likely to have a bank account. It is also possible that individuals self-exclude from the financial system. According to Allen et al. (2016), those who do not have a bank account usually say that they do not have the necessary documentation to open an account, or claim that banks are too expensive and untrustworthy. I try to control for these self-reported barriers to financial inclusion by using the responses recorded in the survey with respect to other indicators of financial inclusion, such as credit use, ATM use, and bank branch use, among others.

To check that only microentrepreneurs decreased their likelihood of having a bank account due to the reform, I first provide evidence that both definitions of treatment group yield similar results (although the treatment group defined at the state level may have identification problems). Then I run the same regression as in Equation 2 but divide the sample into formal salaried workers, informal salaried workers, and microentrepreneurs.

6. RESULTS

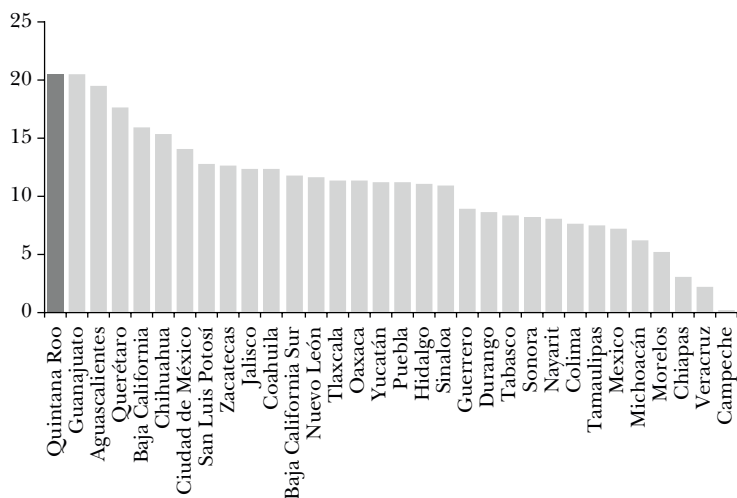
6.1 Difference-in-Differences Results Using Different Treatment Group Definitions

Column 2 of Table 3 shows the results from estimating Equation 1 in which the definition of the treatment group is at the municipality level, meaning only municipalities in which the VAT rate changed are included in the treatment group. Since these estimates use the whole sample, indicator variables for whether the individual is a microentrepreneur or an informal salaried worker are included as control variables. According to the results, residing in a northern border locality after the reform decreases the probability of having a bank account by nine percentage points, the effect of which is statistically significant at the 5% level.

For individuals residing in a southern border state, the probability of having a bank account is positive and significant after the tax amendment (the coefficient is 0.125 and significant at the 5% level). This last result is not as expected, which could be due to differences between the treatment group in southern border localities and the control group with respect to other observed and unobserved characteristics for which I did not control in the estimation. More research on this issue is necessary to understand what could be confounding the results. One key issue in the data is that when considering the treatment group at a municipality level in the southern border, we have very few observations from the states of Chiapas, Tabasco, and Campeche. This is because of the fact that there are no major cities on the 20-kilometer border fringe of these states, and that this zone mainly consists of biosphere reserves. As a result, the treatment group for the south considered in this exercise tends to represent only the whole state of Quintana Roo, which is the state with the highest growth in the number of workers in the formal sector from 2012 and 2015 (see Figure 3). Given the fact that by law the salary of workers should be paid in payroll bank accounts, the formalization of workers implies an increase in the number of people with bank accounts. Hence, this positive effect of job formalization could have compensated for the potential negative result of a VAT increase on holding a bank account in the southern fringe.

Figure 3

GROWTH RATE OF WORKERS IN THE FORMAL SECTOR, 2012-2015



Note: The number of formal workers refers to the number of registered people at IMSS.
Source: INEGI.

The northern border result is consistent with the hypothesis that individuals living in municipalities in the northern border were less likely to have a bank account after the VAT rate increased from 11% to 16%, compared to the control group in which the VAT rate did not change. The hypothesis claims that as the VAT rate increased, the demand for goods and services in the informal sector, where no VAT is charged, also increased. In such circumstances, partial tax compliance increases among microentrepreneurs and, given that fiscal authority has access to financial system information, bank account ownership is more likely to decrease. To prove that such an effect only occurs among microentrepreneurs and not among formal or informal salaried workers (because salaried workers cannot credit VAT payments), it is necessary to run this regression for each of these groups separately.

Continuing with the results in Column 2 of Table 3, the probability of having a bank account is 33.6 percentage points lower for microentrepreneurs than for formal salaried workers. In addition, this probability is 38 percentage points lower for informal salaried workers than for formal salaried workers. Both effects are statistically significant at the 1% level. The probability of having a bank

account significantly increases by 6.5 percentage points for women relative to men in which the estimate is significant at the 1% level. Given that the sample was restricted to adults who work and earn money, this may be related to unobserved characteristics of women who self-select into employment that is related to participation in the financial system.⁸ Additionally, the probability of owning a bank account increases 3.3 percentage points for household heads, with the coefficient being statistically significant at the 5% level. According to the results, one more year of schooling increases the probability of owning a bank account by 1.7 percentage points with the coefficient statistically significant at the 1% level. Relative to income, all income brackets have positive coefficients significant at the 1% level. The effect on financial inclusion is more prevalent at a higher level of income, with the exception of the last income bracket. Earning between 13,000 real pesos and 20,000 real pesos increases the probability of owning a bank account by 28.1 percentage points compared to individuals who earn less than 3,000 pesos. In contrast, earning between 3,000 real pesos and 5,000 real pesos increases the probability of owning a bank account by only 5.5 percentage points. Unexpectedly, variables related to self-reported barriers of entering into the financial system have a positive and significant effect on the probability of having a bank account.

Column 3 of Table 3 shows the results from estimating Equation 2, where the definition of the treatment group is at the state level; that is, observations located in states where at least one municipality was affected by the VAT rate change are included in the treatment group. According to these results, the probability of having a bank account is 4.7 percentage points lower after the tax amendment in affected states, the effect of which is statistically significant at the 5% level. Comparing this result to the one obtained in column 2, we cannot reject the null hypothesis that they are the same. In fact, *t*-tests for each variable comparing estimates in columns 2 and 3 show that estimated coefficients are similar, except for the interaction term $I(t = 2015)_{it} * Southern_{is}$. This is evidence that, in this case, results using the broader treatment group yields more similar results than the narrower treatment group.

⁸ Another potential explanation is that between 2012 and 2015, women participating in welfare programs now participated in the financial system, as many transfers were paid through bank accounts. However, the estimation includes poverty level indicators to control for such effect.

Table 3

ORDINARY LEAST SQUARES RESULTS

	<i>Treatment defined at the municipal level</i>	<i>Treatment defined at the state level</i>
I(t=2015)	0.065 ^c (0.030, 0.101)	0.054 ^c (0.021, 0.087)
Northern	-0.134 (-0.368, 0.100)	-0.127 (-0.329, 0.0759)
Southern	-0.309 ^c (-0.528, -0.089)	-0.274 ^a (-0.592, 0.043)
I(t=2015)*Northern	-0.090 ^b (-0.162, -0.02)	-0.047 ^b (-0.095, -0.0007)
I(t=2015)*Southern	0.125 ^b (0.018, 0.231)	0.022 (-0.039, 0.084)
Microentrepreneur	-0.336 ^c (-0.369, -0.304)	-0.346 ^c (-0.375, -0.318)
Informal salaried worker	-0.380 ^c (-0.412, -0.348)	-0.381 ^c (-0.409, -0.353)
Women	0.065 ^c (0.039, 0.093)	0.073 ^c (0.050, 0.096)
Age	-0.003 (-0.010, 0.004)	-0.003 (-0.009, 0.003)
Age-squared	0.00004 (-4.4E-05, 1E-04)	0.00004 (-2.6E-05, 0.0001)
Married	-0.0000330 (-0.025, 0.025)	0.00346 (-0.018, 0.025)
Head of household	0.0331 ^b (0.004, 0.062)	0.0322 ^b (0.007, 0.057)
Years of education	0.0170 ^c (0.014, 0.020)	0.0165 ^c (0.014, 0.020)
Earnings from MXN 3,000 to MXN 4,999	0.0554 ^c (0.024, 0.087)	0.0526 ^c (0.025, 0.080)

Earnings from MXN 5,000 to MXN 7,999	0.114 ^c (0.076, 0.153)	0.126 ^c (0.093, 0.159)
Earnings from MXN 8,000 to MXN 12,999	0.227 ^c (0.182, 0.273)	0.220 ^c (0.180, 0.260)
Earnings from MXN 13,000 to MXN 20,000	0.281 ^c (0.221, 0.342)	0.287 ^c (0.236, 0.338)
Earnings above MXN 20,000	0.251 ^c (0.166, 0.337)	0.252 ^c (0.182, 0.323)
Number of children and elderly	-0.003 (-0.0134, 0.007)	-0.002 (-0.011, 0.006)
Number of adults in the household	0.004 (-0.0054, 0.014)	-0.001 (-0.010, 0.007)
Not interested in financial system	0.042 ^c (0.0192, 0.067)	0.042 ^c (0.022, 0.063)
Do not trust in financial institutions	0.119 ^c (0.089, 0.150)	0.112 ^c (0.085, 0.138)
Do not have the required documents	-0.008 (-0.0346, 0.017)	-0.009 (-0.032, 0.013)
Informal savings	0.045 ^c (0.022, 0.070)	0.037 ^c (0.016, 0.058)
Bank branch is far away	0.049 (-0.0273, 0.127)	0.020 (-0.043, 0.084)
Constant	0.939 ^c (0.323, 1.56)	0.656 ^b (0.097, 1.21)
N	5,268	6,924
R ²	0.318	0.317
State fixed effects	Yes	Yes
Locality size indicators	Yes	Yes
Formality and poverty indicators	Yes	Yes

Note: ^a p<0.1, ^b p<0.05, ^c p<0.01. The 95% confidence interval is in parentheses.

Source: Own calculations with data from ENIF 2012 and 2015.

Table 4

ORDINARY LEAST SQUARES RESULTS BY GROUPS OF INTEREST

	<i>All</i>	<i>Formal salaried</i>	<i>Informal salaried</i>	<i>Micro- entrepreneur</i>
I(t=2015)	0.0542 ^c (0.0169)	0.0303 (0.0276)	0.0431 (0.0305)	0.0768 ^b (0.0315)
Northern	-0.127 (0.103)	-0.133 (0.149)	0.0424 (0.215)	-0.164 (0.199)
Southern	-0.274 ^a (0.162)	-0.225 (0.238)	-0.00370 (0.338)	-0.426 (0.307)
I(t=2015)*Northern	-0.0479 ^b (0.0240)	-0.0249 (0.0351)	-0.0391 (0.0506)	-0.124 ^b (0.0482)
I(t=2015)*Southern	0.0225 (0.0315)	0.0768 (0.0500)	0.0346 (0.0634)	-0.0273 (0.0557)
Microentrepreneur	-0.346 ^c (0.0143)			
Informal salaried	-0.381 ^c (0.0142)			
Women	0.0732 ^c (0.0118)	0.0313 ^a (0.0178)	0.105 ^c (0.0228)	0.113 ^c (0.0224)
Age	-0.00339 (0.00302)	-0.00210 (0.00493)	0.00865 (0.00551)	-0.0135 ^b (0.00600)
Age-squared	0.0000470 (0.0000373)	0.0000131 (0.0000614)	-0.0000860 (0.0000718)	0.000170 ^b (0.0000697)
Married	0.00346 (0.0111)	0.0126 (0.0169)	-0.00648 (0.0208)	0.00433 (0.0214)
Head of household	0.0322 ^b (0.0128)	0.0189 (0.0196)	0.0207 (0.0250)	0.0516 ^b (0.0233)
Years of education	0.0165 ^c (0.00150)	0.0127 ^c (0.00236)	0.0190 ^c (0.00290)	0.0183 ^c (0.00266)
Earnings from MXN 3,000 to MXN 4,999	0.0526 ^c (0.0141)	0.0980 ^c (0.0274)	0.00538 (0.0227)	0.0661 ^b (0.0260)
Earnings from MXN 5,000 to MXN 7,999	0.126 ^c (0.0171)	0.172 ^c (0.0287)	0.0789 ^b (0.0342)	0.134 ^c (0.0338)

Earnings from MXN 8,000 to MXN 12,999	0.220 ^c (0.0204)	0.260 ^c (0.0300)	0.186 ^c (0.0575)	0.234 ^c (0.0476)
Earnings from MXN 13,000 to MXN 20,000	0.287 ^c (0.0259)	0.275 ^c (0.0337)	0.580 ^c (0.0785)	0.374 ^c (0.0610)
Earnings above MXN 20,000	0.252 ^c (0.0360)	0.242 ^c (0.0441)	0.280 (0.179)	0.350 ^c (0.0699)
Number of children and elderly	-0.00225 (0.00445)	-0.00627 (0.00743)	0.00840 (0.00844)	-0.00609 (0.00755)
Number of adults in the household	-0.00178 (0.00435)	-0.00400 (0.00710)	0.00409 (0.00835)	-0.00698 (0.00758)
Not interested in financial system	0.0422 ^c (0.0105)	0.0359 ^b (0.0154)	0.0747 ^c (0.0209)	0.0207 (0.0203)
Do not trust in financial institutions	0.112 ^c (0.0136)	0.0876 ^c (0.0166)	0.139 ^c (0.0327)	0.133 ^c (0.0298)
Do not have the required documents	-0.00969 (0.0115)	0.00849 (0.0181)	-0.00757 (0.0218)	-0.0163 (0.0209)
Informal savings	0.0370 ^c (0.0107)	0.0241 (0.0162)	0.0475 ^b (0.0205)	0.0407 ^b (0.0197)
Bank branch is far away	0.0207 (0.0325)	0.126 ^b (0.0528)	0.0141 (0.0727)	-0.0523 (0.0486)
Constant	0.656 ^b (0.285)	0.640 (0.415)	-0.612 (0.586)	0.887 ^a (0.539)
N	6,924	2,852	1,913	2,159
R ²	0.32	0.13	0.14	0.17
State fixed effects	Yes	Yes	Yes	Yes
Locality size indicator	Yes	Yes	Yes	Yes
Formality and poverty indicators	Yes	Yes	Yes	Yes

Note: a $p < 0.1$, b $p < 0.05$, c $p < 0.01$. The 95% confidence interval is in parentheses.
Source: Own calculations with data from ENIF 2012 and 2015.

6.2 Who Is Less Likely to Have a Bank Account?

Given that the results are not statistically different for treatment groups defined at the municipal level or state level, I use the latter to estimate Equation 2 for formal salaried workers, informal salaried workers, and microentrepreneurs separately. Continuing with the main hypothesis of the present paper, the increase in the VAT rate only affects the decision of having a bank account by microentrepreneurs because the fiscal obligations of salaried workers did not change with the VAT rate increase. In contrast, both formal and informal microentrepreneurs are more likely to stay out of the financial system when the VAT rate increases, and given that the risk of tax evasion detection is greater when the fiscal authority cross-checks fiscal obligations with information from banking institutions. Table 4 shows the results of estimating Equation 2 for the whole sample (same results as in Table 3, column 3), and for formal salaried workers, informal salaried workers, and microentrepreneurs respectively. The results indicate that among microentrepreneurs residing in a northern border state there was a decrease in the probability of having a bank account by 12.4 percentage points after the reform, significant at the 5% level. For formal and informal salaried workers, the effect is similarly negative but not statistically significant. In this case, the effect of the tax amendment on individuals with residence in a southern state is not statistically significant for any of the groups of interest. With respect to all other regressors, results are very similar to previous estimations with the exception of age, which produced statistically significant results for microentrepreneurs, and the indicator for those “not interested in the financial system,” which did not have statistically significant results for microentrepreneurs.

6.3 Placebo Test

As a robustness check to rule out the possibility of spurious results, I drop all treated states and keep only non-border states. I then randomly assign these states into treatment and control groups. I redo estimates using Equation 2 for the whole sample, restricting it to microentrepreneurs respectively. As shown in Table 5, the interaction term of interest is not statistically significant in any of the two columns.

Table 5

PLACEBO TEST ORDINARY LEAST SQUARE RESULTS

	<i>All</i>	<i>Microentrepreneur</i>
I(t=2015)	0.0642 ^c (0.0205)	0.0804 ^b (0.0391)
Placebo	-0.155 (0.148)	-0.103 (0.283)
I(t=2015)*placebo	-0.00439 (0.0260)	-0.00754 (0.0495)
Business owner	-0.337 ^c (0.0181)	
Salaried-informal worker	-0.377 ^c (0.0179)	
Woman	0.0710 ^c (0.0150)	0.103 ^c (0.0287)
N	4,420	1,403
R ²	0.31	0.16
State fixed effects	Yes	Yes
Other controls	Yes	Yes

Note: ^ap<0.10 ^bp<0.05 ^cp<0.01. Robust standard errors are in parentheses. Treatment group is defined at the state level. Source: Own calculations with data from ENIF 2012 and 2015.

7. CONCLUSIONS

This paper analyzes the effect of an increase in VAT on the probability of having a bank account by microentrepreneurs. It relies on a difference-in-difference approach based on a legislation change that took place in Mexico in 2014. This tax amendment represents a natural experiment to evaluate an exogenous increase in the benefits of being informal on the probability of owning a bank account by comparing microentrepreneurs located in areas affected by the tax amendment to microentrepreneurs in other locations, before and after the reform. The hypothesis is that an increase in the VAT rate increases the benefits of being informal, which in turn decreases the probability that microentrepreneurs will open a bank account to avoid inspections. The results suggest that an increase in the VAT

rate negatively affects the financial inclusion decision of microentrepreneurs. More precisely, the probability of having a bank account decreased 9.1 percentage points after the reform took place for individuals who resided in a northern border municipality. Due to sample size limitations, we define the treatment group at the state level and redo the estimation for formal salaried workers, informal salaried workers, and microentrepreneurs separately. Results indicate that the probability of having a bank account decreases for microentrepreneurs in which the effect is statistically significant at the 5% level. Moreover, the probability of owning a bank account for both formal salaried workers and informal salaried workers did not significantly change because of the VAT rate increase.

The previous literature argues that small informal firms are the ones with the lower probability of having a bank account. Further research can aim to definitively prove or disprove this claim by measuring the size of microenterprises by income or by dividing them between those who have employees and those who do not. The ENIF 2015 can also provide further evidence about the main hypothesis of this paper by verifying that entrepreneurs are more likely to have canceled their bank account in the past than other groups. A third potential topic for future study is research on whether the location of an individual in a northern or southern border state would affect the ease with which that person could obtain benefits from the financial system. For example, an explanation for the fact that northern states were affected differently to southern states could be that opening an account in the USA enables individuals to more easily obtain benefits from the financial system than opening an account in Guatemala.

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