Loans and Employment: Evidence from Bank-Specific Liquidity Shocks

Román Acosta*
Northwestern University
(Job Market Candidate)

Josué Cortés
Banco de México

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Abstract

This paper investigates the relationship between expansionary credit events and firms' employment decisions. To overcome the endogeneity coming from the supply side of credit we exploit the legal and political framework in Mexico to examine the effects of local governments' prepayment of loans, a situation that leads banks to channel newfound liquidity to firms. Analysis of a novel data set covering a 10-year period shows that a one-standard-deviation increase in the issuance of new loans increases firms' employment by 2.57 percentage points. Timing of the boost in employment varies with smallest firms reacting immediately and larger firms reacting four months later. The effects are driven by firms in the manufacturing sector. The results highlight the importance of the bank lending channel to stimulate employment in the short run, especially for smaller firms. Further, our estimates suggest that the effect of credit on employment could be amplified with policies that promote a more competitive corporate loan market.

Keywords: corporate loans, bank lending channel, employment

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1 Introduction

The 2008-2009 global financial crisis showed the importance of understanding the relation between firms' access to credit and employment. Far-reaching economic consequences can arise due to credit-constrained firms reducing employment despite having sound fundamentals. The literature on this topic has focused on how financial frictions can reduce firms' access to credit and impair job growth (Chodorow-Reich, 2013; Benmelech et al., 2011). However, to complete the picture we need to understand how firms respond to an increase in their access to credit. Assuming that this relation is symmetrical to one of employment and credit crunches can lead to costly policy decisions if this assumption does not hold. This becomes especially important for policymakers trying to stimulate job creation through credit expansions (Yellen, 2013). Ideally, we would like to know how these credit-expanding policies operate on different types of firms (Bernanke et al., 2010). Unfortunately, studies in this literature are often limited to specific groups of firms for which financial and employment data is available.

This paper studies how employment responds to an increase in firms' access to credit. Our quasi-experimental design exploits institutional characteristics of Mexican credit markets. We identify bank-specific liquidity shocks that are exogenous to borrowing firms, originated with the prepayment of local government loans, that increase the bank's supply of credit. To study the effects of this increase in credit, we construct a novel dataset that follows the employment and borrowing decisions of firms nationwide from 2009 to 2018. We estimate that a one-standard-deviation increase in new credit increases a firm's number of employees by 2.57 percent. The richness of the data allows us to look at firms of different sizes. We find that response times vary significantly across firms. For example, firms with a handful of employees increase employment within the first month of receiving more credit and the boost in employment continues after 12 months. In contrast, larger firms can take up to four months and the stimulus fades away in eight months. Finally, we test whether differences in capital intensity of investment among firms and competition in the

corporate credit market explain the mechanisms behind these results.

The first part of this paper develops the identification strategy. The main challenge is to separate the bank's loan offerings from the firm's demand for credit. To do this, we find variations in the banks' liquidity originating in the prepayment of local government loans. This variation is substantial because, unlike local governments in the US, Mexican local governments have a negligible capacity to issue bonds and virtually all of its borrowing comes from bank loans. The key aspect of prepayments is that they are not related to firms' demand for credit; their main drivers are local political considerations (Kinto, 2014; Benton and Smith, 2017). We test this piece of common knowledge and, as expected, we find no relation between the prepayment events and the economic situation at the local or national level. Our identification strategy has two features that are unusual in this literature. First, it allows us to study credit expansions instead of the more common credit crunches. Second, it does not rely on a systemic shock to the economy or a structural policy change. Indeed, local government loans are highly concentrated in 32 states and some big municipalities, which means that a single loan can represent a large percentage of the bank's portfolio. At the same time however, a single loan is not large enough to disturb the whole financial system. This gives our estimations the advantage of being derived in "normal times", which can be useful for policy makers considering credit expansions to stimulate employment outside of a crisis.

To connect bank-specific shocks to firms, we rely on an important characteristic of the Mexican banking system: its strong relationship banking. This phenomenon occurs when banks find it more profitable to offer new loans to customers with which they have developed a relationship than to look for new customers. More than 53 percent of firms in our sample deal with at most one bank and less than seven percent deal with more than three. This means that firms that have dealt with banks receiving liquidity shocks in the past are more exposed to the shocks. Our results for the first stage confirm this. A firm connected to a bank that experiences an increase in liquidity of one percent will receive 0.46 percent more liquidity from

that bank.

We construct a new dataset with two main sources of information to conduct our analysis. The first one is a monthly report of corporate loans that banks are required to file to Mexican regulators. This allows us to follow firms' borrowing behavior for the past 10 years as well as to keep track of their banking relationships. The second source of information comes from the Mexican department of social security, which keeps monthly records of wages for all workers employed by private firms. This gives us the opportunity to study firms of all sizes, including the smallest firms in the economy. This is important because small firms are an important driver of gross job creation (Bernanke et al., 2010) and studies are often limited in their ability to analyze them due to data restrictions.

To estimate the effect on employment we use exogenous liquidity shocks to banks as an instrumental variable for the supply of new credit to firms. Our estimates confirm a positive relation between more access to credit and an increase in payroll. With no significant increase in the average or median wage in the firm, the effect is mainly driven by new hires: a one-standard-deviation increase in new credit increases the number of employees by 2.57 percentage points or around 1.7 employees for the average firm. To continue with the analysis we separate firms in four groups according to their size measured in employees. The magnitude of the effects is similar across different firm sizes, but the reaction times vary significantly. Firms in the first quartile of the number of employees see an almost immediate increase in the number of employees after receiving more credit, with the effect persisting over the next 12 months. Conversely, employment in firms in the second and third quartiles take around four months to respond to more credit and this effect fades away within the first 12 months. For firms in the fourth quartile we do not observe an increase in employment after the firms access more credit. The largest response of these firms comes before they receive the credit.

To understand the heterogeneity in the response of employment across firms we explore two mechanisms. First, to understand why smaller firms react faster we

test the relation between capital needs and employment growth. The objective is to understand if labor is growing because of its complementarity with capital or if firms are directly hiring new workers. Unfortunately, we do not observe capital expenditures in our data, so we take a different approach. We separate firms in manufacturing and non-manufacturing sectors under the premise that firms in the manufacturing sector have higher capital requirements. Hence, if labor is growing because it is a complement to capital, we should observe that manufacturing firms present a slower response to more credit. Our results for firms in the first quartile show that this is not the case; firms in the manufacturing sector have a faster response. This suggests that for these firms the direct effect of credit on labor is more important. For firms in the second and third quartile the response in both sectors is more similar. These results suggest that as firms increase their size, their employment growth is more closely related to their capital investments.

The second mechanism we explore helps us understand the anticipated reaction in employment for firms in the fourth quartile. We posit that this effect reflects the banks' ability to choose the firms they prefer to lend to. This is unlikely to be the case for the smaller firms in our sample, due to the cost of placing small corporate loans individually. However, as firms grow, it may become profitable for banks to take the time to screen and pick among their best performing clients to offer new loans. If this performance is correlated with past employment growth this would explain the anticipated effect of new credit on employment. This explanation would only be plausible in a context of very low competition in the Mexican corporate loan market. To test this hypothesis, we study the changes in the interest rate offered by banks after they experience a liquidity shock. A reduction of the interest rate would suggest that banks need to lower their prices in order to place more credit in the market. We find no evidence of a decrease in interest rates. On the contrary, we find a modest increase, although it is still statistically significant. This increase in the interest rate is largest for the smallest firms in the sample, which is consistent with previous diagnoses of the Mexican corporate loan market (Banxico, 2015).

Our findings paint a richer picture of the effects of credit expansions for firms in normal times. Our estimations suggest moderate effects on employment, with a rapid response from the smallest firms in the economy. These results suggest that policy makers trying to use the bank lending channel to stimulate job growth are better off focusing on expanding credit to small firms. It is worth underscoring that firms in our sample take additional credit at an extra cost; this suggests that improving the competition in the corporate loan market for small firms could further amplify the stimulating effects of credit.

The rest of the paper proceeds as follows: Section 2 describes the Mexican institutional context in detail and provides an overview of the literature. Section 3 presents the data we use. Section 4 explains the natural experiment setup. Section 5 presents our main results. Section 6 shows the changes in loan conditions that we use to draw inferences about the competitiveness of the Mexican corporate loan market. Section 7 concludes.

2 Mexican Institutional Context and Literature Review

Access to bank financing by Mexican firms is limited. For example, estimates suggest that around half of Mexican firms lacked access to bank financing in 2010 (Banxico, 2015). The Mexican banking system is also highly concentrated. Using the corporate loan census by the Comisión Nacional Bancaria y de Valores (CNBV), we observe that the 10 largest banks make 90 percent of the loans to Mexican firms.

For these reasons, relationship banking is strong in the Mexican economy. In Mexico, only 17 percent of the firms with bank loans from 2009 to 2018 had outstanding balances with more than two banks (see Table 3). This suggests that firms in Mexico may be exposed to bank-specific shocks in the economy. To find these bank-specific shocks we turn to another peculiar characteristic of the Mexican financial system: the deep dependence of local governments on bank loans to finance

their projects.

Unlike states and municipalities in the United States, local governments in Mexico rarely issue bonds to finance infrastructure projects. According to the local government debt registry of the Mexican ministry of finance, only 4.8 percent of the total debt held by local governments was in the form of bonds. In contrast, almost 90 percent of total debt held by states and municipalities in Mexico is in the form of bank loans. [1]

As a result of this setup, banks are the most exposed actors in the financial system to changes in local governments' management of their debt portfolio. The Mexican literature has documented the dependence of debt management decisions on political variables from an empirical standpoint. Studies show how debt related decisions of Mexican local governments strongly correlate to the local political context for states (Kinto, 2014) as well as municipalities (Benton and Smith, 2017). These results are unsurprising given the Mexican institutional framework. For example, all local governments planning to refinance debt need approval of the local congress (for states) or the town hall (for municipalities). Hence, any decision regarding the government's debt necessarily passes through the legislative process. Institutional features like this one allow us to use local government debt prepayment decisions as a source of variation in the available liquidity of banks that is plausibly uncorrelated with the firms' demand for credit, especially those firms out of state.

The literature in political economy has also explored the strong relationship between debt management and politics from a theoretical standpoint (Alesina and Passalacqua, 2016). For example, political budget cycle models explain how governments are induced to cut taxes and/or increase spending before an election – thus, potentially acquiring more debt (Rogoff, 1990; Rogoff and Sibert, 1988; Drazen and Eslava, 2006). Other models argue that public debt can be used as a strategic variable by politicians uncertain about their future tenure in office (Alesina and Tabellini, 1990; Aghion and Bolton, 1990; Lizzeri, 1999). Finally, this literature has

[1] Available online at http://disciplinafinanciera.hacienda.gob.mx

also documented the driving force of the common pool problem in fiscal policy, in which the agents in charge of deciding the level of spending do not fully internalize its costs, leading to excessive spending (Weingast et al., 1981; Baron and Ferejohn, 1989; Battaglini and Coate, 2008a).

From the perspective of the bank, a debt prepayment means that the bank is at risk of losing a costumer. Indeed, when a state or municipality decides to prepay its debt, the process usually involves refinancing by acquiring debt with different banks.[2] Unlike the relationship banking observed at the firm level, the financing needs of states and municipalities are so large that most of them contract debt with multiple banks. This gives us the opportunity to trace the events in which a bank loan is prepaid unexpectedly before its contractual maturity. This in turn generates an unexpected excess cash flow in the bank's balance sheet. If the bank wants to keep making money, it needs to use this cash to purchase an asset that will compensate for the lost revenue from the local government.

Then, because corporate loans are among the assets that banks could purchase, these prepayments may thus increase the bank's willingness to lend, effectively relaxing the bank-specific credit supply. In this sense, the prepayments from the local governments act as a positive liquidity shock to firms. In Section 5 we document that the sensitivity of banks' lending to firms is around 0.46 percentage points for each one percentage point increase in local government debt prepayment.

Having established the relation between local government prepayments and a bank's supply of credit, we analyze the impact on firms' employment decisions. To do this we take advantage of the Mexican regulatory setup. All private firms in Mexico are required to register their employees in the Mexican Institute of Social Security (Instituto Mexicano del Seguro Social, known by its Spanish acronym, IMSS). This institute is responsible for the administration of public health care and other worker

[2]From the perspective of the local government, this process can be a refinance (if it uses funds from a different bank), a prepayment (if it uses its own funds to pay for the loan), or a restructure (if it stays with the same bank but improves on the terms of the credit contract). From the perspective of the bank, the first two constitute a prepayment, which is the case we are interested in examining.

benefits such as childcare, pensions, and disability insurance. Hence, IMSS has demographic information and employment conditions for all people employed in private firms. By linking the CNBV corporate loan data set and the IMSS monthly employee records, we are able to study how the changes in the firms' access to finance affect their employment outcomes.

The corporate finance literature has documented the effects of credit crunches and institutional changes on financial markets on employment. For example, Berton et al. (2018) document the effect of credit supply-side shocks on job contracts. Benmelech et al. (2011) document how financial frictions and access to credit affect firm-level employment decisions, as well as aggregate unemployment outcomes. Chodorow-Reich (2013) uses dispersion in a lender's health after the Lehman Brothers bankruptcy to track the effect of access to finance to a firm's employment decisions. Similarly, Bentolila et al. (2013) exploit solvency problems from Spanish banks in the Great Recession.

These studies largely exploit significant financial or economic events or institutional changes to analyze firms' responses to changes in access to finance. Most of these events involve negative shocks to access to finance, and occur in periods of overall economic and financial distress. By contrast, our work examines positive shocks in firms' access to credit, looks at the responses of firms to changes in their access to finance in crisis-free times. We analyze the period from the second semester of 2009 to the end of 2018, an economically stable period in Mexico with modest economic growth. Our work uses these lenses to shed light on the importance and effects of access to finance for firms.

3 Data

We use two sources that provide loan and firm-level data spanning the 10-year period (2009-2018). The first source is a monthly report of all loans issued to firms by financial institutions operating in Mexico. This report is mandatory and is enforced by the *Comisión Nacional Bancaria y de Valores*, the Mexican equivalent of the

U.S. *Securities and Exchange Commission.*

This report tracks two aspects of the loans. First, it captures the terms and conditions of all new loans, including the issuing financial institutional, the receiving firm, and the agreed-upon financial terms such as authorized funds, interest rate, and maturity of the loan. Second, the report tracks the monthly status of each loan issued to the firms in the past. Regulations require financial institutions to report whether a loan was prepaid before it reached the maturity date, and whether the prepayment was due to a restructure of the loan, a refinancing, or other motives.

This last condition allows us to track prepayments of local government loans and differentiate them from restructures or loans that were terminated for other reasons before reaching maturity. Also, the loan-level data allow us to construct a measure of proximity between firms and banks: We say that a firm is connected to bank i at time t if the firm had any loans with bank i prior to period t.

The second data set is the administrative records of employees working for Mexican firms. These records contain monthly information about Mexican workers' employment, including their gender, daily salary, and the name, tax identification number and other information about their employer. To link these records with the loan census data, we signed a collaboration agreement between the IMSS and the CNBV to share the tax identification number of firms with the Bank of Mexico. In this way, we have unprecedented access to the merged data sets for the firms operating in Mexico in the last months of 2018. This allowed us to analyze a subpopulation of more than 118,000 Mexican firms.

4 Natural Experiment Setup

We exploit the characteristics of Mexican capital markets, the banking system in Mexico, the political factors governing public debt decisions at the local government level, and the strong presence of relationship banking between firms and banks. In this section we go over each one of these dimensions and explain how they build up to the main argument in our identification strategy.

4.1 Mexican Capital Markets and Local Governments

Unlike local governments in the United States, states and municipalities in Mexico finance their budgets mainly from bank loans, as shown in Table 1. In the first quarter of 2019 almost 95 percent of local government liabilities where held by banks in the form of loans. Less than 5 percent of total liabilities were held by the public. In contrast, according to the Organisation for Economic Co-operation and Development (OECD), almost 60 percent of the liabilities held by U.S. local governments in 2014 were in the form of debt securities.

These aspects of the Mexican market are important for two reasons. First, the large market for local government loans means that there is a higher chance that prepayments will be large enough to relax a bank's supply of credit. Second, the data show that local government lending is an important business for banks. According to public CNBV data, local government lending represents around 20 percent of Mexican banks' commercial lending portfolio.

4.2 Politics as a Driver of Local Fiscal and Financial Decisions

The main motivation behind using local government debt prepayment, instead of any other type of debt prepayment, is that debt management decisions are strongly driven by political factors: the party composition of local congress, changes in the party in power, and electoral timing are among the most-cited drivers in both the empirical and theoretical literature.[3]

The following two excerpts of news articles exemplify the findings of the Mexican political economy literature. In the first, the governor of the State of Mexico argues that a debt restructure (which he refers to as "refinance") should take place immediately because of a looming shift of power to the opposing party: "Before losing majority in local Congress, the PRI governor Alfredo del Mazo asks legislators for the authorization to refinance the state's public debt for more than 43 billion pesos"

[3]For more on this literature see Section 2.

(Mendoza, 2018). In the second article, the new governor of the state of Quintana Roo argues for restructuring (again, using the term "refinance") state debt based on bad budgetary management by his predecessors in the opposing party: "Governor Carlos Joaquín González, informed that he has approached financial institutions to refinance the state's debt of 19 billion pesos... the transition team informed that the previous administration left the state in bankruptcy with a deficit of 2.7 billion pesos..." (Vázquez, 2016).

To test the idea that the decisions to prepay a local government loan are not related to the firms' demand for credit at the national level we use the prepayment episodes in our sample. We construct a panel of the 32 states in Mexico across 114 months, July 2009 through December 2018, with economic indicators at the national and state level. Our expectation is that none of the economic variables are the national level will be good predictors of a local government loan prepayment.

The model we use is:

$$Prepayment_{it} = \beta_0 + \beta X_{it} + \gamma_i + \eta_{m(t)} + \epsilon_{it}$$

Where $Prepayment_{it}$ takes the value of one when state i makes a prepayment in period t. X_{it} will be the annual percentage changes on different economic indicators. All specification include months fixed effects to control for seasonality effects on the corporate debt market and errors are clustered at the year level. Table 7 presents the results of this exercise.

Column 1 shows the results of the first specification using the unemployment rate at the national level. The estimated coefficient is 0.00005 and it is not statically nor economically significant. Column 2 adds the state unemployment rate and state level fixed effects, but the results are similar; there is no apparent relation between unemployment at the national or state level and prepayment episodes. Column 3 repeats the same exercise but this time using economic indicators that proxy for the monthly behaviour of the GDP. Again, none of these variables is statistically or economically significant to explain prepayment episodes.

The next specification builds upon the previous one by adding the reference interest rate and the price of Mexican oil. We include these two variable for different reasons. The reference interest rate is an important financial determinant of the total cost of the loan and it is especially important in a debt refinancing process. In the other hand, oil revenues make up for a significant portion of the government's funds, including state and municipal governments. Column 4 presents the estimations for this specification, in which none of these variables is statistically or economically significant. Finally, column 5 presents the results of the same specification as in Column 4 but with the addition of the unemployment variables. The results do not change.

The findings in this literature and the evidence we provide support our identifying assumptions: local government prepayments increase the issuance of new bank loans and the cause of these prepayments is orthogonal to firms' demand for credit. That is, the reasons that lead a local government to prepay its debt (from a bank's perspective) do not include the business conditions faced by firms around the country. Further, to eliminate any concerns on how local political factors may correlate with firms' demand for credit, we track the geographical source of the shock and exclude the firms in that same geography from the analysis of the impact of a given shock. Certain characteristics of the Mexican banking system helps us do that (as explained in Section 4.3).

4.3 Banking System in Mexico

Two facts about the Mexican banking system provide reassurance that our identifying assumption holds. First, lending to local governments is highly concentrated in a few banks. This is not exclusive to local government lending. The Mexican banking system is highly concentrated, and most business is conducted by the seven largest banks.[4] Also, because these banks tend to be large, they have operations

[4]According to publicly available data of the CNBV, in 2019Q1 the 7 largest banks held more than 75% of the total commercial debt portfolio (corporate, local government, residential, and consumption) in the country.

throughout the country, as shown in Table 2.

For the purposes of our strategy, the national presence of banks is the second important characteristic of banking and local government loans in Mexico. The nationwide networks mean that the sources of the prepayments are scattered across the country, making it possible for us to limit the analysis to the variation of liquidity at the bank level coming from prepayments that originated out of state. Figure 2 shows the states of origin and the amount of prepayments used in our analysis.

4.4 Relationship Banking

Using the source of variation in a bank's liquidity as a means to analyze firms' responses to increased access to finance requires firms to be heterogeneously exposed to bank-specific liquidity shocks. We use relationship banking as a source of this heterogeneity.

The loan census data of the CNBV show that 56.6 percent of Mexican firms deal with at most one bank, and that more than 93 percent have dealt with at most three banks throughout the 10 years of our sample. The access to more banks is highly correlated with the size of the firm, meaning that only very large firms in Mexico have access to several banks. Table 3 shows the distribution of the number of banks with which a firm has dealt in the 10 years of our sample. However, we use a slightly different definition to link firms with banks: We define firm i as being linked to bank j in time t if firm i was a client of bank j at any point on or before period t.

5 Results

We organize the results in three subsections. First we show how sensitive the issuance of new loans is to the prepayment of local government loans. We find an elasticity of 0.46, and we find that issuance responds quickly. Second, we estimate the effect of the instrumented measure of new loans on employment. We find a positive but

heterogeneous effect that depends on the size of the firm. Finally, we present an exercise to estimate how long firms take to respond to this new source of finance in terms of employment. Again, we see a heterogeneous effect depending on the size of the firm. This ranges from a quick and sustained positive effect on small firms to a small and shorter-term effect on larger firms.

5.1 Local Government Prepayments and Issuance of New Loans

Table 6 shows the result of regressing the monthly amount of firms' finance that comes from new loans made possible by the prepayment of a local government loan to a bank. The exact model is:

$$NewLoans_{it} = \beta_0 + \beta_1 I_{it} * Prepayment_t + \gamma_i + \eta_t + \epsilon_{it}$$

Where $NewLoans_{it}$ refers to the total amount of money that firm i received in month t from new loans. I_{it} is a vector in which the $j'th$ entry indicates with a one that firm i has done business with bank j before or on period t and 0 otherwise. $Prepayment_t$ is a vector in which the $j'th$ entry has the total amount of prepayments coming from bank j's local government loans. It is important to note that in the construction of the $Prepayment_t$ variable, we do not include the prepayments coming from local governments in the same state or municipality in which the firm is located nor do we include prepayments that are too small or too large [5]. So, for example, if firm i is in Tijuana, then any prepayments coming from local governments in Baja California would not be taken into consideration for the $Prepayment_t$ values corresponding to firm i. Finally, γ_i and η_t are firm and time fixed effects respectively.

The estimated coefficient for the log value of the prepayment is 0.4552, which can be interpreted as an increase of 0.4552 percent in the amount of new loans

[5]Small prepayments are defined as those for which the amount prepaid is less than 1 percent of the bank's yearly issuance of loans in that year. Big loans are defined as those for which the amount prepaid is more than 100 percent of the bank's yearly issuance of loans in that year. The results do not change substantially if we use the whole sample of prepayments.

received by firms, with an increase of 1 percent in prepayments coming from local governments. To check how long it takes the prepayment to affect the supply of loans we include a specification with lags of the prepayment variable in Column 2. We observe statistically significant and positive effects of the lags but with limited economic significance; an increase of 0.032 percent for every 1 percent increase in the prepayment after one month.

We are also interested in verifying if there is any reaction in the issuance of new loans suggesting that banks can anticipate the prepayments. To see this, we include a specification with three leads of the prepayment variable. Column 3 shows the estimated effects. Similar to the analysis with the prepayment lags, we observe a statistically significant but economically small effect for the leads. Finally, Column 4 includes both sets of lags and leads and confirms the previous results.

To make sure that we are not missing a relevant period in time we analyze a window of 12 months before and 12 months after the prepayment. Figure 1 shows that the largest effect of prepayments take place in the same period that prepayment occur. This is consistent with what we know about the timing of the report of prepaid loans: banks only report a loan as prepaid after the local government has transferred the funds. This means that by the time we observe the prepayment in the monthly CNBV report the bank has known for some time that the loan was in process of being prepaid.

5.2 Case-by-Case Study

The results in the previous subsection suggest that banks' response to shocks in liquidity is fast, with the greatest effect occurring in the same month the prepayment is reported. In this section we provide supplementary evidence on this finding. To this end, we adapt the methodology used by Khwaja and Mian (2008).

The approach consists on taking firms that have multiple banking relationships and calculating the growth in their loans from each bank after they receive the liquidity shock. Then, we can test whether the same firm shows a larger increase in

lending from the bank facing a relatively greater increase in their liquidity.

In our case, however, we have different points in time in which banks receive a liquidity shock. Hence, to implement this design we analyze separate time windows. Each window has the characteristic that no bank receives a liquidity shock immediately before the beginning or immediately after the end window.[6] The ideal size of a window would be of two months: one month before and one after the liquidity shock. This way, we alleviate the concern that liquidity shocks at different periods affect the estimation. The exact specification is:

$$Y_{ij} = \beta_0 + \beta_1 Shock_j + \gamma_i + \epsilon_{ij}$$

Where Y_{ij} is the log difference of new loans received by firm i from bank j from before and after the shock. $Shock_j$ is the liquidity shock received by bank j coming from the prepayment of local government liquidity shocks. γ_i is a firm fixed effect respectively.

Table 9 presents the results of this exercise for the ideal window size of two. The sample is restricted to firms having a relationship with a bank that was shocked. Also, we restrict the sample to firms related to exactly two banks.[7] For the three time windows we estimate a positive and statistically significant effect of the liquidity shock. Column 1 shows the estimated coefficient for the window starting in August 2016 and ending in September 2016. It shows a coefficient of 0.263 which translates to an increase of 0.26 percentage points in the firm's borrowing from a bank that had a liquidity shock that is one percentage point higher than the shock received by the other bank.

Columns 2 and 3 show the estimated coefficients for time windows of October 2017 to November 2017 and October 2018 to November 2018. These coefficients

[6] We only consider immediate months, before or after the limits of the window, because our estimates in the previous subsection suggest that most of the response to the liquidity shock happens in the same month.

[7] Results including firms with a relationship with more than two banks to do not change significantly. We are interested in firms with relationship to only two banks because they tend to be smaller firms, which will be the focus of our analysis later on.

translate to an increase of 0.11 and 0.09 percentage points in the growth rate of loans respectively for a one percentage point increase in liquidity. The results of this analysis confirm that there is positive relation between new loans received by firms and additional liquidity of the banks with which they do business.

5.3 Employment Effects

Table 10 shows the results of regressing different employment outcomes on the instrumented amount of money coming from new loans. The exact model is:

$$Y_{it} = \beta_0 + \beta_1 \hat{NewLoans}_{it} + \gamma_i + \eta_t + \epsilon_{it}$$

Where Y_{it} is the daily payroll, the number of employees, the average wage, the median wage, and the average gender in firm i in period t. $\hat{NewLoans}_{it}$ refers to the amount of money that firm i received in period t from new loans. γ_i and η_t are firm and time fixed effects respectively.

We instrument the New Loans variable using the local government prepayments and we estimate the model using a two-stage least square method. There are possible biases that we wish to address with this strategy. First, firms that are doing well and growing might demand more loans to keep growing. Second, firms that are not doing well might demand more loans to stay afloat. In the former scenario, new loans would be correlated with a growth in employment outcomes, while in the latter new loans would be correlated with lower growth or even a decrease in employment outcomes.

We start by analyzing the total amount of money spent daily by the firm using the payroll variable. Columns 1 and 2 in Table 10 show a positive relationship between new loans and payroll. The estimated coefficient for the IV is 24.2 percent larger, which suggests a downward bias in the non-IV estimation. The coefficient of 0.00198 translates into an increase of 2.96 percent for a one-standard-deviation increase in new loans. This 2.96 percent represents around USD 30 for a firm with

the average daily payroll in the sample.

To analyze any heterogeneous effects of new loans on firms we interact this variable with the size of the firm, as measured by the average of workers across time. This provides a time-invariant classification of firms. We conduct the same interaction using two other time-invariant definitions of firm size: one that allows firms to change classifications each month depending on their relative place in the distribution, and a second using the number of workers at the first time in which the firm appears in the sample. The outcomes do not change significantly with any of these definitions.[8] The exact model is:

$$Y_{it} = \beta_0 + \beta_1 \hat{NewLoans}_{it} * I_{1Qi} + \beta_2 \hat{NewLoans}_{it} * I_i$$
$$+\beta_3 \hat{NewLoans}_{it} * I_{3Qi} + \beta_4 \hat{NewLoans}_{it} * I_{4Qi} + \gamma_i + \eta_t + \epsilon_{it}$$

Where the variables are the same as above and I_{nQi} is a dummy variable that takes the value of one if firm i is in the n'th quartile of the size distribution. Because we use a time-invariant definition, the classification of firms does not change through time.

Columns 3 and 4 in Table 10 show the estimated results for both the IV and the non-IV models. Unlike the aggregated results, for small firms there is an upward bias in the estimated coefficient of new loans on payroll, the IV-estimated coefficient is 38.8 percent smaller than the non-IV coefficient. This suggests that the impact of financing on small firms might be overestimated by looking solely at the simple correlation. Furthermore, the estimated coefficient is not statistically significant in this sample (p=0.108). However, the economic size of the coefficient is not small; it translates into an increase of 3.41 percent in payroll after a one-standard-deviation increase in the amount of new loans received by small firms (see Tables 13 and 14).

For firms in the second, third, and fourth quartiles, the non-IV coefficient un-

[8]The Mexican Census Bureau (Instituto Nacional de Estadística y Geografía) defines four sizes of firms: micro (0-10 employees), small (11-50 employees), medium (51-100 employees), and large (100+). We prefer our definition because it allows us to capture variation in size among micro and small firms, where we expect the effect of credit to be larger.

derestimates the effect of new loans on payrolls. The largest bias is in the second quartile firms, for which the IV coefficient is 139.43 percent larger than the non-IV coefficient. Firms in the second quartile are also the most sensitive to new loans with a one-standard-deviation increase in new loans followed by payroll increase of 2.89 percent, compared to 1.06 percent for firms in the third quartile, and 2.28 percent for firms in the fourth quartile.

These results show that smaller firms respond the most to a one-standard-deviation increase in loans relative to their average payroll. Further, the fact that the OLS estimate is larger than the IV estimate suggests that, for these firms, the bias comes from a higher demand for credit of growing firms. This is contrary to the other groups, for which the direction of the bias suggests that struggling firms are demanding more loans; this leads non-IV coefficients to underestimate the effect of new loans on employment.

Due to the detail of the data available we are able to investigate what is driving the increase in the payroll of firms. The two most straightforward options are new hires or salary increases. To test these two possibilities, we look into the number of employees in the firm and the average salary in the firm.

Columns 6 and 10 in Table 10 show that the increase in the number of employees is significant both statistically and economically. The IV coefficient on employment implies a 2.57 percent increase in the number of employees for a firm with the mean number of employees after a one-standard-deviation increase in new loans. The result is statistically significant at the 1 percent level. By contrast, a one-standard-deviation increase in the amount of new loans only increases the average wage by 0.17 percent for a firm with the mean average wage; the result is not statistically significant at any of the conventional levels. We take this as evidence that firms that increase their expenditure on labor as a result of the availability of new loans are doing so by hiring new workers.

For the number of employees, we estimate a similar model to the previous with payroll, interacting new loans with the size of the fi rm. The pattern is similar to the

one observed by payroll: the OLS coefficients overestimate the effect of new loans on employment on small firms; for the rest of the firms the bias is downward. Firms in the second quartile of the size distribution are also the ones with the largest bias, with the IV coefficient being 171.53 percent larger than the OLS estimated coefficient. The effects on firms with the average number of employees are 2.27 percent (first quartile), 2.47 percent (second quartile), 0.88 percent (third quartile), and 2.13 percent (fourth quartile).

This last set of results suggests that firms hire workers after receiving new loans. We next analyze the effect of new loans on the median salary in the firm and the average gender composition, with the objective of understanding which type of workers the firm hires after receiving new loans.

Table 11 shows the results of estimating a similar model as before with the median salary and gender as the dependent variables. Column 2 shows that new loans do not have a statistically or economically significant effect on the median wage. The coefficient for the IV estimate in Column 2 translates into an increase of 0.09 percent in the median salary for a one-standard-deviation increase in new loans. A similar situation emerges when we break down the effect by the size of the firm. Column 4 shows that none of the IV-estimated coefficients are statistically significant. The smallest firms have the greatest economically significant effect of the four groups with a one-standard-deviation increase in new loans translating into a 0.81 percent increase in the median wage. Interestingly, for the largest firms, the effect on the median wage is negative, albeit not very large economically: a one-standard-deviation increase in new loans translates into a -0.21 percent increase in the median wage.

We interpret these results on the median wage to mean that firms with access to new finance hire workers who are similar to their current workers in terms of wages, with the new employees earning a slightly higher wage than the median worker. We next analyze the gender composition of the work force in columns 6 and 8. None of the estimated coefficients in columns 10 and 12 are statistically significant, and

the largest effect on gender composition takes place among the smallest firms, with a decrease of 0.30 percent in the average female composition of the work force.

Our evidence suggests that financing does have a positive effect on a firms' expenditure on labor. This effect is mainly driven by the number of employees, with slight wage increases that are not statistically significant. The composition of the workforce in terms of the median distribution and gender composition does not change significantly with the new incorporation of employees.

5.4 Employment in Time

In this subsection we explore the time it takes firms to respond to new funding in terms of the number of employees. We use an event study-like test that includes the lags and leads of the new loans variable around the date when the firm receives the loan. The exact specification is:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d \hat{NewLoans}_{i,t+d} +$$
$$+\beta_0 \hat{NewLoans}_{i,t} + \sum_{d=1}^{d=12} \beta_d \hat{NewLoans}_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. Finally, just as we did in the previous section, we instrument new loans using the local government prepayments.

In the previous section we showed that firms' employment reactions differ depending on the size of the firms. For this reason, we analyze firms by sorting them into four bins, depending on their size. Figure 3 presents the effect of loans on employment using the instrumented variable for new loans for firms in the first quartile of the size distribution. The horizontal axis represents the months before and after the loan is issued. The baseline is the effect on employment of the sum of all leads

and lags outside the 25 month window. The vertical axis represents the estimated coefficients in the equation described above.

We observe an almost immediate response in employment one and two months after the firm receives the loan. This positive effect picks up on the sixth month and again on the twelfth month after the loan. On tests that we performed with larger windows of time we observe that the effect dissipates after the twelfth month and turns slightly negative.

Figure 4 shows that firms in the second quartile of the firm size distribution do not show an immediate reaction to new loans. The first effect on employment surfaces at four months, and it reaches its maximum effect in the fifth month. After that, the effect drops consistently until practically reaching zero.

Unlike their smaller counterparts, firms in the second quartile show an anticipated effect of employment in months eleven through eight prior to the new loan. We conjecture that this might be a selection effect coming from banks: as firms grow larger and become more important clients, it might be easier for banks to pick firms with strong past growth and offer them loans. This story is plausible but unlikely to be the main driver behind the positive effect of new loans on employment for firms in the second quartile. If the only driver of employment was the bank picking growing firms then we would probably observe a positive effect on months -7 through -1 and no effect on the months after the new loan.

Figure 5 shows a similar exercise for firms in the third quartile of the size distribution. For these firms, the effect on employment starts at the month in which the new loan is reported to the CNBV, month zero. The effect grows for the first months, and reaches its maximum effect in the fourth month after the new loan is issued. After that, the effect drops consistently until practically reaching zero. Similar to firms in the second quartile, we observe a positive effect in the months previous to the loan.

Figure 6 shows the estimated coefficients for the same model, but for the firms in the fourth quartile only. For this group of firms, we observe that the largest effects

on employment occur prior to the issuance of the new loan, eleven and ten months before the issuance. The anticipated effect on loans decreases consistently until the eighth month after the loan and then picks up again slightly.

The pattern observed for firms in the largest quartile suggests that banks have a strong selection effect in this group of firms. This means that banks may be choosing to lend to firms that have demonstrated good past performance. This make us cautious to interpret our results as average treatment effects, especially for larger firms. Rather, this pattern suggests that the estimated effects of new loans on employment are better understood as the average treatment effect on the treated firms.

The results in this subsection confirm the importance of studying different sized firms separately. The employment response of the smallest firms in our sample is quicker than the response of the larger firms and the positive effect is more persistent. Further, for smaller firms, the timing of the response suggest that increase in employment is in fact driven by the additional sources of finance.

5.5 Direct and Indirect Effects of Credit on Employment

There are two potential mechanisms through which more access to credit might lead firms to increase their workforce. The first one is the indirect effect of an increase in the firm's capital. Adding capital goods to grow the firm is likely to increase the productivity of labor and entice the firm to hire more workers. The second one is the direct effect of the newfound liquidity to cover the initial costs of hiring.[9] To understand which mechanism is at play we would ideally observe the variation in the firms' purchase of capital goods and other investments. Unfortunately we do not have this information in our data. Hence, we take a different approach.

We separate the firms in our sample in manufacturing and non-manufacturing firms to compare their employment's reaction times. We focus on the smaller firms. If the indirect effect is driving the increase in employment, we would expect it to

[9]See Benmelech et al. (2011) for more on how labor can have fixed cost components like training costs.

be larger for firms in the manufacturing sector which have greater capital requirements. Further, since the indirect effect requires a previous investment to increase the firm's capital, we would expect the reaction of employment to be slower for firms in the manufacturing sector (where the indirect effect should be higher). Similarly, if the indirect effect is the important mechanism at play, we would expect non-manufacturing firms to have a quicker response in employment to additional credit.

Figure 7 presents the results for both types of firms in the first quartile of the size distribution. In this group, manufacturing firms present the largest response in employment at the third and eleventh month after the new loan is received. In contrast, non-manufacturing firms exhibit a more modest response in the first months after the loan, and their largest response is around the sixth month. The fact that manufacturing firms respond faster than non-manufacturing firms suggests that the direct effect is driving the increase in employment for the smallest firms in our sample.

Figure 8 shows the results for firms int he second quartile. Both types of firms have similar response patterns during the first nine months. After this, the response of manufacturing firms is significantly higher, especially on the tenth month after receiving the new loan. These patterns suggest that for firms in the second quartile the indirect effect is more important. As firms grow in size their employment growth is more closely related to their investment opportunities.

Finally, Figure 9 presents the results for firms in the third quartile. The patterns for both types of firms are similar except for the persistence of the effect, which appears to be larger for non-manufacturing firms. We omit the analysis of the firms in the fourth quartile because, as we discussed previously, we believe that the effect on employment cannot be interpreted as a treatment effect. Nevertheless, Figure 10 presents the results for this group of firms.

6 Loan Conditions After Prepayment

In this section we explore how the terms of the newly issued loans change after a local government prepayment. We focus on two variables: the interest rate spread and the time to maturity of new loans. The interest rate spread is defined as the difference between the nominal interest rate of the new loan and the reference interest rate at the time of the issuance of the new loan. The reference interest rate in Mexico is called the Tasa de Interés Interbancaria de Equilibrio (TIIE). Most of the variable rate loans in our sample are referenced to this reference interest rate, which is the one we use to calculate the spread. The time to maturity is defined as the number of months until the date of the loan maturity, which is set upon issuance of the loan.

The intuition behind the interest rate spread is straightforward: this is the price of the loan. We look into the price of the loan because it helps us understand the situation underpinning the loan market. If firms are in a situation in which all their financing needs are satisfied, then the only way banks can make loans more attractive is by lowering the price of the loan. However, if firms are credit constrained, banks may be able to get away offering a similar or slightly higher price to firms. The evidence we find for changes in the credit conditions of firms suggest that the latter scenario is happening.

Table 12 shows the results of estimating the effect of a local government prepayment on the conditions of the loans issued by banks. The exact model being estimated is:

$$Y_{it} = \beta_0 + \beta_1 Prepayment_{it} + \gamma_i + \eta_t + \epsilon_{it}$$

Where Y_{it} is the average spread above the reference interest rate and the time to maturity at the time of issuance for firm i in period t. Prepayment refers to the amount of money that banks in business with firm i received in period t from local governments prepaying their loans. γ_i and η_t are firm and time fixed effects, respectively.

Columns 1 and 2 present the results for the overall change in the interest rate and the breakdown of the effect by size of the firm. The coefficient in Column 1 translates into a 1.42 percent increase in the average interest rate spread for a one-standard-deviation increase in local government prepayments; this represents around 12 basis points for the firm with the average spread. Column 2 shows that the effect is largest for small firms, with the coefficient representing a 3.39 percent increase in the average interest rate spread for a one-standard-deviation change in prepayments; this translates into an increase of 30 basis points. The effect is decreasing as the size of the firm grows, with the coefficients representing changes of 2.16 (second quartile), 1.21 (third quartile), and 0.67 percent (fourth quartile).

This set of results suggests that banks are not being forced to lower their prices to place more loans. Further, the rise in the interest rate spread, particularly for smaller firms, could be due to the bank lending money to its riskier clients. However, as columns 3 and 4 show, banks are also increasing the time to maturity of loans.[10]. The fact that banks are offering longer time to maturity to their clients makes it difficult for us to conclude that firms are financially under served, or that banks are lending to riskier clients because it is possible that banks are offering the longer time to maturity as a way to convince firms to take new loans. Further, longer time to maturity implies more risk for a bank. In other words, it makes the costs of lending higher, which would also explain the increase in the interest rate spread.

The coefficient in Column 3 translates into 1.61 percent increase in the average time to maturity for a one-standard-deviation increase in local government prepayments; this represents around 0.43 months for the firm with the average time to maturity. Column 4 shows that the effect is largest for small firms, with the coefficient representing a 6.16 percent increase in the average time to maturity for a one-standard-deviation change in prepayments; this translates into an increase of 1.66 months. The effect is decreasing as the size of the firm grows, with the coefficients

[10]It is important to note that this increase is relative to the time to maturity of the last loan that the firm acquired. That is, the increase is not a change with respect to the current time to maturity Otherwise, time to maturity would always be mechanically higher for similar loans.

representing changes of 1.97 percent (second quartile), 0.92 percent (third quartile), and 0.62 percent (fourth quartile).

7 Conclusions

Trying to establish a causal relationship between a firm's access to credit and its performance is a complicated empirical task. A main problem is the difficulty in directly observing a firm's access to finance. For instance, it is difficult to know exactly how many loans a firm has and with which financial institutions, the amount, and the terms, among other characteristics. Moreover, even when we can observe the details of a firm's debt, it is difficult to break the endogeneity between a firm's performance and its financial access. Indeed, a growing firm might need funds to keep growing, and a struggling firm might seek access to more credit to slow down the downsizing of its operations.

A novel data set linking Mexican firms' loan level information with administrative records on their employees allows us to surpass these difficulties. We are able to track the monthly borrowing history of firms as well as the information on their payroll. Further, we design an identification strategy that allows to take care of the concern that the effect of loans on employment is coming from the credit demand side of the equation. Our identification strategy relies on the fact that local governments in Mexico use bank loans as their primary source of funding. This means that every time a state or a municipality refinances a loan, a bank likely experiences an unexpected excess of liquidity.

Mexican firms do not deal with many banks; more than 83 percent of firms deal with at most two banks, and more than 93 percent deal with at most three. This suggests that relationship banking is strong in Mexico, and that those firms with an established relationship with a bank that receives a local government prepayment are more exposed to variations in their access to finance.

We use this variation in liquidity coming from local government prepayments to instrument for the issuance of new loans received by firms. This allows us to

estimate the causal effect of new loans on different employment outcomes. We find statistically and economically significant effects on the firms' expenditures on labor. The level of detail of our data allow us to investigate the drivers of this change. We find that the main causes of this increase in payroll are the number of employees and, to lesser extent, an increase in the average wage. We also find very moderate effects on the median wage of firm employees, as well as an increase in the male composition of the workforce.

The impact of the access to new loans on employment differs depending on the size of the firm. For the smallest firms, employment responds quickly, and the effect persists through the first twelve months after the issuance of the new loan. For firms in the second and third quartiles of the size distribution the effect takes around four months to reach its maximal impact on employment; after that, the effect quickly diminishes to zero. Finally, for the largest firms the effect on employment occurs in the months before the loan is issued. We interpret this as a selection effect of banks in this group of firms, which makes us cautious to interpret this result as an average treatment effect, and rather see it as the effect on employment of being selected by the bank.

Our final set of results analyzes how credit conditions change after the prepayment of local government loans. We observe an increase in the average interest rate spread, and an increase in the time to maturity for the new loans. The increase in the average interest rate spread can be interpreted as indicating that banks are not forced to lower prices to place more loans. This is consistent with a story of firms being under served financially – especially smaller firms, which are the main drivers of the results showing an increase in the interest rate spread. However, the fact that we observe an increase in the time to maturity of the new loans casts doubt on the previous story. Increasing the time to maturity increases the costs of lending, which might be driving up the interest rate spread. This could be interpreted as revealing banks' efforts to convince their clients to take on more debt.

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8 Tables and Figures

8.1 Tables

Table 1: Local Government Liabilities 2019Q1

This table shows the distribution of local government liabilities by source. The data is provided by the Secretaría de Hacienda y Crédito Público, the Mexican equivalent to the Department of the Treasury. By law, all states and municipalities in Mexico must report their financial obligations to the federal government each quarter.

Source	**Amount***	**%**
Bank Loans	526,881	94.8
Bonds	26,944	4.8
Other	2,013	0.4

*Millions of Mexican pesos

Table 2: Geographical presence of banks in Mexico

This table shows the number of states in which Mexican banks operate. We only consider banks that do business with local governments. These banks are also in business with more than 97% of the firms in the sample. There are 32 states in Mexico and we say that a bank has presence in a state if we observe it having business with at least one firm at any point in our sample (July 2009 through December 2018).

Bank	A	B	C	D	E	F	G	H	I	J	K	K	M	N	O
States (32)	32	32	32	32	30	25	9	20	32	9	21	32	31	22	22

Table 3: Firm-Bank Business Relationship in Mexico

This table shows the distribution of the number of banks with which a firm has dealt in our sample. We say that firm i deals with n banks if throughout our sample we can observe loans from n different banks being issued to firm i. Firms with a value of zero means that they only deal with banks that do not issue local government loans

Total Banks	**N**	**%**	**Cumulative**
0	3,272	2.8	2.8
1	66,936	56.6	59.4
2	28,415	24.0	83.4
3	11,902	10.1	93.4
4	4,867	4.11	97.5
5+	2,908	2.5	100.0

Table 4: Geographical presence of banks in Mexico per quarter

This table shows the number of states in which each Mexican banks issued at least one loan per quarter from July 2009 to December 2018. We only consider banks that do business with local governments. There are 32 states in Mexico.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
2009Q3	32	0	32	32	32	31	12	27	20	14	16	32	18	10	1
2009Q4	32	1	32	32	30	32	7	26	22	11	15	32	28	11	1
2010Q1	32	32	32	32	32	32	6	24	18	9	17	32	28	10	1
2010Q2	32	16	32	32	31	32	7	26	22	11	17	32	28	12	2
2010Q3	32	32	32	32	31	31	4	28	20	10	15	32	25	10	1
2010Q4	32	32	32	32	31	32	6	28	19	13	17	32	23	13	1
2011Q1	32	32	32	32	30	32	2	28	21	10	16	32	30	11	21
2011Q2	32	32	32	32	29	31	8	28	18	10	17	32	29	14	17
2011Q3	32	32	32	32	28	32	7	28	21	13	19	32	27	15	24
2011Q4	32	32	32	32	29	31	8	26	22	10	20	32	27	17	18
2012Q1	32	32	32	32	30	31	4	27	21	12	17	32	31	15	17
2012Q2	32	32	32	32	30	32	11	29	19	8	21	32	25	17	22
2012Q3	32	32	32	32	31	32	7	26	21	12	24	32	30	17	23
2012Q4	32	32	32	32	30	29	4	26	20	14	22	32	27	18	22
2013Q1	32	32	32	32	31	32	4	26	22	10	26	32	27	18	26
2013Q2	32	32	32	32	30	32	7	28	24	10	26	32	27	19	22
2013Q3	32	32	32	32	30	30	6	26	25	12	28	32	25	18	22
2013Q4	32	32	32	32	31	32	3	27	26	6	27	32	29	19	24
2014Q1	32	32	32	32	30	32	3	16	24	11	28	32	22	14	27
2014Q2	32	32	32	32	29	32	6	14	28	7	29	32	28	18	13
2014Q3	32	32	32	32	32	32	5	12	26	13	30	32	25	15	14
2014Q4	32	32	32	32	29	32	5	12	23	10	30	32	24	18	15
2015Q1	32	32	32	32	30	30	2	11	25	11	30	32	23	16	20
2015Q2	32	32	32	32	29	31	4	10	24	12	27	32	25	19	20
2015Q3	32	32	32	32	31	21	3	11	25	14	30	32	24	20	20
2015Q4	32	32	32	32	32	29	8	9	24	12	28	32	28	24	19
2016Q1	32	32	32	32	30	19	1	8	23	10	28	32	24	17	18
2016Q2	32	32	32	32	30	21	3	8	22	10	26	32	27	24	21
2016Q3	32	32	32	32	32	16	5	10	27	11	29	32	26	20	19
2016Q4	32	32	32	32	32	19	4	9	29	10	28	32	26	22	23
2017Q1	32	32	32	31	29	18	5	10	30	14	25	32	24	16	25
2017Q2	32	32	32	31	29	11	3	12	32	8	24	32	24	19	25
2017Q3	32	32	32	31	29	8	3	10	30	9	23	32	25	17	22
2017Q4	32	32	32	31	32	14	5	10	29	11	24	32	26	16	24
2018Q1	32	32	32	31	31	11	4	13	31	15	24	32	23	17	19
2018Q2	32	32	32	31	29	13	2	15	32	16	23	32	24	12	23
2018Q3	32	32	32	31	29	14	0	11	31	13	28	32	25	17	23
2018Q4	32	32	32	31	31	13	0	11	31	15	26	32	25	20	22
Average	32	30	32	32	30	26	5	19	24	11	24	32	26	16	18

Table 5: Relationship banking per quarter in Mexico

This table shows the distribution of firms that received loans from different numbers of banks per quarter from July 2009 to December 2018.

	1	2	3	4	5	6	7 or more
2009Q3	10,755	1,270	214	45	11	4	3
2009Q4	9,770	1,103	189	49	9	8	4
2010Q1	9,312	1,022	171	40	12	2	4
2010Q2	10,781	1,256	205	46	19	5	3
2010Q3	11,515	1,486	229	69	16	5	3
2010Q4	12,128	1,461	240	58	22	7	7
2011Q1	11,982	1,320	222	51	21	3	3
2011Q2	11,539	1,426	258	52	31	7	3
2011Q3	11,453	1,301	248	75	26	4	4
2011Q4	13,499	1,595	277	78	24	9	3
2012Q1	14,578	1,783	302	77	28	12	3
2012Q2	14,010	1,638	323	69	19	6	5
2012Q3	15,737	1,848	307	84	31	5	5
2012Q4	14,802	1,806	368	66	28	6	5
2013Q1	13,713	1,591	310	83	24	11	3
2013Q2	14,687	1,824	343	83	27	15	-
2013Q3	15,252	1,907	364	85	27	12	4
2013Q4	16,312	1,913	378	100	33	17	4
2014Q1	15,996	1,798	313	79	25	4	1
2014Q2	16,525	1,966	372	105	29	11	2
2014Q3	16,371	1,920	342	123	24	2	6
2014Q4	20,767	2,572	475	122	33	13	1
2015Q1	17,387	2,009	389	116	17	8	5
2015Q2	18,571	2,039	406	117	44	6	3
2015Q3	19,339	2,140	413	121	26	9	5
2015Q4	19,378	2,272	462	115	35	11	4
2016Q1	22,122	2,552	449	114	27	12	7
2016Q2	18,559	2,096	401	144	37	6	2
2016Q3	18,821	2,229	385	125	46	11	7
2016Q4	19,302	2,159	402	112	23	14	7
2017Q1	15,397	1,454	237	35	13	1	1
2017Q2	15,444	1,537	258	51	10	4	-
2017Q3	15,077	1,443	240	52	10	1	-
2017Q4	14,497	1,366	249	31	10	5	2
2018Q1	14,699	1,337	213	39	8	-	2
2018Q2	15,475	1,486	225	45	12	3	2
2018Q3	15,176	1,300	233	45	12	2	-
2018Q4	14,767	1,330	222	34	7	3	-

Table 6: Loan Issuance Sensitivity to Prepayments

This table shows the result of regressing the monthly amount of finance received by a firm coming from new loans against the prepayment of a local government loan to a bank. The exact model takes the following form:

$$NewLoans_{it} = \beta_0 + \beta_1 I_{it} * Prepayment_t + \gamma_i + \eta_t + \epsilon_{it}$$

Where $NewLoans_{it}$ refers to the total amount of money that firm i received in period t from new loans. I_{it} is a vector in which the $j'th$ entry indicates with a 1 that firm i has done business with bank j before or on period t and 0 otherwise. $Prepayment_t$ is a vector in which the $j'th$ entry has the total amount of prepayments coming from bank j's local government loans. The data goes from July of 2009 to December 2018. a, b and c denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	Log(New Loans + 1)			
	(1)	(2)	(3)	(4)
Log(Prepayment+1)	0.4552a	0.4478a	0.3957a	0.4416a
	(0.0007)	(0.0017)	(0.0022)	(0.0019))
Lag 1		0.0368		0.0320
		(0.0017)		(0.0010)
Lag 2		0.0316		0.02618
		(0.0011)		(0.0010)
Lag 3		0.028		0.0244
		(0.0010)		(0.0010)
Lead 1			-0.0020	0.0396
			(0.0013)	(0.0011)
Lead 2			-0.0109	0.0347
			(0.0014)	(0.0011)
Lead 3			0.0023	0.0287
			(0.00125)	(0.0010)
Time Fixed Effects	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES
N	4,598,255	4,598,255	4,598,255	4,598,255
Firms	118,300	118,300	118,300	118,300

Standard errors clustered at the firm level in parenthesis

Table 7: **Prepayment Decisions and National Economic Indicators**

This table shows the estimated effects of different national and local economic indicators on the probability of observing a prepayment. We include state and month fixed effects and cluster standard errors at the year level. a, b and c denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Prepayment Episode at State Level				
Variable	(1)	(2)	(3)	(4)	(5)
National Unemployment	0.05	0.10			-0.91
	(0.94)	(0.93)			(0.91)
State Unemployment		-0.08			-0.09
		(0.25)			(0.28)
National GDP Index			3.77	4.42	4.11
			(2.18)	(3.48)	(3.29)
State GDP Index			6.41	6.95	6.68
			(6.28)	(7.28)	(7.56)
Reference Interest Rate				-0.35	-0.52
				(0.22)	(0.031)
Oil Price				-0.07	0.00
				(0.14)	(0.14)
Month Fixed Effects	YES	YES	YES	YES	YES
State Fixed Effects	NO	YES	YES	YES	YES
N	3,264	3,264	3,648	3,648	3,264
R-squared	0.0129	0.0632	0.0613	0.0688	0.0695

Robust standard errors clustered at the year level in parenthesis

Table 8: **Descriptive Statistics**

	N	Mean	Std. Dev.	1Q	Median	3Q
Firms	118,300					
Periods	114					
Employees	4,598,321	66.15	638.36	6	15	38
Payroll (daily)	4,598,321	985.96	317,389.40	2,598.12	2598.12	7366.2
Average wage (daily)	4,598,321	218.15	188.96	113.04	164.76	255.79
Median wage (daily)	4,598,321	188.23	181.36	99.29	139.36	212.93
Gender (1=male, 2=female)	4,598,321	1.34	0.25	1.14	1.3	1.5
Loan issued (Mexican pesos)	4,598,321	1,261,217	31,200,000	0	0	0

Table 9: **Loan Growth After Liquidity Shock**

This table shows the results of regressing liquidity shocks to banks (i.e. the local government loan prepayments) on the new loan growth at the firm level for those firms that deal with two banks. The exact model is:

$$Y_{ij} = \beta_0 + \beta_1 Shock_j + \gamma_i + \epsilon_{ij}$$

Where Y_{ij} is the log difference of new loans received by firm i from bank j from before and after the shock. $Shock_j$ is the liquidity shock received by bank j coming from the prepayment of local government liquidity shocks. γ_i is a firm fixed effect respectively. We cluster the standard errors at the firm level and all variables are in logarithms. a, b and c denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Windows		
	Aug16-Sep16	Oct17-Nov17	Oct18-Nov18
Variable	(1)	(2)	(3)
Log(Prepayment+1)	0.263 a	0.105 a	0.093 a
	(0.039)	(0.014)	(0.017)
Constant	-0.022	0.138 a	2.04 a
	(0.039)	(0.033)	(0.17)
Firm Fixed Effects	YES	YES	YES
N	27,604	20,790	5,542
R-squared	0.503	0.493	0.431

Robust standard errors clustered at the firm level in parenthesis

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Table 10: **Employment Response to New Loans**

This table shows the results of regressing the new loans on different employment outcomes in the firm.

$$Y_{it} = \beta_0 + \beta_1 NewLoans_{it} + \gamma_i + \eta_t + \epsilon_{it}$$

Where Y_{it} is the daily payroll, the number of employees, and mean wage in firm i in period t. New Loans refers to the amount of money that firm i received in period t from new loans. We instrument New Loans with the local government prepayments and present the results for both the IV and the non-IV regression. γ_i and η_t are firm and time fixed effects respectively. We cluster the standard errors at the firm level and all variables are in logarithms. a, b and c denote statistical significance at the 1%, 5%, and 10% levels, respectively. All coefficients are multiplied by a thousand to facilitate reading.

	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	Log(Payroll + 1)				Log(Employees + 1)				Log(Mean Wage + 1)			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
log($NewLoans$+1)	0.964 a	1.198 a			0.802 a	1.039 a			0.138 a	0.070		
	(0.096)	(0.02235)			(0.086)	(0.200)			(0.036)	(0.089)		
log($NewLoans$+1)* I_{1Q}			1.342 a	0.821			0.949 a	0.547			0.124	0.226
			(0.180)	(0.563)			(0.111)	(0.340)			(0.111)	(0.333)
log($NewLoans$+1)* I_{2Q}			0.383 b	0.917 b			0.288 a	0.782 a			0.141 b	0.085
			(0.168)	(0.409)			(0.133)	(0.325)			(0.072)	(0.190)
log($NewLoans$+1)* I_{3Q}			0.578 a	1.100 a			0.462 a	0.909 a			0.138 b	0.102
			(0.184)	(0.391)			(0.159)	(0.354)			(0.067)	(0.169)
log($NewLoans$+1)* I_{4Q}			1.446 a	1.589 a			1.318 a	1.484 a			0.143 b	0.026
			(0.194)	(0.436)			(0.190)	(0.424)			(0.058)	(0.122)
Time Fixed Effects	YES				YES				YES			
Firm Fixed Effects	YES				YES				YES			
N	4,598,255				4,598,255				4,598,255			
Firms	118,300				118,300				118,300			

Robust standard errors clustered at the firm level in parenthesis

Table 11: **Employment Response to New Loans cont'd**

This table shows the results of regressing the new loans on different employment outcomes in the firm.

$$Y_{it} = \beta_0 + \beta_1 NewLoans_{it} + \gamma_i + \eta_t + \epsilon_{it}$$

Where Y_{it} is the median wage and the average gender in firm i in period t. New Loans refers to the amount of money that firm i received in period t from new loans. We instrument New Loans with the local government prepayments and present the results for both the IV and the non-IV regression. γ_i and η_t are firm and time fixed effects respectively. We cluster the standard errors at the firm level and all variables are in logarithms. a, b and c denote statistical significance at the 1%, 5%, and 10% levels, respectively. All coefficients are multiplied by a thousand to facilitate reading.

	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	Log(Median Wage + 1)				Log(Gender + 1)			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log($NewLoans$+1)	0.141 a	0.035			-0.023 a	-0.037 b		
	(0.038)	(0.0943)			(0.007)	(0.018)		
log($NewLoans$+1)* I_{1Q}			0.009	0.194			-0.046 c	-0.073
			(0.117)	(0.343)			(0.026)	(0.081)
log($NewLoans$+1)* I_{2Q}			0.210 a	0.167			-0.007	-0.061
			(0.074)	(0.199)			(0.015)	(-0.038)
log($NewLoans$+1)* I_{3Q}			0.116 c	0.081			-0.035 a	-0.018
			(0.069))	(0.182)			(0.011)	(0.029)
log($NewLoans$+1)* I_{4Q}			0.177 a	-0.144			-0.014 c	-0.022
			(0.064)	(0.135)			(0.008)	(0.020)
Time Fixed Effects	YES				YES			
Firm Fixed Effects	YES				YES			
N	4,598,255				4,598,255			
Firms	118,300				118,300			

Robust standard errors clustered at the firm level in parenthesis

Table 12: **Changes in Credit Conditions**

This table shows the results of regressing the local government prepayments on the firm's credit conditions for new loans, the average interest rate spread and the time to maturity.

$$Y_{it} = \beta_0 + \beta_1 Prepayment_{it} + \gamma_i + \eta_t + \epsilon_{it}$$

Where Y_{it} is the average spread above the reference interest rate and the time to maturity at the time of issuance for firm i in period t. Prepayment refers to the amount of money that banks in business with firm i received in period t from local governments prepaying their loans. γ_i and η_t are firm and time fixed effects respectively. We cluster the standard errors at the firm level and all variables are in logarithms. a, b and c denote statistical significance at the 1%, 5%, and 10% levels, respectively. All coefficients are multiplied by a thousand to facilitate reading.

	Log(Interest Rate + 1)		Log(Time to Maturity + 1)	
Variable	(1)	(2)	(3)	(4)
log(Prepayment+1)	1.262 a		1.428 a	
	(0.09)		(0.167)	
log(Prepayment+1)* I_{1Q}		2.460 a		4.471 a
		(0.23)		(0.421)
log(Prepayment+1)* I_{2Q}		1.648 a		1.504 a
		(0.178)		(0.323)
log(Prepayment+1)* I_{3Q}		1.054 a		0.803 b
		(0.169)		(0.320)
log(Prepayment+1)* I_{4Q}		0.759 a		0.694 a
		(0.143)		(0.267)
Time Fixed Effects	YES		YES	
Firm Fixed Effects	YES		YES	
N	4,598,255		4,598,255	
Firms	118,300		118,300	

Robust standard errors clustered at the firm level in parenthesis

Table 13: **Descriptive Statistics by Firm Size**

Variable	N	Mean	Std. Dev.	Min.	Max.
Employees	4,598,321	66.15	638.36	1	141,220
Firms in the 1Q	961,772	3.49	2.17	1	97
Firms in the 2Q	1,281,211	9.94	4.60	1	220
Firms in the 3Q	1,192,219	24.09	11.29	1	726
Firms in the 4Q	1,163,119	223.01	1,256.08	1	141,220
Payroll	4,598,321	19,928.05	31,789.40	0	45,700,000.00
Firms in the 1Q	961,772	746.80	867.61	0	41,306.08
Firms in the 2Q	1,281,211	1,938.00	1,699.60	54.30	94,976.69
Firms in the 3Q	1,192,219	4,927.74	4,175.15	20.92	244,861.80
Firms in the 4Q	1,163,119	70,981.03	628,279.10	0	45,700,000.00
Average wage	4,598,321	218.15	188.96	0	2,015.00
Firms in the 1Q	961,772	236.34	285.30	0	2,015.00
Firms in the 2Q	1,281,211	197.31	147.76	54.30	2,015.00
Firms in the 3Q	1,192,219	206.19	141.56	20.92	2,015.00
Firms in the 4Q	1,163,119	238.33	167.19	0	2,015.00
Median wage	4,598,321	188.23	181.36	0	2,015.00
Firms in the 1Q	961,772	223.15	286.58	0	2,015.00
Firms in the 2Q	1,281,211	169.12	136.58	54.30	2,015.00
Firms in the 3Q	1,192,219	172.19	126.91	20.92	2,015.00
Firms in the 4Q	1,163,119	196.86	152.70	2.01	2,015.00
Proportion females (=2) to males (=1)	4,598,321	1.34	0.25	1	2.00
Firms in the 1Q	961,772	1.39	0.34	1	2
Firms in the 2Q	1,281,211	1.34	0.23	1	2
Firms in the 3Q	1,192,219	1.32	0.22	1	2
Firms in the 4Q	1,163,119	1.32	0.22	1	2

Table 14: **Descriptive Statistics by Firm Size**

Variable	N	Mean	Std. Dev.	Min.	Max.
New loans (millions of pesos)	4,598,321	1,261,217	31,200,000	0	22,900,000,000
Firms in the 1Q	961,772	979,696	40,700,000	0	8,090,000,000
Firms in the 2Q	1,281,211	329,837	10,400,000	0	2,780,000,000
Firms in the 3Q	1,192,219	439,985	4,251,259	0	845,000,000
Firms in the 4Q	1,163,119	3,361,728	48,200,000	0	22,900,000,000
Local government prepayments (millions of pesos)	4,598,321	31,300,000	352,000,000	0	9,700,000,000
Firms in the 1Q	961,772	20,400,000	281,000,000	0	9,700,000,000
Firms in the 2Q	1,281,211	22,600,000	296,000,000	0	9,510,000,000
Firms in the 3Q	1,192,219	30,200,000	346,000,000	0	9,510,000,000
Firms in the 4Q	1,163,119	51,100,000	453,000,000	0	9,510,000,000
Average spread above interest rate (pct points)	4,598,321	8.14	5.66	0	120.92
Firms in the 1Q	961,772	8.78	6.02	0	61.92
Firms in the 2Q	1,281,211	8.97	5.62	0	61.59
Firms in the 3Q	1,192,219	8.39	5.42	0	62.19
Firms in the 4Q	1,163,119	6.45	5.27	0	120.92
Average time to maturity (months)	4,598,321	26.70	25.45	0	492.10
Firms in the 1Q	961,772	26.93	26.04	0	492.10
Firms in the 2Q	1,281,211	28.67	25.32	0	492.10
Firms in the 3Q	1,192,219	27.80	25.08	0	492.10
Firms in the 4Q	1,163,119	23.20	25.48	0	492.10

8.2 Figures

Figure 1: New Loan Issuance After Prepayment

The first summation includes 12 lags of the Prepayment variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects.

$$NewLoans_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d Prepayment_{i,t+d} +$$
$$+\beta_0 Prepayment_{i,t} + \sum_{d=1}^{d=12} \beta_d Prepayment_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

Where $NewLoans_{it}$ refers to the total amount of money that firm i received in period t from new loans. $Prepayment_{it}$ is the total amount of prepayments that banks in businesses with firm i at period t received from local governments. The data go from July of 2009 to December 2018. All variables are in logs.

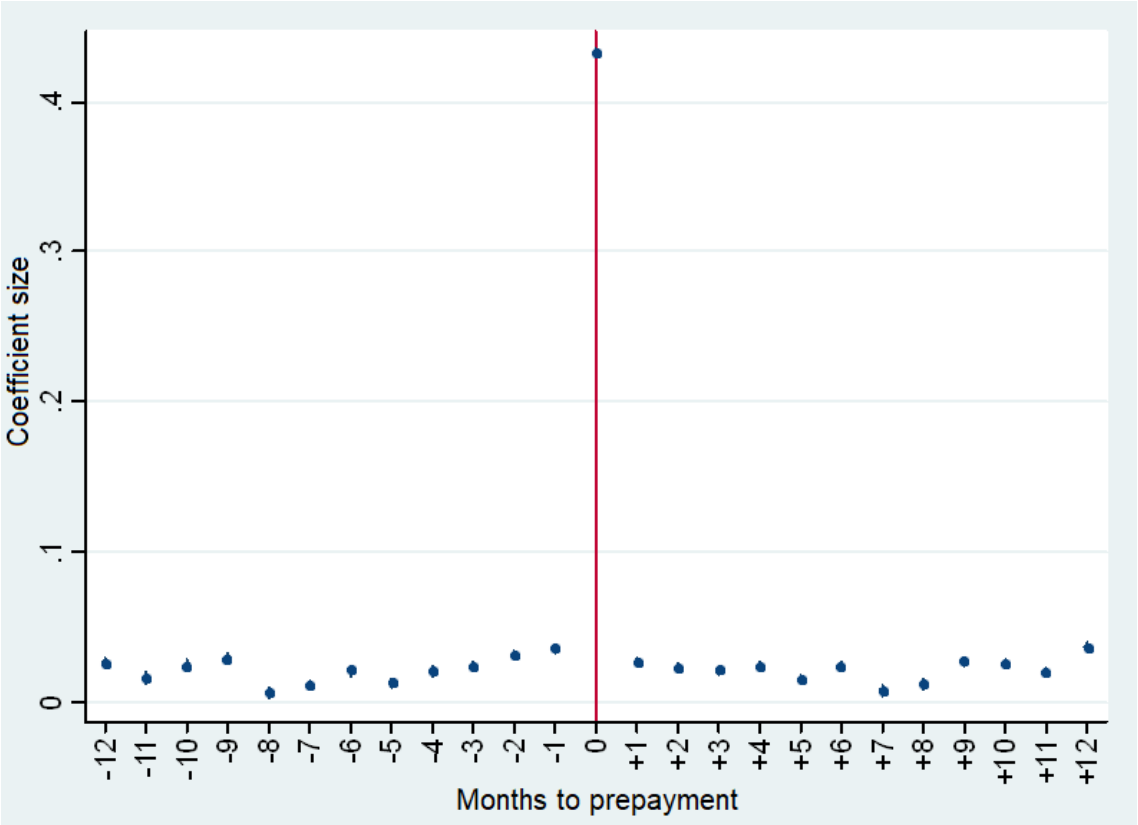

Figure 2: Geographical distribution of prepayments in Mexico

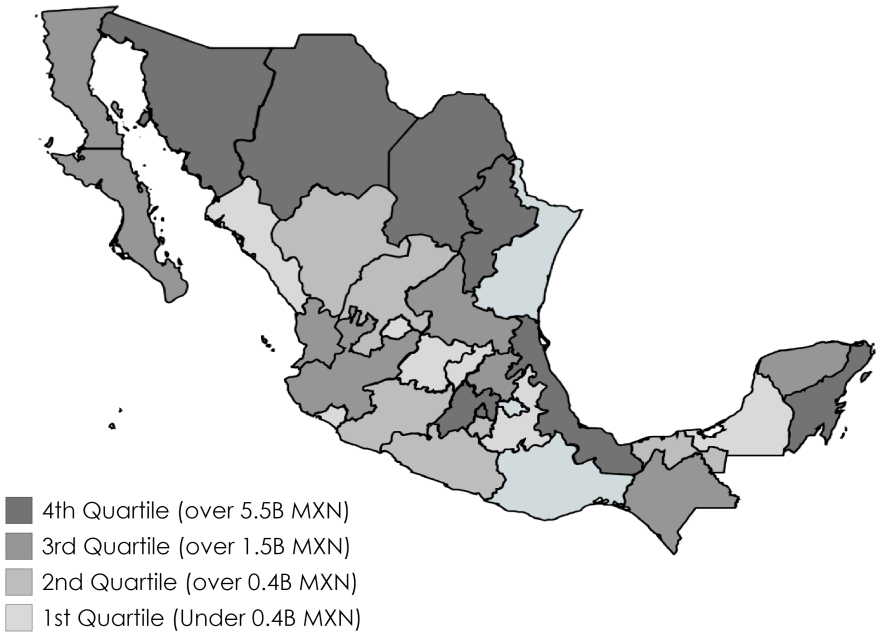

Figure 3: Firms with an average of 5 employees or less

This figure shows the estimated coefficients the effect of different lags and leads of new loans on employment for firms in the first quartile of the size distribution:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d New\hat{L}oans_{i,t+d} +$$
$$+\beta_0 New\hat{L}oans_{i,t} + \sum_{d=1}^{d=12} \beta_d New\hat{L}oans_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. We instrument new loans with the local government prepayments and include firm and time fixed effects.

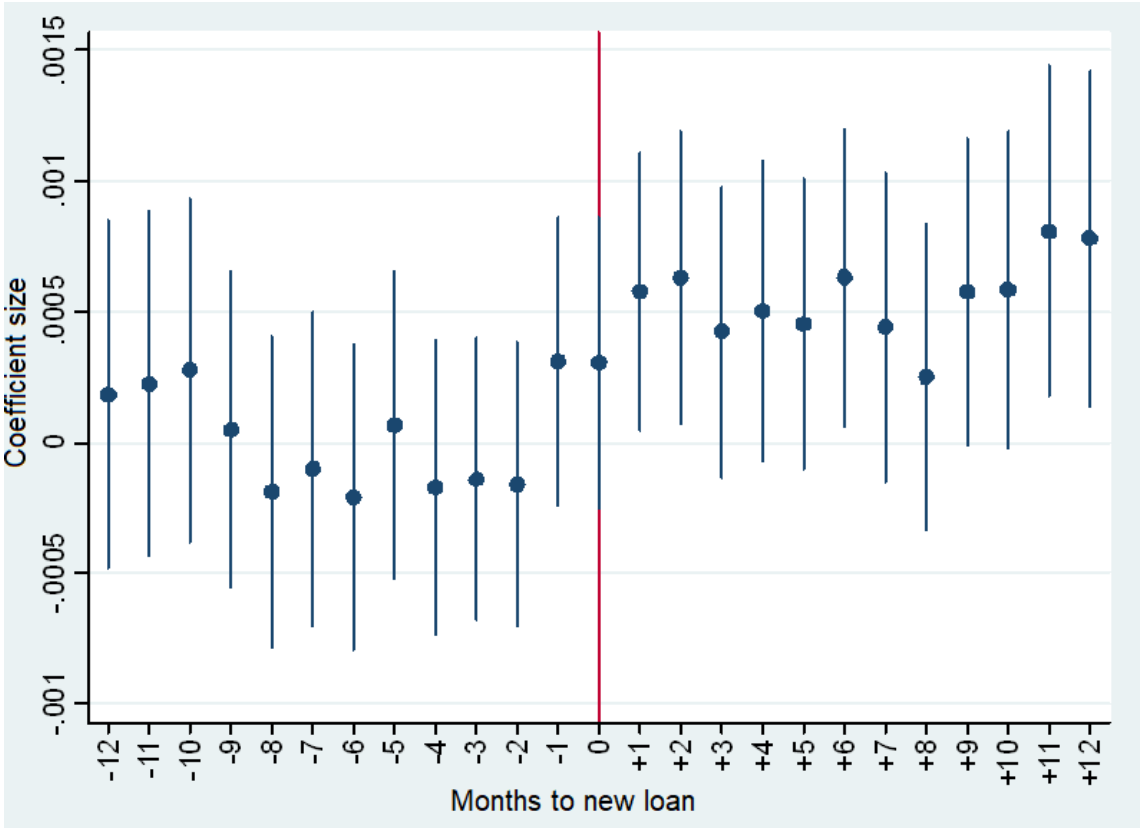

Figure 4: Firms with an average of 6 to 14 employees

This figure shows the estimated coefficients the effect of different lags and leads of new loans on employment for firms in the second quartile of the size distribution:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d New\hat{L}oans_{i,t+d} +$$
$$+\beta_0 New\hat{L}oans_{i,t} + \sum_{d=1}^{d=12} \beta_d New\hat{L}oans_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. We instrument new loans with the local government prepayments and include firm and time fixed effects.

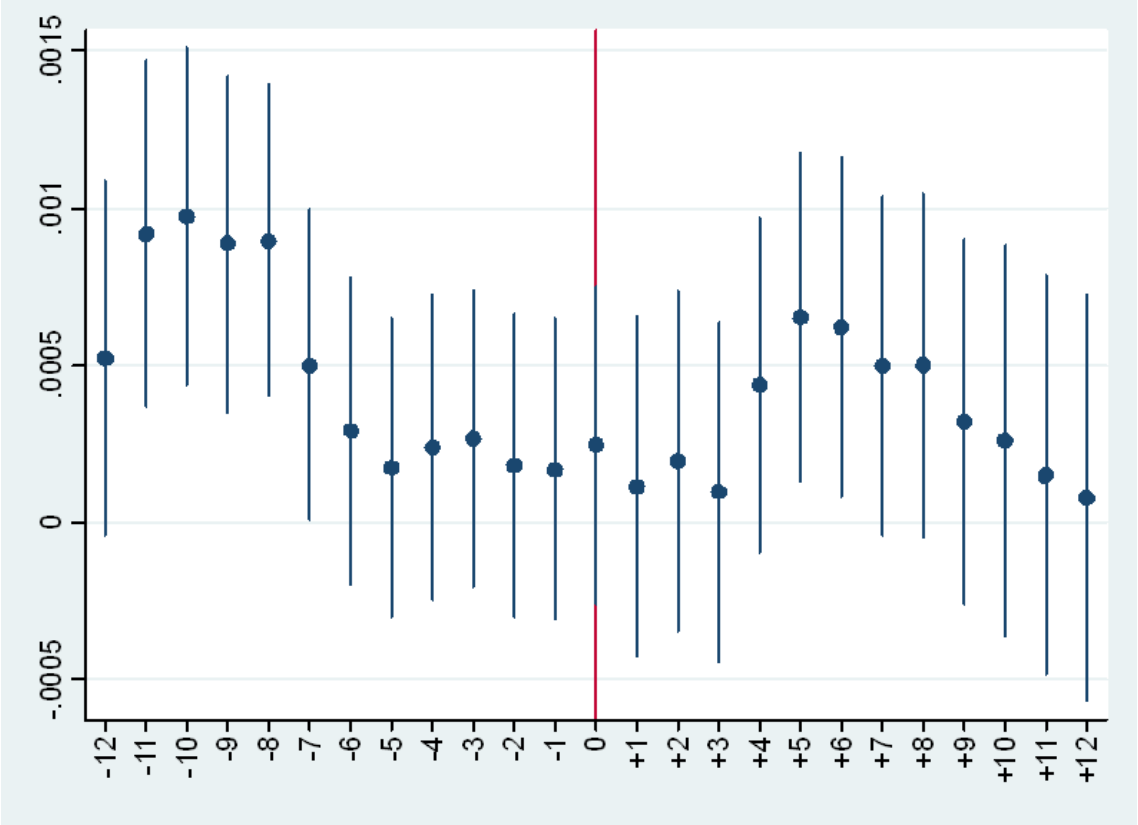

Figure 5: Firms with an average of 15 to 37 employees

This figure shows the estimated coefficients the effect of different lags and leads of new loans on employment for firms in the third quartile of the size distribution:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d New\hat{L}oans_{i,t+d} +$$
$$+\beta_0 New\hat{L}oans_{i,t} + \sum_{d=1}^{d=12} \beta_d New\hat{L}oans_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. We instrument new loans with the local government prepayments and include firm and time fixed effects.

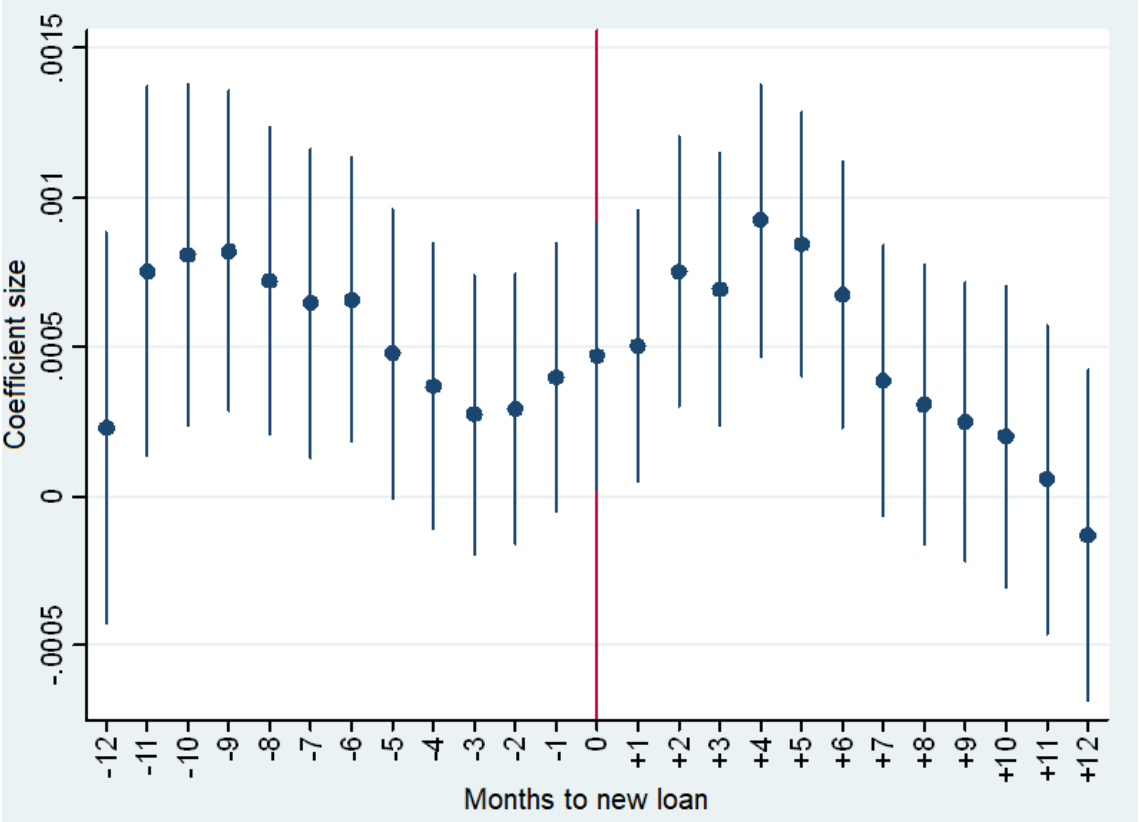

Figure 6: Firms with an average of 38 employees or more

This figure shows the estimated coefficients the effect of different lags and leads of new loans on employment for firms in the fourth quartile of the size distribution:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d New\hat{L}oans_{i,t+d} +$$
$$+\beta_0 New\hat{L}oans_{i,t} + \sum_{d=1}^{d=12} \beta_d New\hat{L}oans_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. We instrument new loans with the local government prepayments and include firm and time fixed effects.

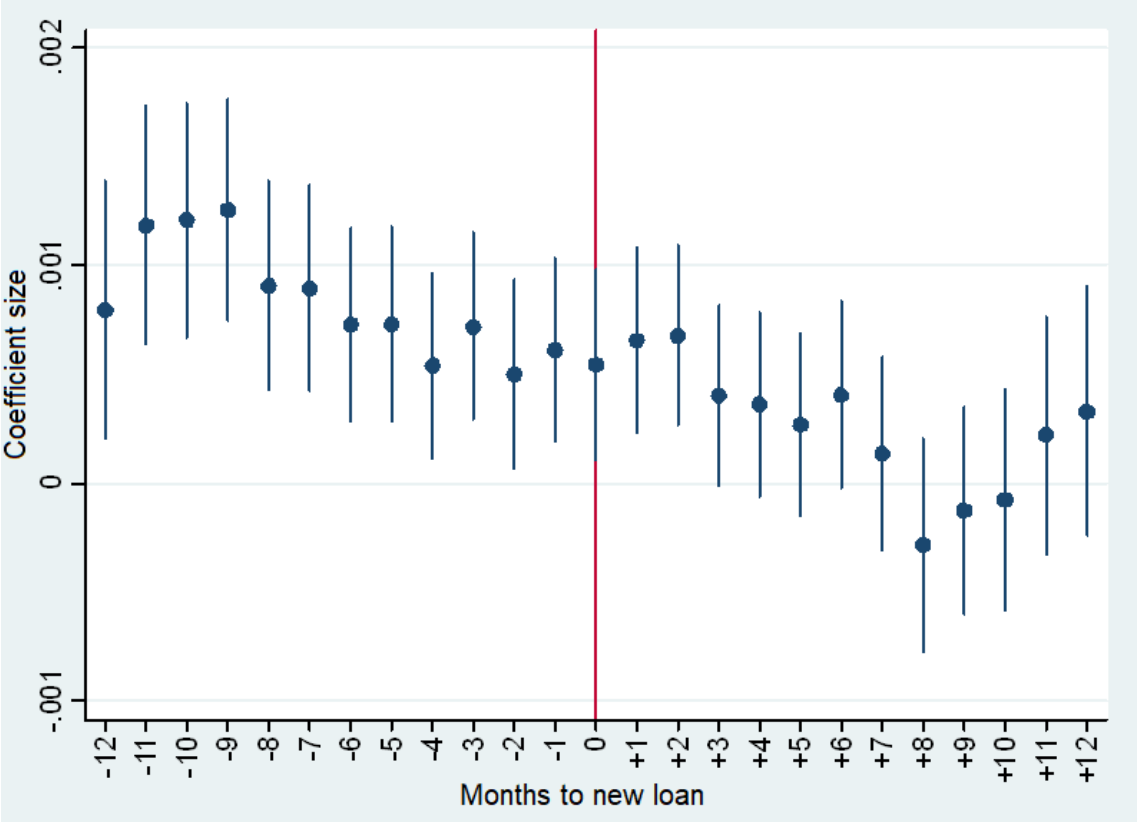

Figure 7: Manufacture and Non-Manufacture Firms with an average of 5 employees or less

This figure shows the estimated coefficients the effect of different lags and leads of new loans on employment for manufacture and non-manufacture firms in the first quartile of the size distribution:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d New\hat{L}oans_{i,t+d} +$$

$$+\beta_0 New\hat{L}oans_{i,t} + \sum_{d=1}^{d=12} \beta_d New\hat{L}oans_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. We instrument new loans with the local government prepayments and include firm and time fixed effects.

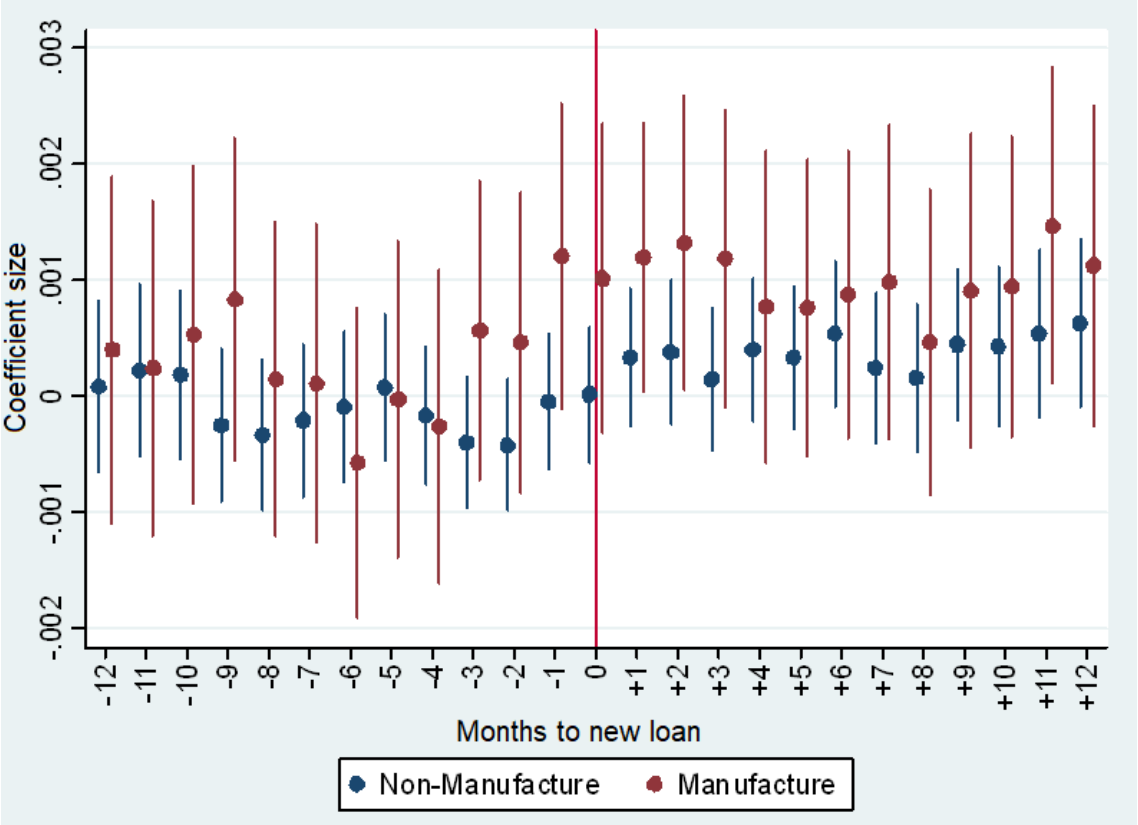

Figure 8: Manufacture and Non-Manufacture Firms with an average of 6 to 14 employees

This figure shows the estimated coefficients the effect of different lags and leads of new loans on employment for manufacture and non-manufacture firms in the second quartile of the size distribution:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d New\hat{L}oans_{i,t+d} +$$
$$+\beta_0 New\hat{L}oans_{i,t} + \sum_{d=1}^{d=12} \beta_d New\hat{L}oans_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. We instrument new loans with the local government prepayments and include firm and time fixed effects.

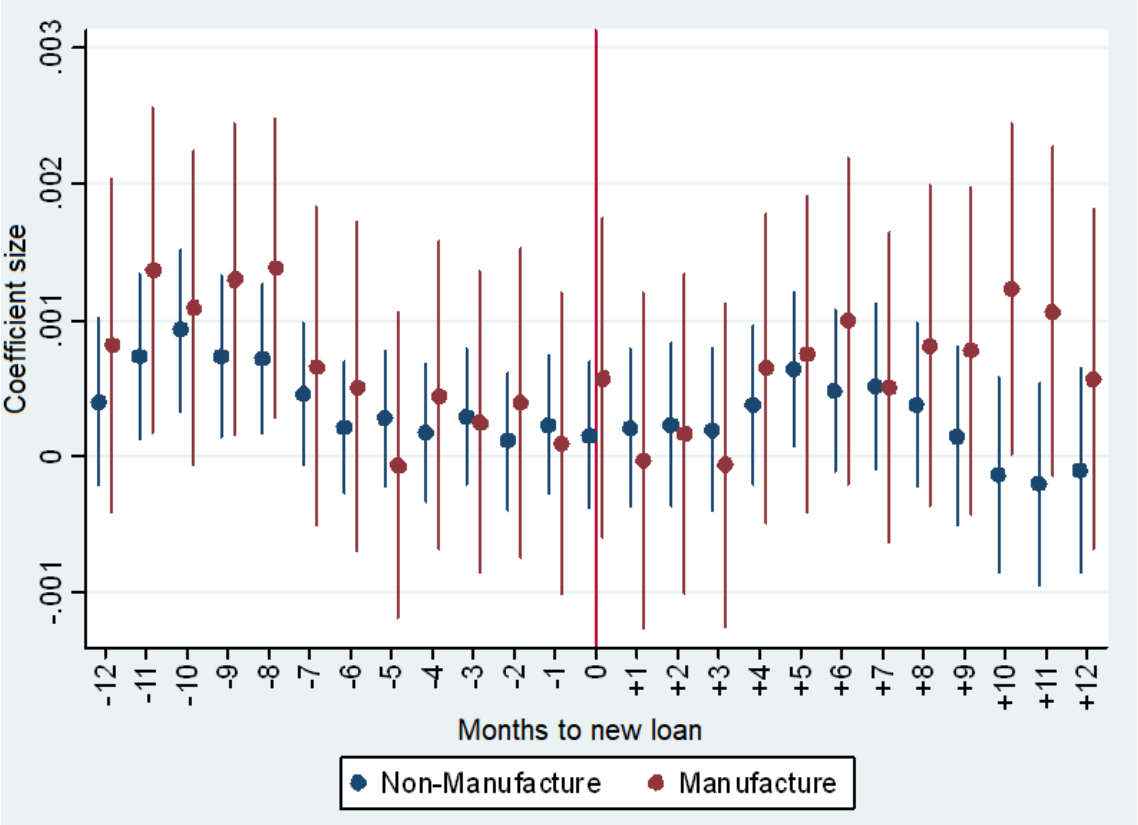

Figure 9: Manufacture and Non-Manufacture Firms with an average of 15 to 37 employees

This figure shows the estimated coefficients the effect of different lags and leads of new loans on employment for manufacture and non-manufacture firms in the third quartile of the size distribution:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d New\hat{L}oans_{i,t+d} +$$

$$+\beta_0 New\hat{L}oans_{i,t} + \sum_{d=1}^{d=12} \beta_d New\hat{L}oans_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. We instrument new loans with the local government prepayments and include firm and time fixed effects.

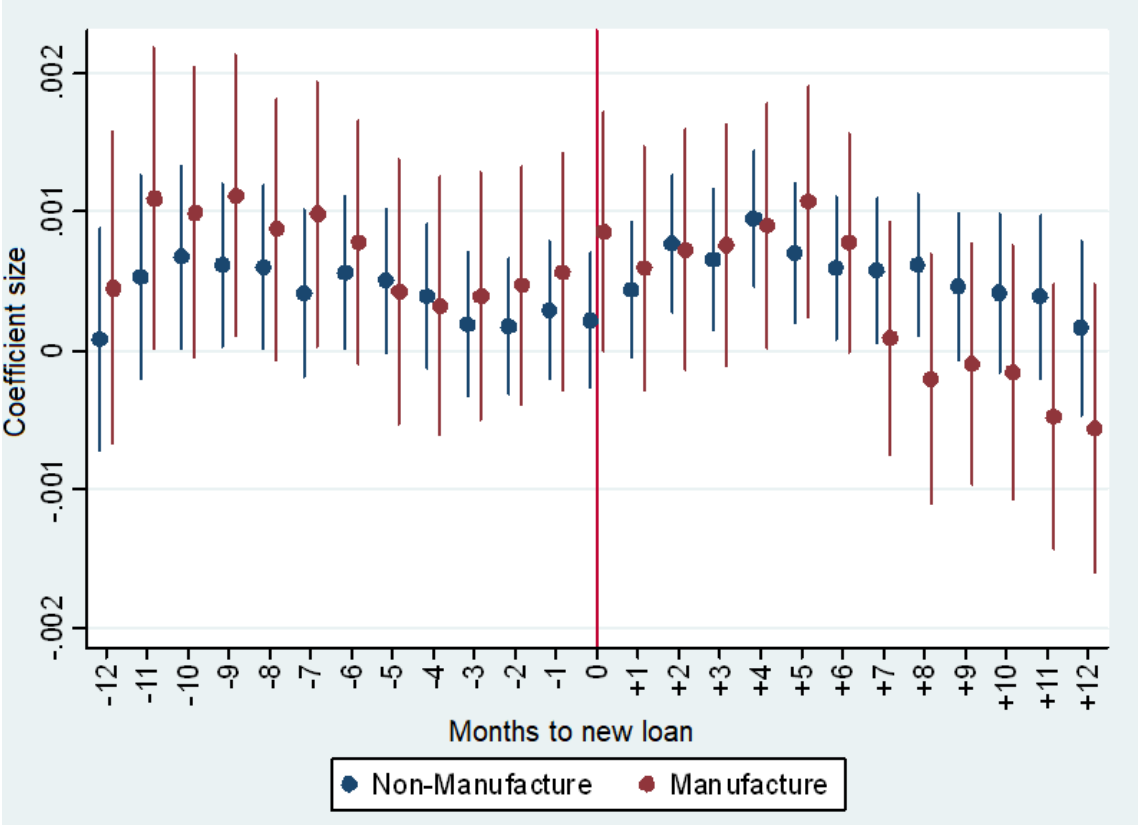

Figure 10: Manufacture and Non-Manufacture Firms with an average of 38 employees or more

This figure shows the estimated coefficients the effect of different lags and leads of new loans on employment for manufacture and non-manufacture firms in the fourth quartile of the size distribution:

$$Employment_{it} = \alpha_0 + \sum_{d=-12}^{d=-1} \beta_d New\hat{L}oans_{i,t+d} +$$

$$+\beta_0 New\hat{L}oans_{i,t} + \sum_{d=1}^{d=12} \beta_d New\hat{L}oans_{i,t+d} + \gamma_i + \eta_t + \epsilon_{it}$$

The first summation includes 12 lags of the New Loans variable while the second summation includes 12 leads of the same variable. The omitted category is the sum of all leads and lags beyond this 25 months window and we include firm and period fixed effects. We instrument new loans with the local government prepayments and include firm and time fixed effects.