Effect of Household Credit on Sectoral Composition: Evidence from Mexico*

Jagdish Tripathy†

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Abstract

This paper uses a natural experiment to study the effect of a drop in household credit on economic activity. I identify a negative shock to household credit supply in Mexico resulting from macro-prudential regulations in early 2012 in Spain. I use the variation in exposure to this shock across Mexican municipalities to measure the local demand effect of the drop in lending to households on the local industries in the tradable and non-tradable sector. Municipalities with higher shares of Spanish banks experienced greater drops in the growth rate of household credit, with a 10% higher pre-shock share of Spanish banks predicting a 2.5% drop in the growth rate of household credit. I show a slow-down in lending to the non-tradable sector in high-exposure municipalities and estimate elasticity of investments in the non-tradable sector to household credit ranging from 1.6-3.5. Investments in the tradable sector do not respond to the drop in lending to households. Numerous robustness checks provide evidence that the identified effects are not biased by the transmission of shocks across municipalities or by direct sector-specific shocks.

Keywords : Household Credit, Demand Channel, Non-tradable Sector, Natural Experiment

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† Universitat Pompeu Fabra, email - jagdish.tripathy@upf.edu

1 Introduction

Does the level of household credit affect economic activity in an economy? Recent empirical work (Mian and Sufi (2014); Mondragon (2014)) has shown that more than half the unemployment in the United States during the recent financial crisis can be explained by declines in employment in the non-tradable sector resulting from a contraction in the supply of household credit. These papers emphasize the existence of a local demand effect which causes a positive comovement in activity in the non-tradable sector of an economy in response to changes in lending to local households.[1,2] In my paper, I address the lack of evidence on the afore-mentioned demand effect in emerging economies by showing a causal link between changes in household credit supply and economic activity in the non-tradable sector in Mexico. I resolve the key challenge of identification using a credit supply shock resulting from financial regulations in Spain that led to a slow-down in lending to households by Spanish banks in Mexico. I use this supply shock to study the effect of household credit on investments in different sectors at a municipality level in Mexico.[3]

The source of the supply shock was macro-prudential regulations undertaken by the Spanish Government to build capital buffers against losses arising from real estate asset holdings, and to alleviate the uncertainty surrounding the quality of assets in the balance sheet of Spanish banks. Introduced in two phases in early 2012 as Royal Decree Law 02/2012 and Royal Decree Law 18/2012, the regulations imposed a retrospective loan-loss provision on real estate assets held as of December 2011 and revised upwards the provision requirements for real estate loans issued in an on-going basis.[4] The effects of these regulations were immediate and there was near universal compliance among Spanish banks by June 2012. BBVA and Santander reported additional provisions of 4.4 billion and 6.1 billion euros respectively to meet the new capital requirements. These two large banking groups also reduced lending to households in Mexico in the immediate aftermath of these financial regulations.[5]

[1] Household credit is the combination of housing credit (mortgages) and consumer credit. Household credit together with corporate credit is called total private credit, or simply commercial credit.

[2] Other papers that have studied the effect of household credit on local demand or on local economic activity include Agarwal et al. (2007), Glick and Lansing (2009, 2010), Gropp et al. (2014) and Adelino et al. (2015). The last two in particular emphasize the challenges of identifying shocks to local demand via changes in housing net worth or household credit.

[3] I use sector level credit as a proxy for investments in the particular sector in a given period. In June 2012, more than 80% of the credit to firms issued by commerical banks in Mexico was in the form of working credit. Other papers that use credit as a proxy for investments and economic activity are Khwaja and Mian (2008), Iyer et al. (2013), Amiti and Weinstein (2013), Chodorow-Reich (2014), among others.

[4] Loan-loss provisions, or more literally provisions against loan losses, are capital requirements that provide a buffer against potential losses from a particular loan. The upward revision of the loan-loss provision hence reflects a downward revision of the vaue of the loan, equivalent to a partial write-down.

[5] The increase in provisions were specifically aimed at Spanish real estate assets in the balance sheet of banks operating in Spain. The drop in lending to households in Mexico is the consequence of the negative

Figure 1 shows year-on-year growth rates for commercial credit issued by Spanish and non-Spanish banks in Mexico during 2010-2013. There is a clear difference in the growth rate of consumer and housing credit issued by Spanish and non-Spanish banks after June 2012. Remarkably, there is no coincident difference between Spanish and non-Spanish banks in lending to firms.[6] The effect of this slow-down in lending to households was significant since the Spanish banks issued 48% of the mortgage credit and 44% of the consumer credit in Mexico in June 2012. I exploit the variation in this exogenous drop across Mexican municipalities as a natural experiment. I show that municipalities with greater exposure to Spanish banks experienced larger declines in the growth rate of household credit between June 2012 to June 2013. In particular, I use a difference-in-difference specification and find that a 10% higher pre-shock share of Spanish banks in household credit predicts a drop of 2.5% in the growth rate of household credit a year after the introduction of the Spanish regulations. This drop is seen for both lending in the form of mortgages and consumer credit.

In order to shed light on the underlying mechanism, I develop a model of a Mexican municipality in which households rely on credit to finance consumption periodically. A shock to the level of household credit affects the local aggregate demand. Since economic activity in the non-tradable sector reflects the level of local demand, the model predicts a positive comovement between shocks to household credit and changes in investment and production in the non-tradable sector.[7] I use the natural experiment described above to study the presence of a local demand effect in Mexican municipalities.

I find strong evidence of the local demand effect in the changes in investments in the different sectors driven by the drop in lending to households by Spanish banks. I show that municipalities with a greater exposure to the shock experienced a higher drop in investments in the non-tradable sector, whereas investments in the tradable sector remained unaffected. In order to ensure that the drop in lending to firms in the non-tradable sector explained by the exposure to Spanish banks does not reflect a direct credit supply shock to those firms, I replicate all the results in a sub-sample of Mexican municipalities with a very limited exposure

liquidity effect resulting fom the high provision requirements on a significant part of the banks' loan portfolio. Real estate loans affected by the Spanish regulations RDL 02/2012 and RDL 18/2012 affected more than 10% of the entire loan portfolio for BBVA, coverage for which went up from 18% in 2011 to 43% in 2012 (*Source:* Page 104, Risk Management, BBVA Annual Report 2012). I discuss the international transmission of the liquidity effect of higher provisions on lending to households in Mexico in greater detail in section 2.

[6] In section 2, I argue that Spanish banks particularly cut the supply of household credit and not firm credit since the former tends to have much longer maturities (mortgages) or higher capital requirements (consumer credit).

[7] Key theoretical contributions that have studied demand effects of changes in household finance on economic activity are Eggertsson and Krugman (2012), Guerrieri and Lorenzoni (2011)and Midrigan and Philippon (2011). I emphasize the effect on the composition of economic activity through local demand effects in the model in section 3.

to Spanish banks for firms in the non-tradable sector.[8] I use the treatment variable, the pre-shock share of Spanish banks in houshold credit for a given municipality, as an instrument to measure the local supply shock to household credit resulting from Spanish regulations. I show that the instrument satisfies the exclusion restriction necessary for identification and does not capture any municipality specific trends in lending to households (or to particular sectors of the economy). Using the exogeous component of the local supply shock to household credit through an IV regression, I estimate an elasticity of investments in the non-tradable sector to changes in household credit ranging from 1.6-3.5.[9] I also detect a drop in the average interest rate of the marginal credit issued to firms in the non-tradadable sector in high exposure municipalities, a finding which is consistent with a drop in local demand for goods and serivces produced by firms in the non-tradable sector and not a local negative credit supply shock specific to the sector.

I conduct numerous econometric checks which suggest that the elasticity reported is highly robust. I find that weighted least square results using municipality characteristics such as population, GDP per capita and local financial development as weights are similar to the results based on OLS. I also present evidence which strongly supports the idea that the identified drop in lending to the non-tradable sector is not biased by the transmission of shocks across the municipalities. The coefficients do not change if I drop small municipalities from the sample, given that these municipalities are more likely to be affected by shocks to demand from neighbouring municipalities. Considering the high concentration of both credit and economic activity in and around Distrito Federal (Mexico City), I show that the coefficients are robust to exluding municipalities in and around Distrito Federal. Finally, I show that drops in investments in the non-tradable sector are largely explained by drops in the credit issued to smaller firms (firms with less than 50 employees), suggesting that the large firms engaged in sectors that are commonly thought of as non-tradable, such as the retail sector, are more immune to local demand shocks than smaller firms.

To the best of my knowledge, this is the first paper which claims identification based on a plausibly exogenous drop in the supply of household credit in an emerging economy. In assessing the effect of a shock to credit on economic activity, my paper is related to macroeconomic literature that studies the effect of financial development on economic growth

[8]The sub-sample includes municipalities in which the Spanish banks issued less than 10% of the total credit issued to the non-tradable firms. The identfied demand effect does not change for alternate thresholds for selecting municipalities in the sub-sample, which strongly suggests that the treatment variable does not capture a direct credit supply shock to non-tradable firms.

[9]Mian and Sufi (2014) and Mondragon (2014) show a drop in employment in the non-tradable sector in response to negative shocks to household spending. My results show the existence of a complementary channel involving a reduction in investments by the firms specifcally catering to local demand in response to a similar shock.

through a combination of theoretical and empirical analysis. The earliest contributions in this literature established the theoretical basis for the necessity of finance, and empirically assessed the effect of access to finance on economic activity using credit as a proxy for financial development.[10] The key contributions of the theoretical literature and the limitations of the afore-mentioned empirical exercises are well documented in the very exhaustive literature review by Levine (2005). Since then, the recent financial crisis has generated significant interest in research that uses the latest econometric tools to analyze channels through which finance interacts with the real economy.

Broadly, two sub-strands have emerged in response to the recent financial crisis. The first documents the significant rise of household credit (particularly mortgages) in the periods leading upto the crisis, a trend that has not shown any signs of abating after a short-lived slow down during the crisis.[11] The second, centered on the United States, questions whether the drop in employment and output during the financial crisis resulted from a drop in household net worth (a demand shock) or was driven by a contraction in lending by illiquid banks (a supply shock). The current paper uses identification techniques similiar to key contributions in the second sub-strand of the literature to study the effect of household credit in an emerging economy.

Mian and Sufi (2014) and Mondragon (2014) use exogenous drops in access to household credit at a county level in the US to establish a causal link with drops in employment in the local non-tradable sector. The latter also estimates an elasticity of employment in the non-tradable sector to the level of household credit. While these two papers use domestic shocks to identify the drops in local demand, the current paper differs by using an international financial shock that caused a drop in the supply of household credit at a municipality level in Mexico. This is interesting in two ways. Firstly, an international financial shock that is not related to any domestic crisis helps me adress the discussion in Gropp et al. (2014) and Adelino et al. (2015) regarding the alternate channels that can explain the drop in household

[10]The literature preceding the recent financial crisis, by and large, used aggregate credit to the private sector as a proxy for financial development. Empirical results were based on cross-country regressions using dynamic panel techniques (for example Levine et al. (2000), Glaeser et al. (2004) and Aghion et al. (2005)) or on studies that evaluated the effect of financial acess on growth at a industrial or firm level (for example Rajan and Zingales (1998), Guiso et al. (2004) and Beck et al. (2005)). The interest in the composition of lending to the private sector between household credit and lending to firms is more recent.

[11]The level of household credit, measured as a percentage of GDP or as a proportion of total credit allocated to households, has gone up in almost every country in the last few decades. The results in this paper suggest that greater access to household credit can trasnform the composition of investments and production between the different sectors of an economy. The change in composition of investment and production towards the non-tradable sector through the demand channel can potentially explain the deeper and longer recessions resulting from a financial crisis ancillary to a boom in lending to households (see Jorda et al. (2015, 2014)). Papers that study the effect of sectoral composition on economic growth are Hausmann et al. (2006), Duarte and Restuccia (2010), Benigno et al. (2015), Perla et al. (2015) etc.

consumption expenditure during the financial crisis. For example, Adelino et al. (2015) provide evidence which suggests that the fluctuations in lending to households before and during the financial crisis are driven by expectations of future house prices. Based on their interpretation, there is likely to be positive comovement in changes in house prices, lending to households and economic activity in specific sectors driven by changes in expectations, calling into question the causality claims in Mian and Sufi (2014). While these findings are currently under active investigation and review, their criticism does not apply to my paper since the source of the shock in my paper is unanticipated financial regulations in a foreign country. In addition, Mondragon (2014) emphasizes the importance of addressing the possibility of bank selection into specific municipalities/counties. This is a lesser concern in my paper given that I base my exogeneity claims on the distribution of Spanish shares almost a year before the unanticipated Spanish regulations, and I further control for municipality level trends using fixed-effects

My paper is also unique in describing an exogenous drop in the supply of household credit driven by the international transmission of a financial shock. The presence of international banks, as is the case in Mexico, exposes a country to shocks that affect the business of the international bank. Peek and Rosengren (1997), Khwaja and Mian (2008), Schnabl (2012), Cetorelli and Goldberg (2011) and Paravisini et al. (2015) are notable examples which use such an international transmission channel to study the effect of credit supply shocks on lending to firms. The effect on firms in my paper is indirect - the international financial shock impacts the firms only through the drop in spending by households and does not represent a direct supply shock to firms in any sector per se. Finally, my paper speaks to the international transmission of capital requirements through the presence of large, globalized banks. Houston et al. (2012) have shown that cross-country differences in capital requirements can leads to bank flows towards countries with lower capital requirements. Aiyar et al. (2014) document a scenario closely related to the Spanish regulations discussed in this paper - they show drops in cross-border lending by banks resident in the UK in response to increases in capital requirements in the UK.

The rest of the paper is organized as follows. Section 2 discusses the regulations pertaining to loan-loss provisions for real estate assets introduced by the Spanish Government in 2012. In particular, I provide plausible arguments on why these regulations were transmitted across the Atlantic as a credit supply shock to housholds and not to firms. Section 3 provides a simple 2-sector, infinite horizon model to provide intuition for the mechanism behind the local demand effect. Section 4 describes the data and discusses the empirical methodology. Sections 5 and 6 report the empirical results relating to the changes in composition of credit in response to the supply shock to lending to households. Section 7 concludes.

2 Spanish regulations & credit supply shock in Mexico

2.1 Regulations in Spain - RDL 02/2012 and RDL 18/2012

The newly elected Spanish government of Mariano Rajoy introduced a financial reforms package in early 2012, just 10 weeks after coming to power in December 2011. The reforms were introduced in two rounds - first in February 2012 and then in May 2012 - with the specific aim of restoring investor confidence in Spanish banks by providing greater transparency on the burden of real estate assets and by restructuring the balance sheet to reflect the uncertainty in the value of real estate assets. These twin objectives were attained by imposing increases in mandatory provisions on asset classes related to real estate which, in turn, greatly reduced the operating income of Spanish banks in Mexico. I argue that this drop in operating income was the driving force behind the drop in the growth rate of household credit issued by Spanish banks starting June 2012.

The first round of reforms, titled the Royal Decree Law 02/2012 and introduced on 3rd February 2012, significantly revised the loan-loss provisions for assets related to real estate. *Specific provisions* were revised upwards for assets which incurred the greatest impairment in their value during the period, namely assets related to land acquisition, foreclosure or projects under development classified as 'Troubled' or 'Doubtful'. On top of this change, a one-off *general* provision of 7% was imposed on the outstanding amount as all standard real estate assets as of December 2011.[12] The second round of reforms, titled the Royal Decree Law 18/2012 pushed upwards the one-off provision requirements of RDL 02/2012 for specific assets. In the second round the one-off 7% provision requirements was increased by 45% for all unsecured real estate assets and by 7-45% for different types of mortgage backed real estate assets.

The above measures met with full compliance by the Spanish banks as reported by the Banco de España in their bi-annual *Financial Stability Reports* in 2012. Even though the compliance deadline was set as December 31st 2012, the Financial Stability Report issued in November 2012 mentions that nearly all the banks had reported the additional provisions required by June 2012, far ahead of schedule (figure 2). While there was an anticipation for financial reforms in Spain during late 2011/early 2012, the exact nature and extent of the

[12]Please see Saurina (2009) for an exhaustive treatment of the specific nature of provision requirements in Spain. *Specific provisions* are the asset specific capital requirements based on the average loan losses resulting from holding that specific asset. *General provisions* are imposed on a per-period basis by the central bank, Banco de España, as a counter-cyclical macro-prudential tool. The reforms in 2012, RD 02/2012 and RD 18/2012, were a combination of an increase in *Specific Provisions* to reflect an impairment in the value of real estate assets in an on-going basis and a one-time *general provision* reflecting the deterioration in the quality of existing real estate assets in the balance sheet of Spanish banks. These two measures collectively were aimed at inspiring greater confidene in the Spanish banking system.

financial reforms were not clear until the introduction of Royal Decree Law (RDL) 02/2012 on 3rd February, 2012.[13] Together with the second round of reforms in May 2012, the two regulations significantly raised the level of provisions required for all real estate assets held by Spanish banks and imposed an obligatory impairment in the value of their real estate assets.

As the two largest Spanish banking groups, BBVA and Santander had the largest burdens resulting from the regulations in early 2012. The sharp upswing in the provisions because of the introduction of RDL 02/2012 and RDL 18/2012 can be understood from a figure taken from BBVA's Annual Report in 2012. Figure 3 shows the very second chart from the 'Earnings Report' in the 2012 Annual Report in which the increase in loan-loss provisions are identified as the primary reason behind a drop in net attributable profits of almost 1.5 billion euros despite an increase in operating income for the year 2012 against the levels in 2011. The message is clear - the drop in profitability vs earlier years is owing to the hit of 4.4 billion euros to earnings from the loan-loss provisions imposed on Spanish real estate assets. The comparable figure for Santander was an outlay of 6.1 billion euros as loan-loss provisions and a corresponding hit to net profits. In addition, Santander reports in its Annual Report for 2012 increasing the provision requirements for real estate loans in Brazil and Chile in response to the regulatory changes in Spain.

2.2 Effect of Spanish Regulations on Spanish banks in Mexico

BBVA and Santander, the two largest Spanish banks by market capitalization and asset holdings world-wide, have a significant presence in Mexico. As we shall see, the drop in net operating income for both the banks in 2012 was not without consequence for their operations in Mexico. I first describe the presence of Spanish banks in Mexico before analyzinging how the regulations in Spain acted as a financial shock to lending in Mexico, particularly to the supply of household credit.

BBVA Bancomer, a wholly owned subsidiary of the BBVA Group head-quartered in Spain, is the largest banking group in Mexico. BBVA Bancomer is the also the leading lender of commercial credit of all types - housing credit, consumer credit and corporate credit - in Mexico.[14] In June 2012, it accounted for 28% of all commercial credit issued by banks in

[13]The election manifesto of PP, the winners of the December 2011 elections, mentions the likelihood of financial reforms to confirm banking regulations in Spain with international best standards and with regulations elsewhere in Europe. While neither the election outcome, nor the likelihood of financial reforms were unexpected, there was no clarity as to the nature and extent of the financial reforms. The retrospective loan-loss provisions can be argued as unanticipated.

[14]Consumer credit aggregates credit issued as credit cards, payroll credit, personal loans, car loans or durable goods' loans. Corporate credit is the credit issued to entrepreneur's and firms. Commercial credit, distinct from corporate credit, refers to the entire portfolio of credit issued by banks. Almost 98% of housing

Mexico, with a strong dominance in the mortgage and consumer credit markets where it issued 37% and 44% of the total credit at a national level.[15] Together with Santander, these two Spanish banks issued almost 40% of the total commercial credit in Mexico in 2012, with their presence strongly felt in the household credit (combining housing credit and consumer credit) market where there share stood at 48%.

The sharp divergence in the growth rate of housing credit and consumer credit between Spanish and non-Spanish banks in June 2012 is a result of the provision reuquirements instituted in February and May 2012. The increase in loan-loss provisions led to an immediate and sharp decrease in the net attributable income. Banco de España reported an almost immediate compliance to the new requirements by June 2012, indicating an immediate effect on lending by Spanish banks as well. The Mexican subsidiaries of the Spanish banks are only partially financed by customer deposits (the figure for 2012 was 44% and 53% for BBVA and Santander respectively), a feature that makes them susceptible to international financial shocks. Three channels are proposed to explain the drop in lending by the Spanish banks in the aftermath of the increase in capital requirements. First, the increase in loan-loss provisions and the imposed impairment in real estate asset value could have acted as a signal of the true value of the bank and acted as a negative liquidity shock for Spanish banks in the wholesale credit market. Second, loan-loss provisions could have negatively affected the amount of leverage in the balance sheet of the banks and since equity financing is expensive at times of crises, banks would have no option but to retract parts of their lending portfolio. Third, it is also possible that that new provision rules, though applicable to holdings of Spanish real estate assets, also affected the provisions held by Spanish banks for housing credit loans in Mexico, as was done by Santander in Brazil and Chile. I remain agnostic as to the strength of these three channels and all the three might be at play in explaining the slow-down in lending by Spanish banks. I dont find a corresponding difference in the growth rate of credit to firms in figure 1 since almost 90% of the credit issued by banks to firms are relationship based loans extended as working capital.

As I show in section 4, municipalities with a higher pre-shock share of Spanish banks in household credit experienced a greater drop in the growth of household credit. This difference provides a setting to study the effect of an exogenous drop in the supply of household credit on the macroeconomy of a municipality. Before sharing the empirical results, I discuss a macroeconomic model of a Mexican municipality to develop intuition for the results that follow.

credit is issued as mortgages - hence housing credit is used interchangeably as mortgage credit.

[15]Not only do Spanish banks have a significant presence in Mexico, Mexico has a weighty presence in the gross income statement of these banks. 25% and 13% profits of BBVA and Santander respectively are attributed to Mexico in 2012.

3 Model of a Mexican Municipality

The unit of observation in the natural experiment I described in section 2 is a Mexican municipality. I model Mexican municipalities as small, open economies with immobile labour and free movement of capital between the municipalities. Firms operate in one of two sectors in the economy - a tradable sector producing a good traded across the municipalities and a non-tradable sector producing a good specifically meant for local demand. Households in the economy are financially constrained and rely on access to household credit periodically to finance consumption. The level of household credit depends on an exogenously determined, municipality-specific parameter. The natural experiment described in the earlier section is modeled a shock to this particular parameter, leading to a variation in the changes to household credit across the municipalities. I use the model to share intuition on the demand channel - i.e., the effect of a shock to household credit on the composition of investment and production between the tradable and non-tradable sector in an economy through its effect on aggregate demand in an economy.

3.1 Model Description

The representative Mexican municipality, identified by subscript 'j', is a small open-economy with two sectors and infinitely lived heterogeneous agents. The unit of decision making is a household and the terms agents and households are used interchangeably in what follows. The economy comprises of two types of households - capital owners who own the firms in the economy and workers who are endowed with labour and are engaged by the firms owned by the capital owners. The capital owners own firms in one of the two possible sectors - a sector producing a tradable good and othe other a non-tradable good. The tradable good can be traded across the municipalities for a given interest rate. The non-tradable good can not be traded between the municipalities. Hence the production for a non-tradable good must be met by the demand for the same within a municipality, and vice-versa.

I begin the presentation of the model with the the consumption-saving decision of the capital owners, the optimal consumption path available to the workers and the resulting equilibrium in the infinite horizon problem of this economy. The decisions are made in the absence of any aggregate uncertainty though the economy may experience shocks periodically. I study the effect of shocks to ϕ_j on economic activity in the municipality.

3.2 Household Problem

There are two types of households in the economy - capital owners and workers. Capital owners are not endowed with any labour and their per-period consumption and saving decisions are aimed at maximizing their life-time utility given by

$$U_0 = max \sum_{t=o}^{\infty} \beta^t log\{c_t\} \tag{1}$$

$$\text{for } c_t = (c_{Tt})^{\tau}(c_{Nt})^{1-\tau},$$

$$R_t a_t = c_t + a_{t+1}, \text{ given } a_o$$

The consumption in any given period, c_t, is a Cobb-Douglas aggregate of the tradable and non-tradable good. For a given starting value of asset holdings a_0 and interest rate R_t, the solution to the dynamic programming problem prvoides the optimal consumption , c_t^i, and saving, a_{t+1}^i function for the capital owners in this economy as

$$c_t = R_t(1-\beta)(\prod_{s=0}^{t-1} R_s\beta)a_o \text{ and } a_{t+1} = (\prod_{s=0}^{t} R_s\beta)a_o \tag{2}$$

The average interest rate R_t, for period 't', is an equilibrium outcome based on the optimal portfolio choice by the capital owners for their savings. The savings of the capital owners can either be invested domestically in the tradable or non-tradable industries or lent abroad for interest rate R^*. Since investments are made by risk-neutral agents under perfect foresight, capital owners invest in the two sectors until the marginal return to capital in either sector, $\{R_{Nt}, R_{Tt}\}$, equals the lending rate R^*, i.e. $R_t = R_{Tt} = R_{Nt} = R^*$.

The workers optimize their lifetime utility given by an infinite sum of a non-separable utility function per period that reflects utility from consumption and disutility from working. I use a specific form of Greenwood-Hercowitz-Hofman preferences as follows

$$U_0 = max \sum_{t=o}^{\infty} \beta log\{c_t - \eta\frac{(n_t)^{1+\psi}}{1+\psi}\} \tag{3}$$

$$\text{where } c_t = (c_{Tt})^{\tau}(c_{Nt})^{1-\tau} \ ,$$

$$R^* a_t + w_t n_t = c_t + a_{t+1} \text{ and } \ -a_{t+1} \leq \phi_t \frac{w_{t+1} n_{t+1}}{R^*}$$

While the workers must consume every period, their labour endowment is staggered over

their lifetime. I assume that workers supply labour in alternate periods of their existence and belong to one of two categories, H_E and H_O, based on whether they supply labour during even-numbered or odd-numbered periods. I also assume that the workers are constrained and can borrow upto a fixed proportion of their next period income. This proportion, ϕ_j, is specific to municipalities and governs the maximum amount of household credit accessible by households in the municipality at time 't'.

I further assume that the workers are impatient (β is less than a threshold value $\bar{\beta}$) and financially constrained (borrowing constrained $\phi_j < \frac{1}{1+\beta} \cdot \frac{\psi}{1+\psi}$). Under these twin assumptions, workers in the economy behave as hand-to-mouth consumers. When not endowed with labour, the households borrow at the limit to finance their consumption. I call these households the 'Constrained Workers'. The remaining workers, whom I canll the 'Employed Workers' clear any outstanding debt and consume what is left of their wages. Hence for a even time period 't', the consumption profile is given by,

$$c_t^i = \begin{cases} (1-\phi) \cdot w_t n_t & \text{if i} \in H_{even} \\ \phi \cdot \frac{w_{t+1} n_{t+1}}{R^*} & \text{if i} \in H_{odd} \end{cases}$$

where n_t is the labour supply given by the market wage $\{\frac{w_t}{\eta}\}^{\frac{1}{\psi}}$. In odd periods, the workers from the two different sets interchange their roles as constrained workers and employed workers. Thus, the total spending from the two types of workers in any period 't' is given by $(1-\phi_{t-1}) \cdot w_t n_t + \phi_t \frac{w_{t+1} n_{t+1}}{R^*}$.

3.3 Production

Firms are perfectly competititve Cobb-Douglas aggregators of capital and labour which specialize in the production of a sector specific good. There is full depreciation of capital every period and the level of capital in a given sector is determined by the level of sector specific investments in the previous period. The production function for firms in the tradable sector is given by $F_T(K_{Tt}, L_{Tt}) = Z_{Tt} K_{Tt}^{\alpha_T} L_{Tt}^{1-\alpha_T}$ and for firms in the non-tradable sector by $F(K_{Nt}, L_{Nt}) = Z_{Nt} K_{Nt}^{\alpha_N} L_{Nt}^{1-\alpha_N}$, where $\{Z_{Tt}, Z_{Nt}\}$ are the sector-specific productivities, $\{\alpha_T, \alpha_N\}$ the levels of capital intensities, $\{K_{Tt}, K_{Nt}\}$ the levels of capital and $\{L_{Tt}, L_{Nt}\}$ the labour allocated in time 't'.[16] The tradable good is the numeraire and the relative price of the non-tradable is given by P_{Nt}.

[16]The sector specific factor intenstiites and productivities can vary across the municipalities. In general, I assume that the preferences are the same for households across the Mexican municipalities and the differneces across the municipalities stem from the parameter ϕ_j and sector specific production functions. Except for ϕ_j, I drop the municipality specific subscript 'j' to minimize notation since we restrict the discussion to a representative Mexican municipality in this section.

The market clearing condition in the labour market entails that the demand for labour $\{L_{Nt} + L_{Tt}\}$ must equal the supply of labour. For wage rate w_t, the total supply of labour is given by $(\frac{w_t}{\eta})^{\frac{1}{\psi}}$. Hence the labour market clearing condition is given by,

$$L_{Nt} + L_{Tt} = (\frac{w_t}{\eta})^{\frac{1}{\psi}} \tag{4}$$

Risk neutral capital owners invest in the two sectors until the marginal return to capital in each sector equals R^* as summarized in the equation below,

$$R^* = \alpha_T \cdot Z_{Tt} \cdot (\frac{K_{Tt}}{L_{Tt}})^{\alpha_T - 1} = \alpha_N \cdot P_{Nt} \cdot Z_{Nt} \cdot (\frac{K_{Nt}}{L_{Nt}})^{\alpha_{N-1}} \tag{5}$$

Finally, the relative price of the non-tradable good is determined by the market clearing condition in equation 6, the *demand equation,* which equates the total spending on non-tradables by households in period t [17] to the total value of production in the non-tradable sector as follows,

$$(1-\tau)\cdot\{\underbrace{R^* \cdot a_t \cdot (1-\beta)}_{Capital\ Owners} + \underbrace{(1-\phi_{t-1}) \cdot w_t n_t}_{Employed\ Workers} + \underbrace{\phi_t \cdot \frac{w_{t+1} n_{t+1}}{R^*}}_{Constrained\ Workers}\} = P_{Nt} \cdot Z_{Nt} \cdot K_{Nt}^{\alpha_N} \cdot L_{Nt}^{1-\alpha_N} \tag{6}$$

At time 't', for given values of $\{K_{Nt}, K_{Tt}\}$, the market clearing conditions discussed in this section establish the equilibrium outcomes$\{L_{Tt}, L_{Nt}, R_{Tt}, R_{Nt}, P_{Nt}, w_t, K_{Nt+1} K_{Tt+1}\}$. In the next section I study how changes in the level of household spending driven by changes in $\phi_{j,t}$ affect economic activity in the two sectors.

3.4 Equilibrium

The workers in the economy rely on access to household credit for consumption during periods when they do not earn wages since their income is concentrated in alternate time periods. Changes in access to household credit, through shocks to parameter ϕ_j, are reflected in both the household credit accessed and the household debt repaid every period. I present the effect of a temporary and permanent shock to household on economic activity in the two sectors of the economy in *result 1* and *result 2* respectively.

[17] Equation 6 is valid for the case when there is no shock experienced at period 't'. In the event of a shock the net wealth of the capital owners would be given by $\underbrace{R_{Nt} \cdot K_{Nt} + R_{Tt} \cdot K_{Tt} - R^* \cdot (K_{Nt} + K_{Tt} - a_t \cdot (1-\overline{\beta}))}$ since the eventual investment risk in the model is absorbed by capital owners and shocks may shift the return to investments away from R^*. The wealth of the households that supply labour during the period will be given by $\underbrace{w_t n_{t,} - \phi^h_{t-1} \cdot E_t(w_t n_t)}_{Employed\ Workers}$ instead of $\underbrace{(1-\phi_{t-1}) \cdot w_t n_t}_{Constrained\ Workers}$.

Result 1: A temporary shock that leads to a drop in the level of household credit always leads to a drop in investment and production in the non-tradable sector of the economy.

Result 2: A permanent drop in the household constraint parameter ϕ_j leads to a permanent decrease in the level of investments and production in the non-tradable sector if and only if $R^* < (1+g)^{\frac{1}{1-\alpha_T}}$ where g is the growth rate of the productivity in the tradable sector.

I refer to the demand equation (eq. 6) to provide an intuitive interpretation of these two results. A temporary contraction in the level of household credit leads to a drop in the spending on goods and services contemporaneously. This is because the shock leads to drop in the contemporaneous borrowing by the constrained workers, without affecting the outstanding household debt of the employed workers (*result 1*). A permanent change in the level of household credit ϕ_j affects both the contemporaneous household credit borrowing and the outstanding household debt in future periods. A permanent drop in household credit would lead to a drop in the total spending as long as the negative effect on current borrowing outweighs the rise in spending in the future after clearing the lower debt acquired in the previous period. If wages are constant (no productivity growth in the tradable sector), that can happen if and only if $R^* < 1$ and in case of productivity growth, if and only if, $R^* < (1+g)^{\frac{1}{1-\alpha_T}}$.

In figure 5, I shock an economy at steady state with a temporary one-period drop in the level of household credit. As set down in *result 1,* the effect of a temporary drop in the level of household credit is independent of parameters governing the economy and always leads to a contemporaneous drop in economic activity in the the non-tradable sector. In casef a permanent drop in the level of household credit, in the short term the economy sees a drop in the level of economic activity in the non-tradable sector and the eventual transition to a new steady state marked by an expansion or contraction in the non-tradable sector depending on the condition laid down in *result 2*. In figure 6 I show the transition in the event of a permanent shock to the level of household credit for an economy with $R^* < 1$.

Figure 7 shows the transition in an economy with a temporary, though persistent, shock to the level of household credit. The economy experiences a negative shock at time period $t = 10$ and experiences a drop in the level of household credit from $\phi_{H,j}$ to $\phi_{L,j}$. From $t = 12$, the level of household credit recovers based on the process $\phi_{j,t} = \phi_{j,t-1} + \theta \cdot (\phi_{H,j} - \phi_{j,t-1})$. The economy experiences an expansion in the non-tradable sector along the transition process since the gain in spending from better access to household credit outweighs the negative effect of the higher amount that must also be repaid very period. Figure 8 highlights the exact opposite transition process in an economy with $R^* > 1$). In this economy, there is an increase in overall spending in response to a drop in access to household credit since the debt burden every period outwieghs the additional demand from better access to credit.

4 Data Description and Empirical Methodology

4.1 Data Description

I use publicly available data from CNBV for household credit and credit-registry data on firm credit to build a panel of credit issued by commercial banks at a municipality level in Mexico from June 2011 to June 2013 at a half-yearly level. Household credit is disaggregated into mortgages and consumer credit.[18] Consumer credit is an aggregate of credit issued as credit cards, personal loans, car loans, payroll credit and durable goods' loan. The reason for limiting the database to the period 2011-13 is that data on the actual amount of credit issued as credit cards, almost 13% of total commercial credit in our sample, is available only starting February 2011. CNBV only reports the number of credit cards at a municipality level in periods prior to 2011. Even so, the available data allows me to observe changes in lending to households and industries at a municipality level after the shock, while controlling for any pre-shock municipality level trends.

Data on firm credit is obtained from the 'R-04C' credit registries which include details on all the credit lines issued by banks to firms reported at a monthly level. In addition to the outstanding credit, banks report the contracted interest rate, date of origination, maturity, and whether the loan is collateralized. Banks also report firm-level characteristics including the firm's size, the firm's revenue and the firm's reported industry. A firm's industry is represented by a 5-digit code that can be matched to the the 2007 NAICS industrial classification at a 5 digit level.[19] I aggregate the credit reported in the credit registry at a 4-digit NAICS industry-bank-municipality level. I also exploit the interest rate dimension of the credit registry to include average interest rates of credit issued to 4-digit NAICS industries at a municipality level.

The 279 4-digit NAICS industries are classified into the non-tradable and tradable sectors based on the criterion used in Mian and Sufi (2014). All industries that are a part of the retail and restaurant sector are classified as the non-tradable sector and industries with gross imports+exports greater than USD $ 500,000 or USD 10,000/employee in the US as tradables. The tradable industries are identified using disaggregated trade data for Mexico for 2010 downloaded from the International Trade Statistics Database maintained by Comtrade, UN. The gross trade/employee data is obtained by combining the industry level trade data with

[18] *Comisión Nacional Bancaria y de Valores,* http://www.cnbv.gob.mx/Paginas/default.aspx

[19] 'R04C' 5-digit codes perfectly match NAICS-2007 Industrial Classification for most industries except the NAICS-2007 industries starting with 44 and 45 (43 and 46 in 'R04C'), the 'Retail' and 'Wholesale' sectors respectively. A reconciliation between the unmatched 'RO4C' industry and their counterpart in NAICS-2007 is provided in the online Appendix.

the by industry employment data in Census 2009.[20] 23 industries are classified as belonging to the 'construction' sector and the remaining industries are classified as 'Others'.

4.2 Summary Statistics

The credit database described above includes outstanding credit to households (as mortgages or consumer credit) and firms (by sector) for 999 municipalities in Mexico.[21] Figure 4 (a) shows the distribution of these municipalities on a map of Mexico, where as table 4 shares summary statistic for key variables. The municipalities covered have an average size of 1193 sq. km. and are drawn from all the 32 Mexican states. The low level of financialization in Mexico is also apparent in access to credit at a municipality level. The average Mexican municipality in the sample has a $Credit/GDP$ figure of just 19.9%. The credit series at a municipality seem to be expanding - I report this increase using changes in log-levels of credit series between June 2011 and June 2012. I also observe that the changes in log-level of credit to firms shows a greater variability than the changes in credit to households. I show the variation in the presence of Spanish banks using the share of Spanish banks in the markets for different credit types. I use the bank-municipality dimension of my database to compute the share of Spanish banks in the specified credit market for June 2011. The share of Spanish banks in the household credit market is normally distributed across the municipalities, as can be seen in figure 9.

I further refine the natural experiment by considering a sub-sample of municipalities with very low shares of Spanish banks in the non-tradable credit market. In particular, I use a sub-sample of 379 municipalities in which the share of Spanish banks in the non-tradable credit market is less than 10%. Any effect on lending to the non-tradable sector identified in this sub-sample can be interpreted with much less concern for capturing a direct supply shock to non-tradable firms resulting from the Spanish regulations. As I shall show shortly, the results of the natural experiment as defined in the full sample closely match the results from this sub-sample. These 379 municipalities are also drawn from all the 32 states, are uniformly distributed across the different regions of Mexico (figure 4 (b)) and most importantly, have a distribution of Spanish share in houshold credit market that matches the distribution in the full sample (table 5).

[20] While I use the same thresholds used by Mian and Sufi (2014) to classify industries as tradable, I find a close match between industries identified as tradable by them using American trade data and by me using Mexican trade data. The discepancies are presented in the appendix.

[21] Mexico has 2456 municipalities. The municipalities included in the sample are the ones which have complete data on all credit types for the entire duration covered by the database. The 999 municipalities comrpising the sample account for % and % of the total credit and total economic activity at a national level. The sub-sample of 379 municipalities accounts for % and % of the total credit and total economic activity at a national level.

4.3 Empirical Methodology

The main challenge in estimating the effect of changes in household credit on economic activity is that changes in household credit are highly endogenous. Since I use changes in credit to different sectors as an outcome variable, it is easy to see why a regression of changes in lending or employment or production in a given sector on changes in lending to households does not identiy the demand channel. For example, in the model in the previous section, a productivity shock can affect the level of investment in a given sector through its effect on factor costs and the level of household credit through its effect on real wages. Hence any estimate of ψ_s that are not based on a truly exogenous change in lending to households will be biased. I use a difference-in-difference specification to measure the exogenous drop in the growth rate of household credit at a municipality level in Mexico resulting from the Spanish regulations. In the natural experiment depicted diagrammatically in figure 11, I regress changes in lending to households in periods before and after the introduction of Spanish regulations (June 2012) on a constructed treatment variable $Post{\cdot}Spanish\ Share_{j,2011}$, where $Post$ refers to periods after June 2012 and $Spanish\ Share_{j,2011}$ is the share of Spanish banks in household credit in municipality 'j' in June 2011. I control for municipality and time fixed effects in the difference-in-difference regressions to allow for different trends in the household credit series between the municipalities. The regression equation is given by

$$\Delta \log(h_{jt}) = \beta \cdot Post \cdot Spanish\ Share_{j,2011} + D_j + D_t + \varepsilon_{jt},$$

where h_{jt} refers to household credit for municipality 'j' at time 't', D_j are municipality dummies and D_t are time dummies. The coefficient β on the interaction term explains the changes in the growth rate of household credit explained by the share of Spanish banks after the introduction of Spanish regulations. To the extent that the treatment variable provides us with precise measurements of the supply shock to household credit at a municipality level, I can use it as an instrument for the municipality level drops in lending to households. The difference-in-difference regression of the changes in lending to households on the treatment variable is the first stage. In the second stage I use the drop in lending to households measured by the first stage to estimate the effect ψ_s of household credit on lending to sector of the economy,

$$\Delta \log(c_{sjt}) = \psi_s \cdot \Delta \log(h_{jt}) + D_j + D_t + \eta_{sjt},$$

where c_{sjt} is the credit lent to sector 's' in municipality 'j' at time 't'.

The exclusion restriction in the instrumented variable set-up requires that the instrument be uncorrelated with the error terms in the second stage, i.e $E(Post \cdot Spanish_{j,2011} * \eta_{jt}) = 0$

. I test for this condition by showing that any effect on the lending to specific sectors of the economy that is explained by the instrument is not the result of a direct effect or through omitted variables, as would be the case if the Spanish shares were to capture a direct supply shock to firms in a particular sector in a given municipality. I do this in two ways - I test for the presence of the demand channel in a sub-sample of municipalities where firms have a very limited exposure to Spanish banks, therefore ruling out any direct supply shocks to firms. Secondly I show changes in interest rate to the marginal credit issued to firms in a particular sector explained by the treatment variable that are inconsistent with the instrument picking up a direct supply shock to firm credit.

5 Empirical Results

5.1 Supply Shock

I use the share of Spanish banks to measure the supply shock to household credit resulting from the Spanish regulations. I use a difference-in-difference specification to show that municipalities with a higher exposure to Spanish banks saw a greater decline in the growth rate of household credit. To measure the slow-down in lending to households, I use annual data on lending to households over June 2011 to June 2013, a year prior to and after the Spanish regulations came into effect. I treat June 2012 as the instance when the natural experiement was implemented across Mexican municipalities, a month after the second round of macro-prudential regulations were imposed by the Spanish Government. I define an interaction term $Post \cdot Spanish\ Share_{j,2011}$ as the treatment variable in the natural experiment to measure the supply shock at a municipality level. *Post* is a dummy variable for the periods after the introduction of the shock, June 2013 in this particular case. $SpanishShare_{j,2011}$ is the share of Spanish banks in the household credit market for municipality 'j' in June 2011, an year before the introduction of the Spanish regulations. The regression specification is given by

$$\Delta \log(h_{jt}) = \beta \cdot Post \cdot Spanish\ Share_{j,2011} + D_j + D_t + \varepsilon_{jt}, \tag{7}$$

where we regress the annual changes in log-levels in household credit for municipality 'j' from June 2011-June 2013 on the treatment variable in the presence of municipality (D_j) and time (D_t) fixed effects. The municipality fixed-effects control for any changes in the log-level of household credit that result from municipality specific trends in lending to households. If there is any selection by Spanish banks in municipalities with a higher or lower trend growth rates in household credit, conrolling for municipality fixed effect allows me to estimate shocks to the growth rate of household credit away from this trend explained by the exposure to Spanish banks. I report cluster standard error by clustering at a municipality level (with 999

or 379 clusters depending on the sample) to allow for auto-correlation in the credit series. This is very conservative since I already take first differences of the credit series to measure the effect of Spanish regulations on household credit lending across Mexican municipalities.

I report a highly negative and significant estimate of β in tables 6 (a) and (b). Results show that a 10% higher exposure to Spanish banks predicts a drop of 2.5% in the growth rate of household credit an year after the introduction of the Spanish regulations. Further, I show that the slow-down in lending to households comes from drops in the growth in both consumer credit and credit lent as mortgages (columns (2) and (3) of table 6 (a) and table 6 (b)). These results hold for the full sample of 999 municipalities and the sub-sample of 379 municipalities. Thus, the variation in the share of Spanish banks in household credit leads to a variation in 'treatment' to the supply shock resulting from the Spanish regulations. I show show a drop in lending to firms in the non-tradable sector in high Spanish share municipalities explained by the treatment variable using the difference-in-difference specification descrived in this section (table7).

5.2 IV Results

I provide estimates of the elasticity of investments in the non-tradable sector to changes in the level of household credit using a measure of the supply shock to the level of household credit. In general, the coefficient of regressing changes in the log-levels of investments in a particular sector on changes in log-levels of household credit is not identified since the the credit to households and credit to firms are equilibrium outcomes based on market clearing in their respective markets. As discussed in section 3, the level of household credit depends on an exogenously determined parameter ϕ_j and the wages w_{jt} earned by households in the municipality during the period. The wages are equilibrium outcomes that are affected by shocks that determine the level of credit in different sectors as well. Hence a regression of changes in the level of credit to a particular sector on changes in household credit is not identified. Instead I measure the component of change in household credit at a municipality level that is exogenous and uncorrelated with any other municipality specific shocks that affect contemporaneous credit levels to different sectoras. I use the pre-shock share of Spanish banks in household credit to instrument the drop in household credit in periods after the introduction of Spanish regulations to measure the supply shock at a municipality shock. The measured supply shock then gives us the elasticity of investments in the non-tradable sector to change in the level of household credit.

The specification described above is given by

$$\Delta \log(c_{sjt}) = \psi_s + \Delta \log(h_{jt}) + D_j + D_t + \eta_{sjt}, \tag{8}$$

where the supply shock is measure by instrumenting for changes in the log-level of household credit by the treatment variable as per the first stage given by $\Delta \log(h_{jt}) = \beta \cdot Post \cdot Spanish\ Share_{j,2011} + D_j + D_t + \varepsilon_{jt}$ (equation 7). The exclusion restriction requires that the variation in the changes in log-levels of credit to any specific sector, particularly the non-tradable sector, is not directly explained by the instrument $Post \cdot Spanish\ Share_{j,2011}$, which would be the case if there was a direct supply shock to firms being picked up the treatment variable.

I report the elasticities of investment in the non-tradable sector to changes in lending to households in tables 8 and 9 which are based on the full sample of 999 municipalities and the restricted sub-sample of 379 municipalities respectively. I regress annual changes in log-levels of credit to the non-tradable sector, the tradable sector and a series that groups the non-tradable and construction sector on the changes in log-levels of household credit instrumented by $Post \cdot Spanish\ Share_{j,2011}$ from June 2011 to June 2013. The first stage results yield a F-stat value of 52 for the full sample and 14.5 for the restricted sub-sample in the regression on the changes in log-levels to credit to the non-tradable sector. The estimated elasticity ranges from 1.65 for the full sample to 3.49 in the restricted sub-sample of municipalities with a very low Spanish presence in the market for credit to the non-tradable industries. The elasticity obtained from the reduced sub-sample is larger than the one estimated from the full sample, indicating that it is unlikely that there is a direct supply shock component to the drop in non-tradable credit in high Spanish exposure municipalities that is picked up by the treatment variable.

I used the sub-sample with a limited exposure for non-tradable firms to Spanish banks to show that the contraction in economic activity in the non-tradable sector in treated municipalities is not the result of a direct supply shock from Spanish banks. In the next sub-section, I share direct evidence of the demand channel at work at a municipality level in Mexico using average interest rates of the marginal credit issued to firms in non-tradable sector in periods before and after the introduction of financial regulations..

5.3 Interest Rates and the Demand Channel.

I use data on the interest rate of each credit line to create a database of the average interest rate for marginal credit issued to different sectors at a municipality level at a half-yearly frequeny from June 2011 to December 2013. I show that there is a drop in the average interest rate of the marginal credit issued to non-tradable firms in high Spanish share municipalities (table 10) after the introduction of Spanish regulations. To do so, I compare the average interest rate of the marginal credit issued to a particular sector in the final quarter of 2012 (6 months after the shock) against the level in the 2nd quarter of 2011 (a year before the

shock). I use the difference-in-difference specification described in the earlier sub-sections to test whether there was a change in the interest rate of the marginal credit issued to specific sectors that is explained by the treatment variable, $Post \cdot Spanish\ Share_{j,2011}$. The reregression equation is given by,

$$IntRate_{sjt} = \gamma_s \cdot Post \cdot Spanish\ Share_{j,2011} + D_j + D_t + \nu_{sjt}$$

where $IntRate_{sjt}$ is the average interest rate of the marginal credit issued to sector 's' in municipality 'j' at time 't', D_j and D_t are municipality and time dummies and $Post \cdot Spanish\ Share_{j,2011}$ is the treatment variable. Results in table 10 show a decline in the average interest rate of the marginal credit issued to the non-tradable sector in high Spanish share municipalities. I observe this drop in the intererest rate for the marginal credit issued in the last quarter of December 2012 for the full sample and the sub-sample. The sub-sample municipalities see a greater decline in the average interest rate of the marginal credit issued to the non-tradable sector, which is consistent with finding a stronger decline in the growth of credit to the non-tradable sector in this sub-sample. Finding an effect in the sub-sample is crucial for this test since it is possible that the drop in the interest rate of the marginal credit issued to non-tradable firms is also the consequence of a supply shock where the Spanish banks cut credit to riskier firms with higher interest rates. Finding results in a subsample where credit to the non-tradable firms is largely issued by non-Spanish banks suggests that the effect captured by the treatment variable is very unlikely to be result of a direct supply shock from Spanish banks.

This drop in the interest rate of the marginal credit to the non-tradable sector is consistent with the slow-down in lending to firms in the sector driven by a drop in demand for their goods and services in municipalities with high exposure to Spanish banks and therefore, a large drop in the growth rate of household credit. If instead the drop in the lending to the non-tradable sector was the result of a supply shock, results would have shown an increase in the average interest rate of the marginal credit issued to the non-tradable sector.

6 Robustness checks

6.1 Placebo Tests.

I argued in section 5 that using fixed effects in the difference-in-difference specification and the parallel trends (in figure 12) suggest the lack of differential trends in credit issued in high and low exposure municipalities. I provide additional evidence on the lack of different

trends using placebo tests to show that the treatment variable ($Post \cdot Spanish\ Share_{j,2011}$) does not predict any changes in the growth rate of lending to households or firms in periods before June 2012. I define a hypothetical experiment in June 2011 in which I check whether the treatment variable $Post - Placebo \cdot Spanish\ Share_{j,2011}$ predicts any differences in the growth of credit to households and firms in the non-tradable sector during December 2010 to December 2011. The variable $Post-Placebo$ identifies periods after June 2011, the treatment period of our hypothetical experiment. I show the natural experiment and the placebo test next to each other using a diagram in figure 11. If there indeed were municipality specific trends that were captured by the share of Spanish banks in household credit in 2011, the treatment variable would capture those trends and predict either an increase or decrease in the growth rate of the credit in periods after June 2011.

I show the placebo in table 11 for mortgage credit and credit to firms in the non-tradable sector. I find that the share of Spanish banks in household credit does not predict any differential growth trend in the treated sample in the post-trial period of the placebo experiment. Therefore, the slow-down in lending to households and firms in the non-tradable sector after June 2012 that is predicted by the Spanish shares is not the result of municipality specific trends, but an outcome of the natural experiment.

6.2 Weighted Least Squares

In table 13 I report weighted least square coefficients of the effect of the treatment variable, $Post \cdot Spanish\ Share_{j,2011}$ on the changes in the credit to the non-tradable sector at a municipality level. The coefficient is very stable in the regressions based on the sub-sample for weighting across different municipality characteristics. I implement weighting based on municipality population in June 2013, the GDP per capita and the GDP reported in 2010 (both from the Census in 2009) and the number of branches per 10,000 people at a municipality level. The WLS coefficients for the regressions based on the entire sample also fairly stable. Only in case of weighting the municipality observations by municipality level popultion I find a sharp jump in the treatment effect with a greater drop in lending to the non-tradable sector attributed to exposure to Spanish banks and hence Spanish regulations.

6.3 Transmission of Shocks Across Municipalities.

I report robustness checks against any potential bias due to the transmission of local shocks across the borders of a municipality. The average size of a Mexican municipality in the full sample of 999 municipalities is 1193 sq. km., with the municipality at the 10th percentile spread across 65 sq. km. There is a potential for the transmission of a shock to household

credit in a given municipality on economic activity in bordering municipalities driven by demand spillovers which can bias the estimates of the elasticities reported in the earlier section. Such demand spillovers are likely to be stronger for smaller municipalities, particularly if there is a bunching of small municipalities. I show in table 14 that the treatment effect on lending to the non-tradable sector is robust to the exclusion of small municipalities. In Column (5) I show the results for municipalities that are larger than 200 sq. km. in the full sample and the sub-sample of municipalities. Moreover, the coefficient is stable to the threshold we pick to drop observations from smaller municipalities.

In columns (3) and (4) of table 14 I report the treatment effect by excluding the municipalities in Distrito Federal (DF) and the municipalities in DF and surrounding states of Estado de Mexico and Morales respectively.[22] Dropping these central municipalities does not affect my results. As an additional check, I report results of the natural experiment by aggregating data at a metropolitan level. Mexico has 59 metropolitan areas. In results I present in the appendix, I find that the loss in power by aggregating data at metropolitan area does not allow me to identify neither an effect on lending to households, nor on lending to firms in the non-tradable sector of the exposure to Spanish banks.

6.4 Firm Size

In table 15, I report regressions results in which I repeat the specification described in equation 7 on the credit to the non-tradable sector broken down by firm size. The credit registry prvoides a categorical variable indicating the firm size of the recepient firm. I split the credit to the non-tradable sectory into three categories - credit to firms with less than 50 employees, firms with 50-200 employees and firms with >200 employees. The results show that the drop in lending to the non-tradable sector is largely driven by firms with less than 50 employees. Does the lack of an effect on the credit issued to large non-tradable firms go against the hypothesis that the drop in lending to non-tradable was in fact in response to local drops in spending resulting from the supply shocks to household credit? There are three reasons to believe this not to be the case. Firstly, we observe the drop in lending to the small non-tradable firms in the sub-sample of municipalities with very low exposure to Spanish banks in non-tradable credit as well. Secondly, we do not see any drops in lending to small size firms in other sectors that is explained by the treatment variable. Finally, it is possible that the large firms in the non-tradable industries are better equipped to move their inventories across municipalities and hence are not non-tradable in the sense used in this paper.

[22] The results also holds if we drop the municipalities in Tlaxcala and Puebla, states which form a part of Valle de Mexico, along with DF, Estado de Mexico and Morales, the largest metropolitan area in Mexico.

6.5 Alternate Definitions for Non-Tradable Industries.

In table A.3, I show the effect of treatment on the growth of credit to the non-tradable sector based on alternate criteria for classifying 4-digit NAICS industries as non-tradable. I take the credit to the retail + restaurant industries as the base and to this I add credit to firms to 5 sub-sectors - Construction, Wholesale, Transportation, Professional Services and Other Services. This helps me check for the existence of the 'demand channel' after the inclusion of credit to these sub-sectors and comment on whether there exists a local demand effect that affects these sub-sectors as well. I do not find any treatment effect on the credit series created after the inclusion of these sub-sectors except in the case of the industries belonging to the transportation sub-sector. This result is consistent across the full sample and the restricted sample of municipalities. This suggests that the local demand effect identified as a result of the natural experiment in Mexico holds for indistries belonging to the retail, restaurant and transportation sub-sectors.

7 Conclusion

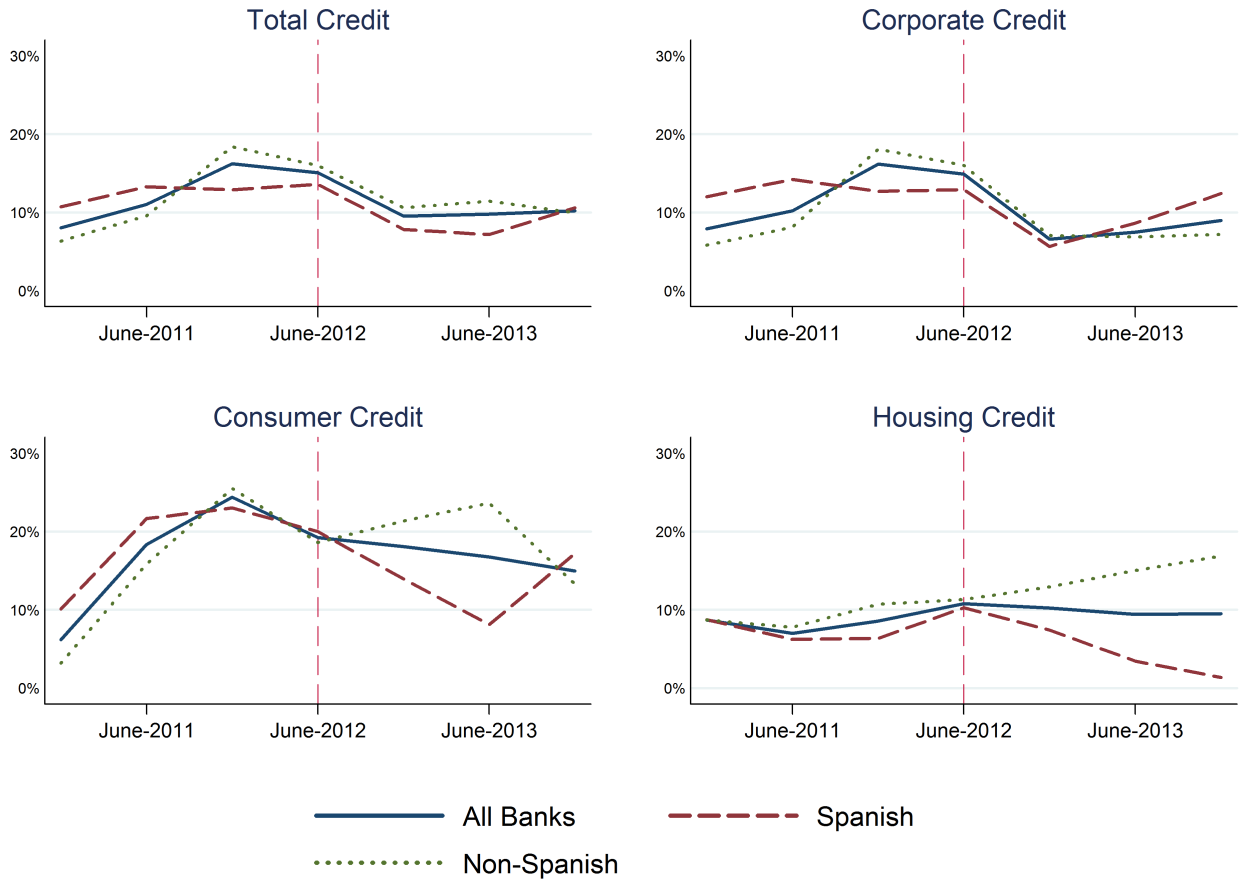
I identify an exogenous drop in the household credit supply in Mexico resulting from the international transmission of a credit crunch in Spain connected to financial regulations. I use the variation in the treatment to this drop across Mexican municipalities as a natural experiment to study the effect of changes in household credit on investments in the different sectors of the economy. My results show that the local demand effect of household credit that has been emphasized by the literature in a highly financialized modern economy like the US also exists in a under-financed, emerging economy like Mexico. While I focus on investments in the non-tradable sector as the outcome variable, the same shock can be used to study the impact on other outcome variables through similar natural experiments in other countries. This is indeed possible considering the global importance of Spanish banking groups such as BBVA and Santander. For instance, Santander has a significant presence in Brazil. The impact of the Spanish regulations on lending by Spanish banks in Brazil can provide additional evidence on the channels proposed in this paper and may also have led to natural experiments similar to the one described in this paper.

In the theoretical section I show that, provided the interest rates are low enough, an increase in the level of household credit can shift the composition of economic activity in an economy towards the non-tradable sector. In my simple model, firms are Cobb-Douglas aggregators of capital and labour. There has been a recent push towards modelling economic activity as an aggregation of capital, labour and intermediates to better capture the complex, inter-connected nature of production in modern economies through inpout-output linkages.

A systematic study of the effect of household credit on production through a model of input-output linkages will give us a more disaggregated view of the channel through which greater household spending affects investment and production in specific sectors of the economy. Empirically, the predictions of this more sophisticated model can be tested by studying how shocks to household credit supply percolate through the input-output linkages down to activity at a sectoral level. While the exact specifics of such a project are a matter of future research, I propose two reasons why such a study presents an interesting and potentially very insightful line of investigation. Firstly, any sectoral changes that are the result of movements in household spending can account for more frequent, longer and deeper recessions (as highlighted by Jorda et al. (2014, 2015)) resulting from sharp increases in household credit. Secondly, compositional changes in production might also raise concerns of lower productivity growth or secular stagnation through channels emphasized in Duarte and Restuccia (2010) and Perla et al. (2015). Eventually, I envisage models which theeorize an optimal level of household credit to guide Government policy. The optimal level is likely to result from the trade-off between welfare gains from higher spending and welfare losses from shifts in sectoral composition as has been identified in my paper.

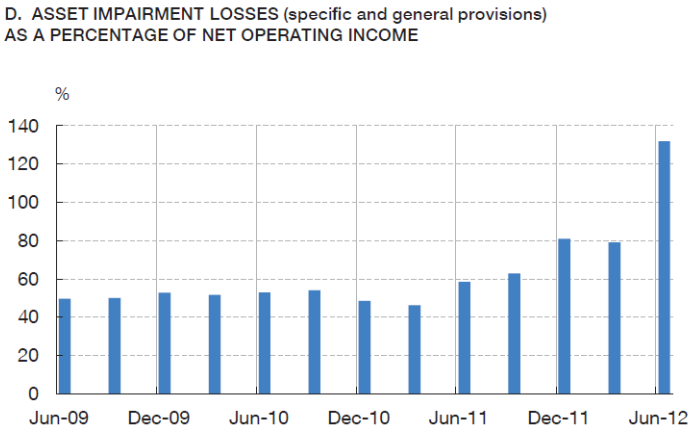
I also share suggestive evidence that the Spanish regulations did not lead to a credit supply shock to lending to firms by Spanish banks. I argue that Spanish banks did not reduce lending to firms in Mexico since, on an average, credit to firms has lower maturity and lower capital requirement than household credit. While these are plausible arguments, data at a firm-level can provide evidence on whether there, indeed, was no direct credit supply shock to firms. Such an analysis can be conducted using credit registry data at the highest level of disaggregation to study whether Spanish banks cut credit to firms in Mexico based on maturity, interest rate, risk or quality of collateral in response to the shock. Jimenez et al. (2012) is a recent contribution which uses firm-level data to study the effect of counter-cyclical loan loss provisions on lending to firms by Spanish banks in Spain. While data constraints have not allowed me to conduct a similar study on the effect of Spanish regulations on lending at a firm level in Mexico, such an analysis is also ear-marked for further inspection.

Figure 1: Growth in credit lending by Spanish and non-Spanish banks in Mexico



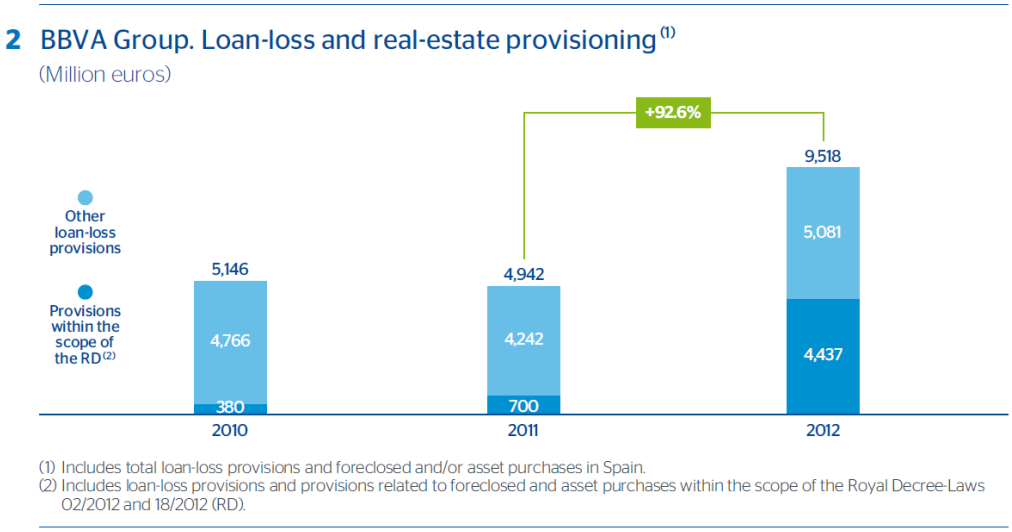
Note: This figure plots growth rates of credit issued by Spanish and non-Spanish banks in Mexico during December 2010 to December 2013. The growth rate is calculated against the level a year ago for the corresponding credit type. There is a sharp decline in the growth rate of lending to households by Spanish banks after June 2012 (lower panels). Top left panel shows that there is no such contrast in the aggregate growth rate of lending to firms for Spanish and non-Spanish banks.

Figure 2: Loan-loss provisions vs Net Operating Income in Spain



Source: Financial Stability Report, Banco de Espana, November 2012 (page 30). Note: This figure shows the sharp increase in the provisions held by Spanish banks as a percentage of net operating income in June 2012 as a consequence of the macro-prudential regulations RDL 02/2012 and RDL 18/2012

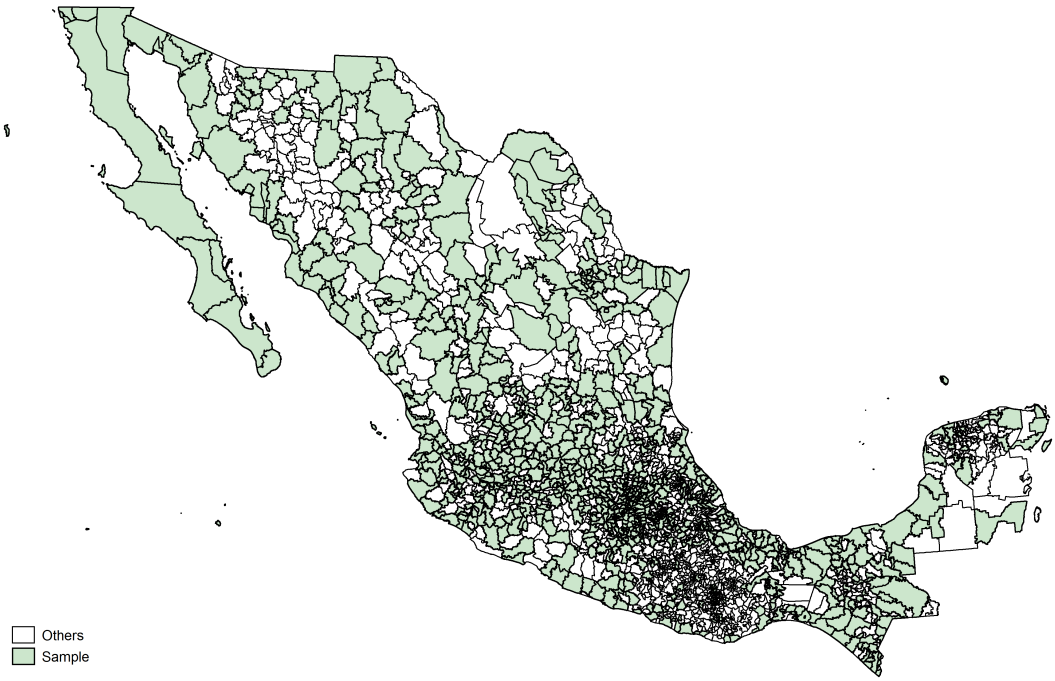
Figure 3: Loan-loss provisions by BBVA resulting from RD 02/2012 and RD 18/2012



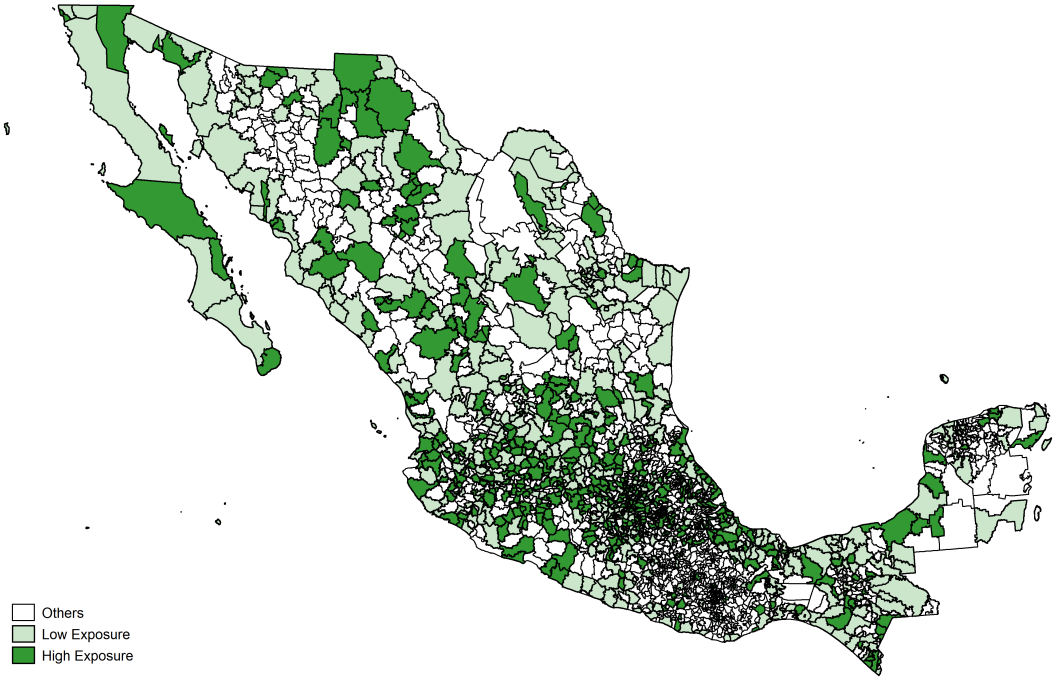
Source: BBVA in 2012, the BBVA banking group annual report for 2012 *(page 65). Note:* This figure shows the total burden of loan loss provisions imposed on BBVA by the regulations in 2012 (dark blue area in the bar for 2012).

Figure 4: Mexican municipalities covered by the database

(a) The full sample

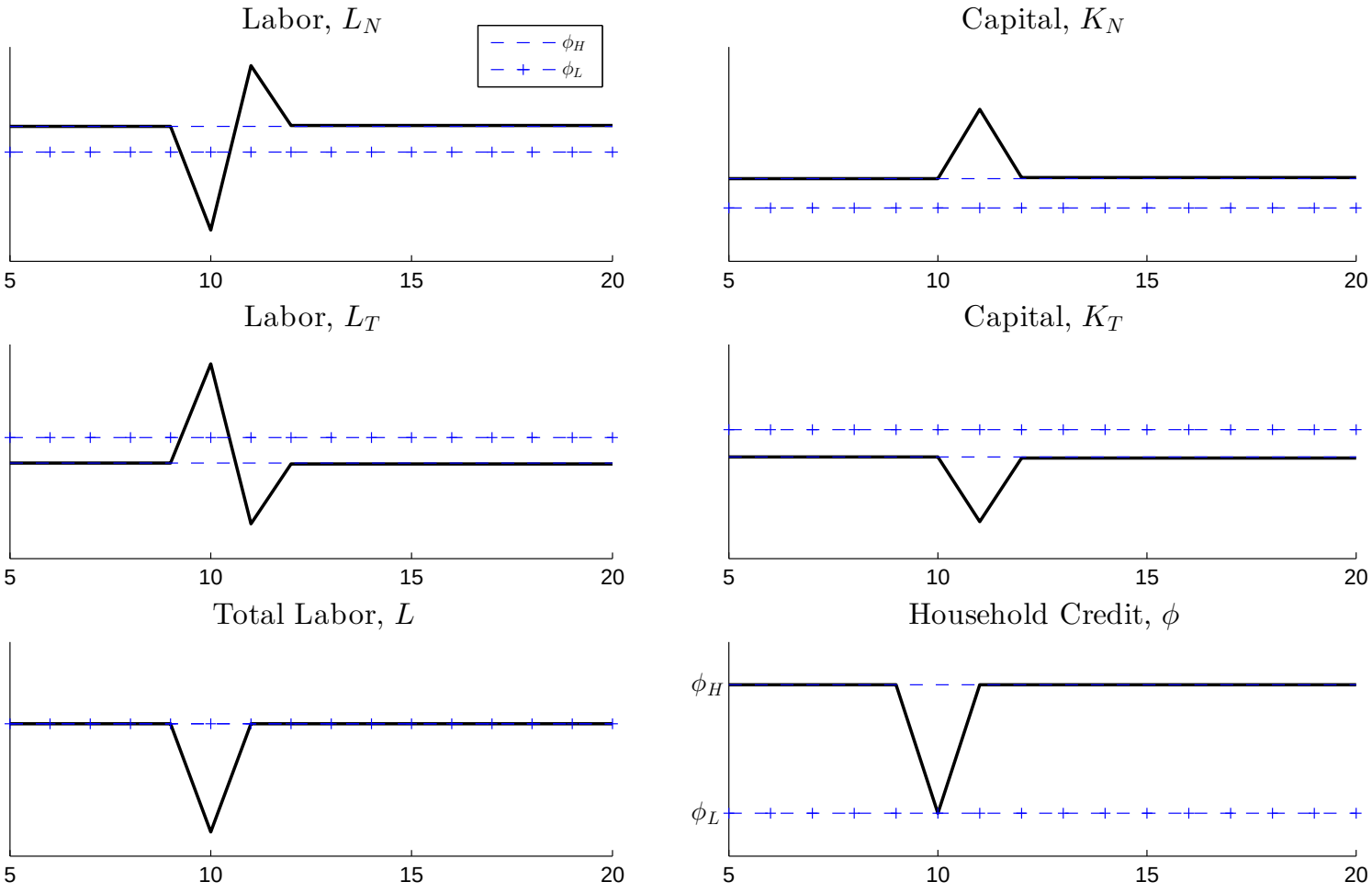


(b) Share of Spanish banks in household credit across the municipalities



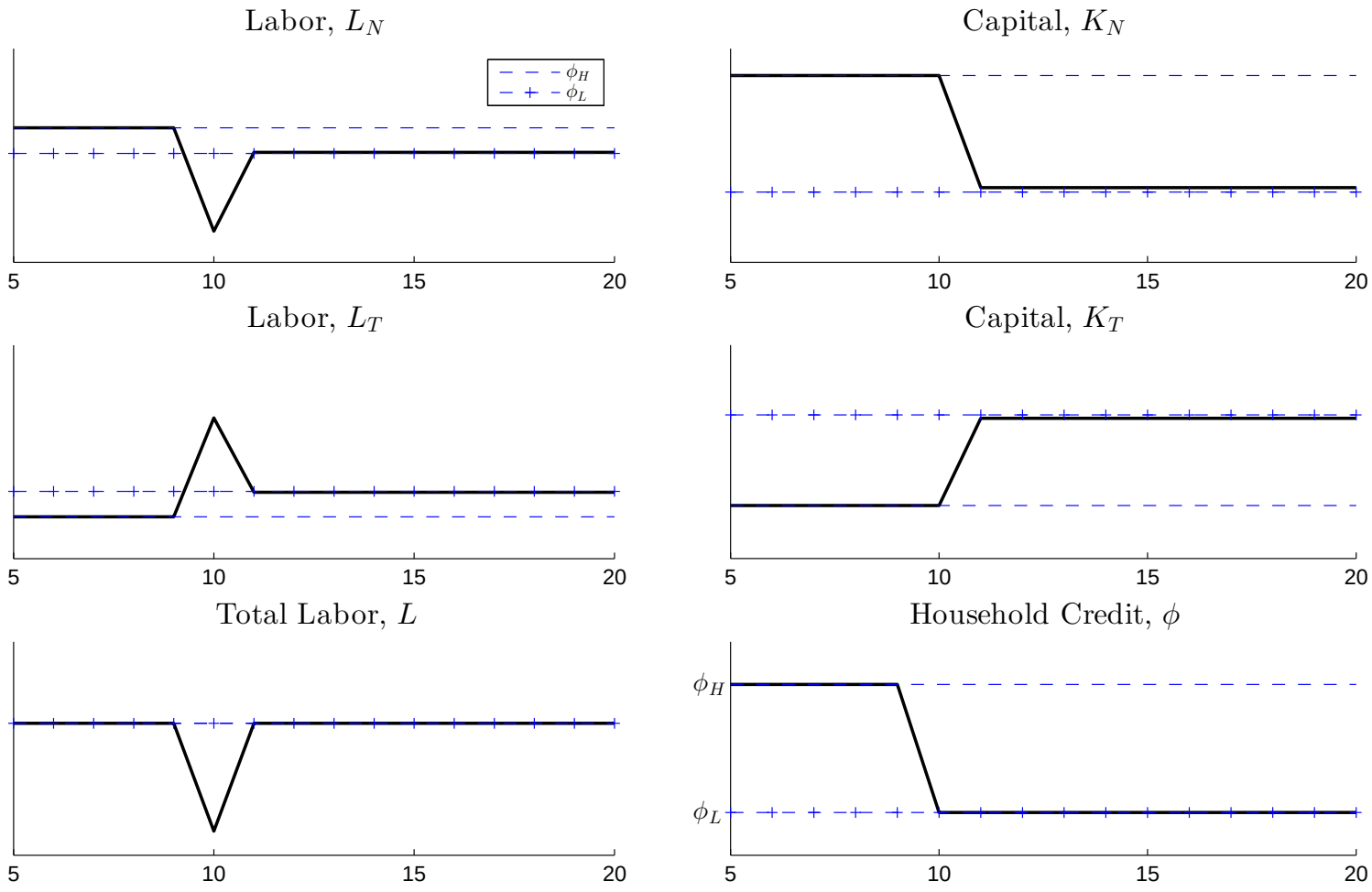
Note: The figure (a) shows the distribution of the 999 municipalities covered by the database. Figure (b) shows the spatial distribution of municipalities with high and low exposure to Spanish banks. High exposure municipalities are defined as those with a share of Spanish banks in household credit market higher than the median value in June 2011. The summary statistics for these 999 municipalities is presented in tables 3.

Figure 5: Effect of a shock leading to temporary change in ϕ



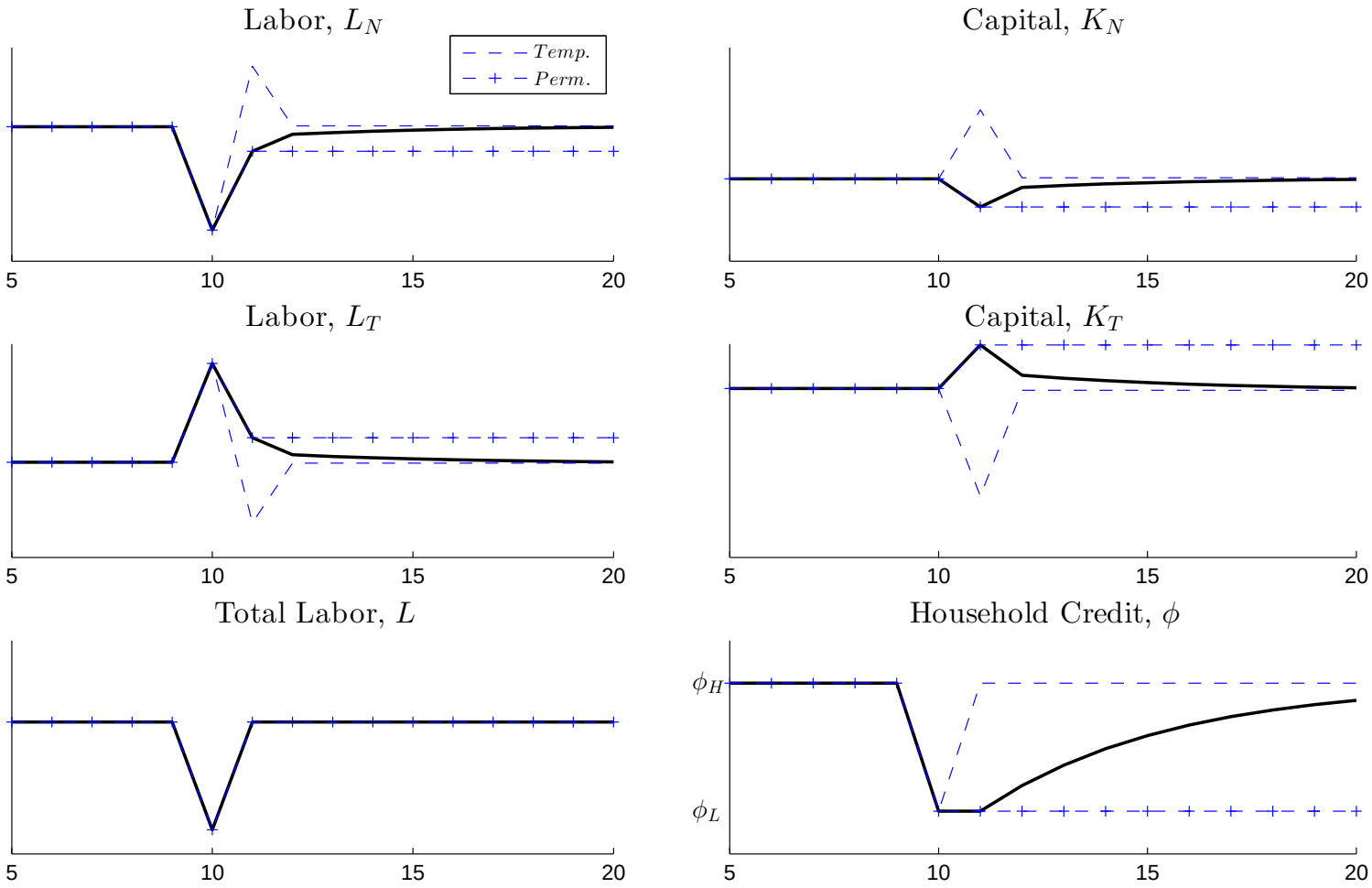
Note - This figure plots the effect of a temporary negative shock to household credit at $t = 10$ (bottom right panel). $\{L_T, L_N$ and $\{K_T, K_N\}$ refer to the labour and capital absorbed in the tradable and non-tradable sectors respectively in the municipality represented in the above simulation.

Figure 6: Effect of a shock leading to a permanent change in ϕ



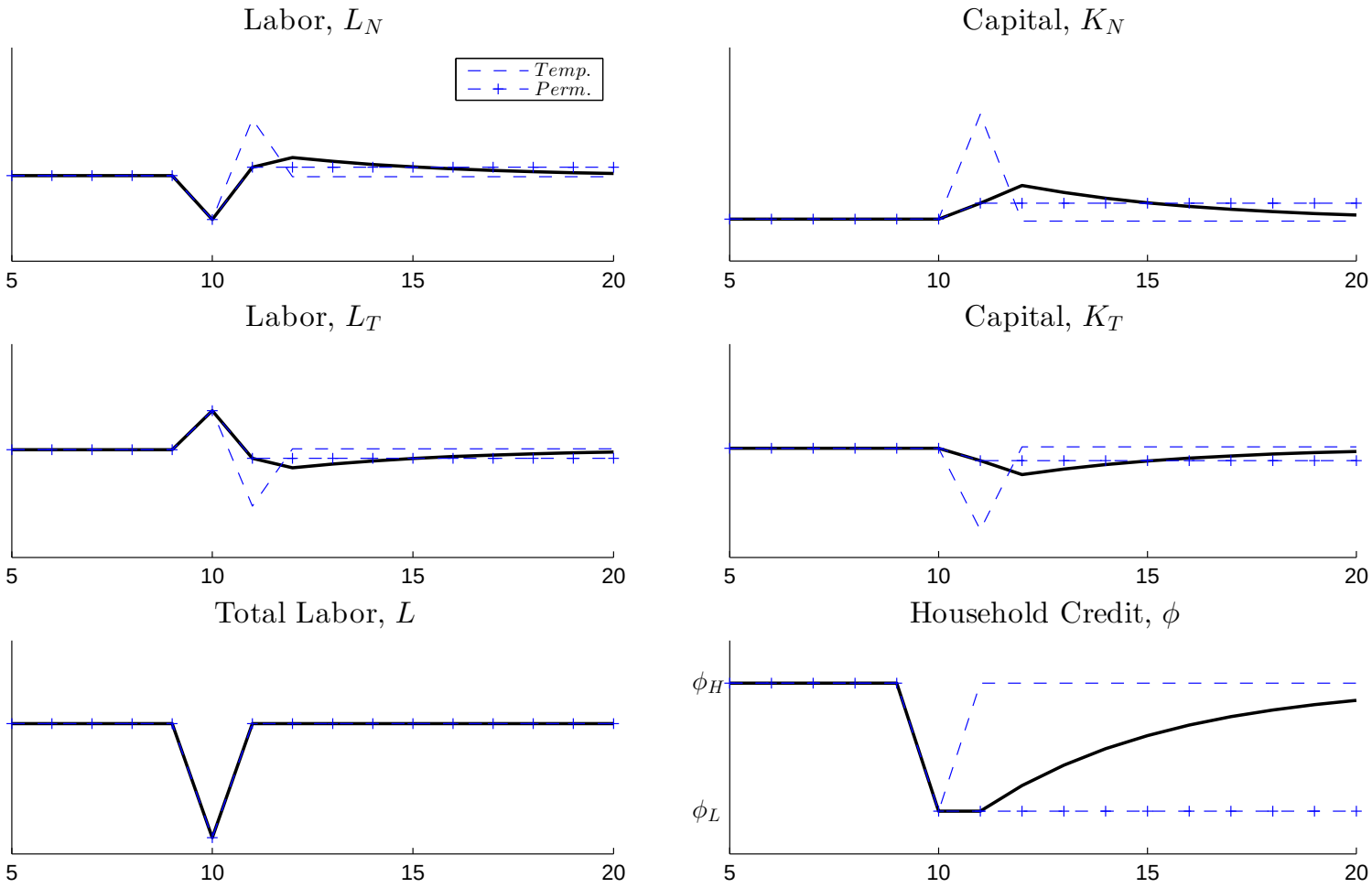
Note - This figure plots the effect of a permanent negative shock to household credit at $t = 10$ (bottom right panel). $\{L_T, L_N$ and $\{K_T, K_N\}$ refer to the labour and capital absorbed in the tradable and non-tradable sectors respectively in the municipality represented in the above simulation.

Figure 7: Effect of a temporary change in ϕ with persistence



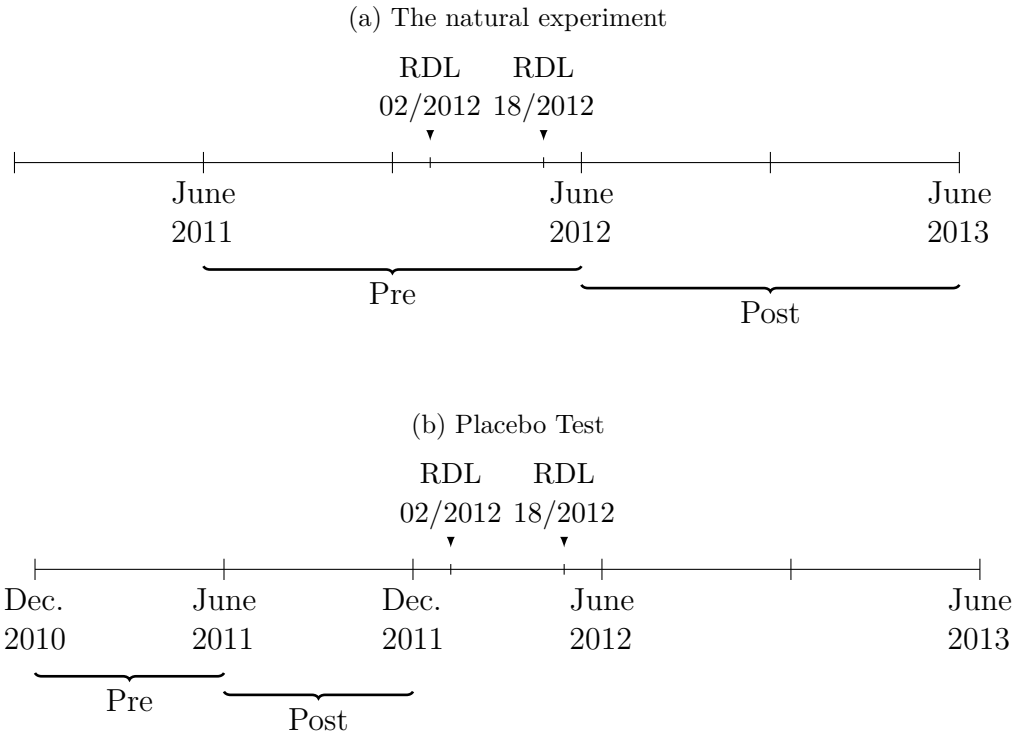
Note - This figure plots the effect of a temporary negative shock to househld credit with persistence at $t = 10$ (bottom right panel). $\{L_T, L_N$ and $\{K_T, K_N\}$ refer to the labour and capital absorbed in the tradable and non-tradable sectors respectively in the municipality represented in the above simulation. There is a drop in investments and labour allocated in the non-tradable until the level of household credit recovers back to the pre-shock level since the interest rates are assumed to be low.

Figure 8: Effect of a temporary change in ϕ with persistence (case $R^* > 1$)



Note - This figure plots the effect of the temporary negative shock in figure 7 when interest rates are high. $\{L_T, L_N$ and $\{K_T, K_N\}$ refer to the labour and capital absorbed in the tradable and non-tradable sectors respectively in the municipality represented in the above simulation. There is an increase in investments and labour allocated in the non-tradable sector despite the fall in household credit since the low levels of household credit mean the employed workers have a higher spending power after clearing their debts from the previous period..

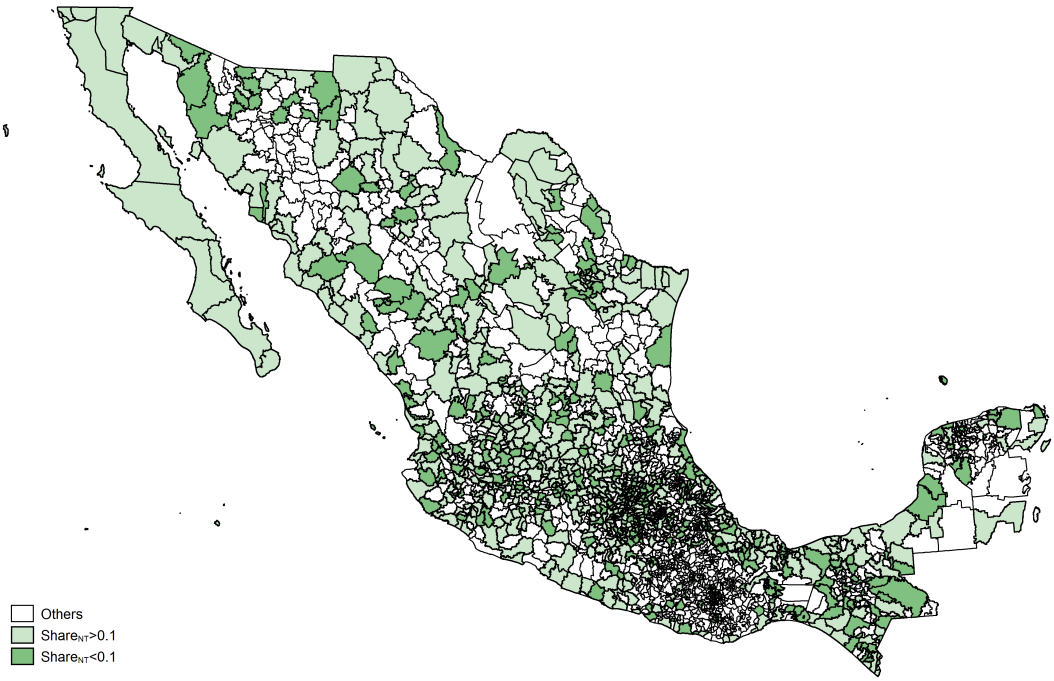
Figure 11: Experiment Design



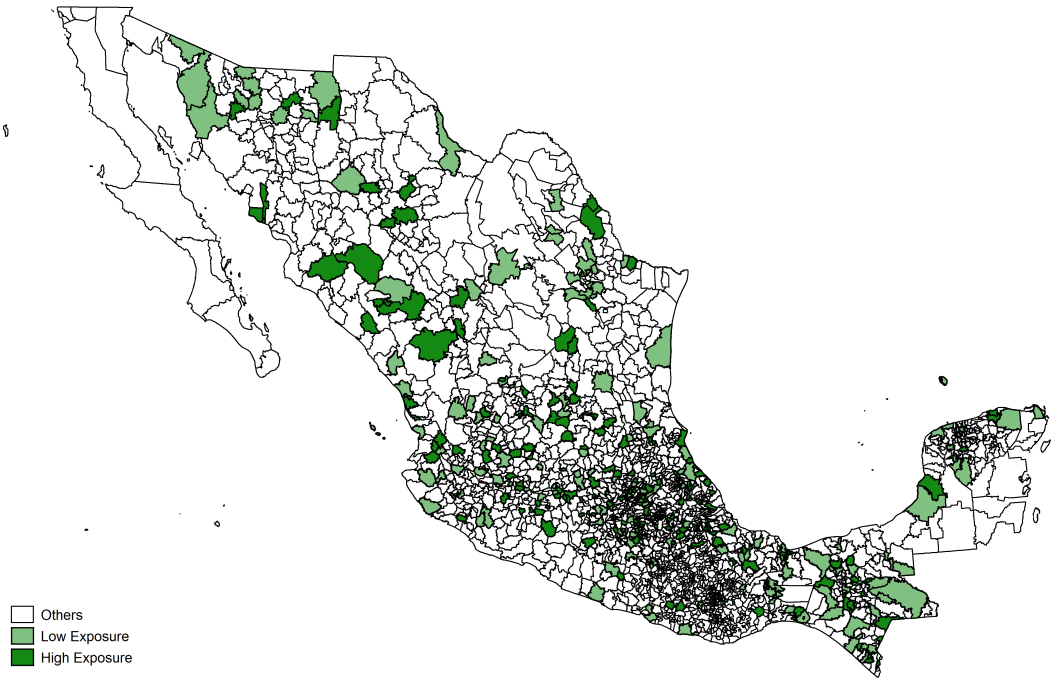
Note: The above figure shows a diagrammatic representation of the natural experiment. The Spanish regulations, RDL 02/2012 and RDL18/2012 were introduced in early February and May 2012. The supply shock to household credit is measured by comparing the growth in household credit across Mexican municipalities with different levels of exposure to the shock a year before and after June 2012 using a difference-in-difference specification. The placebo test is conducted using a hypothetical experiment in June 2011 to show that the exposure to Spanish banks does not predict different trends in the growth of household credit.

Figure 9: Sub-sample of municipalities with limited exposure to Spanish banks for non-tradable firms

(a) Sub-sample municipalities in darker green



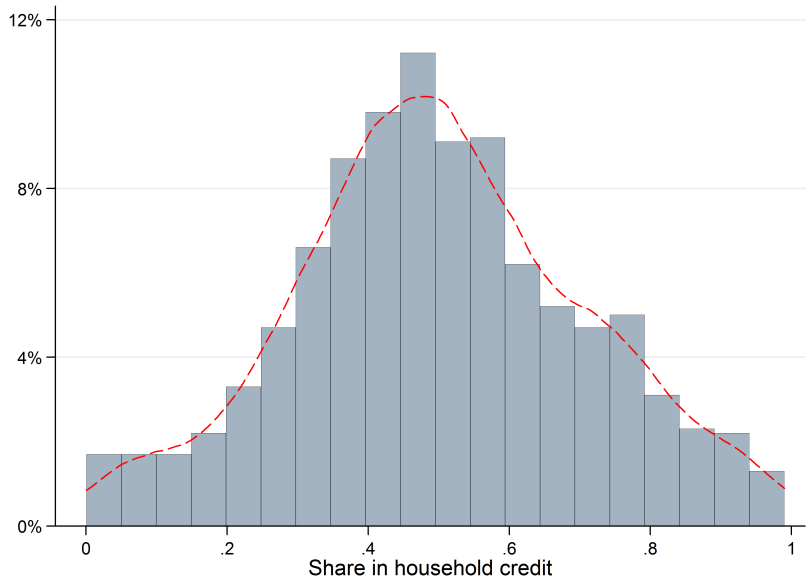
(b) Share of Spanish banks in household credit across the municipalities in the sub-sample



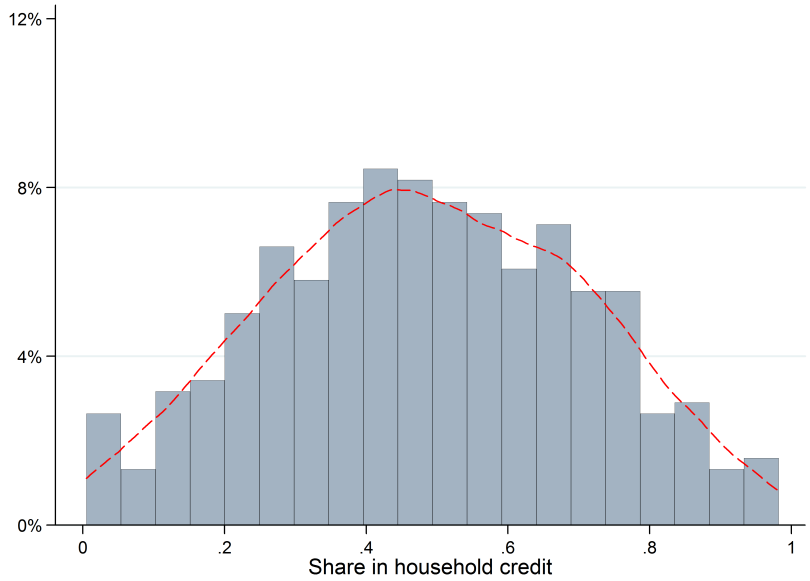
Note: The figure (a) shows the spatial presence of the 379 municipalities amongst the 999 municipalities of the sample which have a very limited presence of Spanish banks in the credut market for non-tradable firms. $Share_{NT}$ indicates the share of Spanish banks in the credit market for non-tradable firms. Figure (b) shows the spatial distribution of municipalities with high and low exposure to Spanish banks in the sub-sample of 379 municipalities. High exposure municipalities are defined as those with a share of Spanish banks in household credit market higher than the median value in June 2011.

Figure 10: Distribution of Spanish-share in household credit in Mexican municipalities in June 2011

(a) Full sample - 999 municipalities

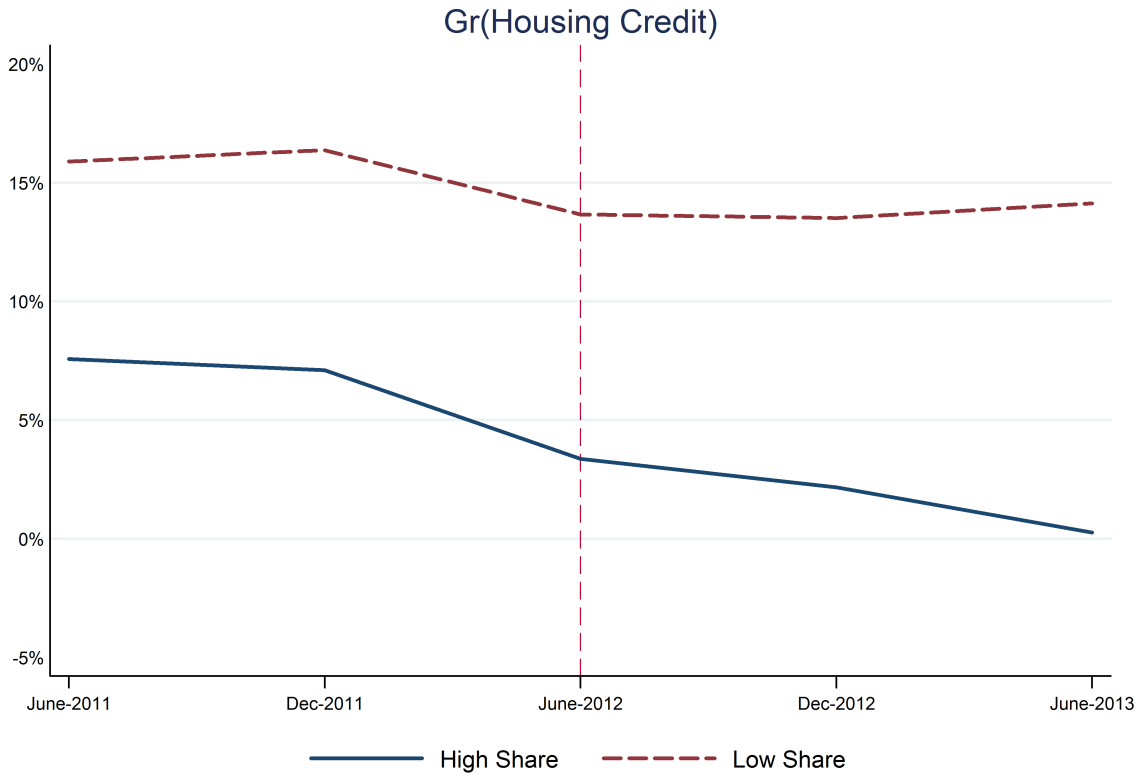


(b) Sub-sample - 379 municipalities



Note : These figures above show the distribution of Spanish shares in household credit markets across the Mexican municipalities for the entire sample (a) and the sub-sample of municipalities with a very low presence of Spanish banks in the non-tradable credit market (b). Restricting the sample to the sub-sample still presents a rich variation in the exposure to the financial shock as captured by the share of Spanish banks in the household credit market.

Figure 12: Parallel trends in growth of housing credit in municipalities with high and low exposure to Spanish banks



Note: The above figure plots the growth rate for total housing credit in Mexican municipalities in high and low exposure to Spanish banks. High exposure municipalities are the ones in which the share of household credit issued by Spanish banks in June 2011 is in the top tercile of the distribution. Low exposure municipalities are the ones in which the share of household credit issued by Spanish banks in June 2011 is in the bottom tercile of the distribution.

Table 1: Aggregate consequences of drop in lending to households by Spanish banks in Mexico

(a) Share of household credit issued by Spanish banks in high- and low-share municipalities

	Jun-2011	Jun-2012	Jun-2013
High-Share Municipalities	55.8%	54.1%	48.9%
Low-Share Municipalities	36.5%	36.1%	33.6%

(b) Share of credit to the non-tradable industries in high- and low-share municipalities

	Jun-2011	Jun-2012	Jun-2013
High-Share Municipalities	38.6%	37.3%	34.9%
Low-Share Municipalities	39.8%	40.8%	39.1%

Note: Mexican municipalities are grouped into high- and low-share municipalities based on the share of household credit issued by Spanish banks at a municipality level in June 2012. We then plot the share of household credit issued by Spanish banks and the % of total corporate credit allocated to non-tradable industries from June 2011 to June 2013 in the two sub-groups. The non-tradable industries includes those belonging to the retail sector, restaurants and the construction sector.

Table 2: Shares in credit markets for commercial banks in Mexico in June 2012

(a) Share of Spanish and non-Spanish banks

	Mortgages	Consumer Credit	Corp. Cred.	Total Cred.
Spanish	48%	44%	35%	38%
Non-Spanish	52%	56%	65%	62%

(b) Share of mortgage credit issued by bank

Bank	Share	Maturity (in month)	Avg. Int Rate
BBVA Bancomer	36.7%	229	11.1
Santander	11.7%	207	10.4
Banamex	15.2%	212	10.4
HSBC	4.7%	232	10.2
Scotiabank	11.3%	222	10.5
Banorte/Ixe	15.8%	222	10.4
Inbursa	0.3%	167	10.0

(c) Share of corporate credit issued by bank

Bank	Share	Maturity (in months)	Avg. Int Rate	Working Credit %
BBVA Bancomer	20.0%	38	7.4	90%
Santander	16.0%	39	7.5	77%
Banamex	14.9%	37	6.8	90%
HSBC	8.3%	36	7.5	94%
Scotiabank	3.9%	35	6.6	55%
Banorte/Ixe	12.2%	62	8.3	85%
Inbursa	8.3%	57	7.4	100%

Note: Table (a) shows the share of Spanish and non-Spanish banks in different credit markets at a Mexico level in June 2012. Table (b) shows the market share, average maturity and average interest rate by bank in the mortgage market. Table (b) shows the market share, average maturity, average interest and the share of credit issued as working capital rate by bank in the credit market for firms. *Source - CNBV, R-04 credit registry.*

Table 3: Summary statistics of sectors by classifying criterion

		Non-tradable	tradable	Construction	Others
Criterion A	No. of sectors	24	81	22	171
	Labour Share	28.1%	21.8%	8.7%	41.4%
Criterion B	No. of sectors	32	74	22	170
	Labour Share	33.2%	7.3%	8.7%	46%

Note - This table shows the number of industries, and their corresponding labour share, comprising the different sector types based on the two classification criteria. *Source - Census 2009.*

Table 4: Summary Statistic for Municipality Characterisitcs

	count	mean	sd	p10	p90
Population, 2013	999	103446	204974	9898	228190
Area in sq. km.	999	1193	2830	65	2722
GDP p.c., 2010	999	11131	4655	6265	16513
Number of accounts, 2013	999	3995	5031	457	8386
Number of ATM transactions, 2013	999	6633	8100	0	15048
Number of credit cards, 2013	999	1156	2223	165	2463
Access to credit	count	mean	sd	p10	p90
Household credit p.c.[a]	999	6642	20745	910	11326
Corporate credit p.c.[a]	999	7222	79638	71	9562
Total credit p.c.[a]	999	13865	92383	1184	20344
Household credit/GDP[b]	999	0.111	0.525	0.008	0.127
Corporate credit/GDP[b]	999	0.088	0.948	0.001	0.117
Total credit/GDP[b]	999	0.199	1.294	0.011	0.253
Δ log Household credit	999	0.20	0.18	0.00	0.38
Δ log Corporate credit	998	0.29	0.64	-0.26	0.86
Δ log Credit to non-trad. industries	999	0.27	0.77	-0.37	1.18
Δ log Credit to trad. industries	687	0.31	1.18	-0.51	1.26
Exposure to Spanish banks	count	mean	sd	p10	p90
Share in household credit	999	0.50	0.21	0.24	0.78
Share in corporate credit	999	0.33	0.28	0.00	0.77
Share in credit to non-trad. industries	999	0.33	0.35	0.00	0.99
Share in credit to trad. industries	707	0.40	0.37	0.00	1.00
Share in total credit	999	0.46	0.20	0.20	0.73

Source: CNBV, Census 2009, UN Reports, R-04

Note: This table shows the summary statistic for the 999 municipalities covered in the credit database.

Table 5: Summary Statistic for Municipality Characterisitcs

	count	mean	sd	p10	p90
Population, 2013	379	44448	72675	7019	88286
Area in sq. km.	379	870	1557	56	1902
GDP p.c., 2010	379	9824	3875	5800	14556
Number of accounts, 2013	379	2252	3018	314	5982
Number of ATM transactions, 2013	379	3842	5414	0	9858
Number of credit cards, 2013	379	655	721	124	1637
Access to credit	count	mean	sd	p10	p90
Household credit p.c.[a]	379	4967	17687	725	6812
Corporate credit p.c.[a]	379	2671	11723	31	5590
Total credit p.c.[a]	379	7638	24489	854	13459
Household credit/GDP[b]	379	0.084	0.315	0.005	0.111
Corporate credit/GDP[b]	379	0.043	0.175	0.000	0.084
Total credit/GDP[b]	379	0.127	0.427	0.008	0.219
Δ log Household credit	379	0.23	0.20	-0.00	0.44
Δ log Corporate credit	379	0.33	0.80	-0.44	1.21
Δ log Credit to non-trad. industries	379	0.24	0.90	-0.56	1.36
Δ log Credit to trad. industries	185	0.38	1.59	-0.51	1.59
Exposure to Spanish banks	count	mean	sd	p10	p90
Share in household credit	379	0.48	0.22	0.19	0.78
Share in corporate credit	379	0.18	0.25	0.00	0.58
Share in credit to non-trad. industries	379	0.01	0.03	0.00	0.05
Share in credit to trad. industries	197	0.29	0.36	0.00	1.00
Share in total credit	379	0.43	0.21	0.14	0.73

Sub-sample municipalities with Share$_{NT}$<0.1

Note: This table shows the summary statistic for the 379 municipalities in the credit database with limited exposure to Spanish banks for firms in the non-tradable sector.

Table 6: Effect of Spanish regulations on household credit lending in Mexico

(a) Regressions based on the full sample

VARIABLES	(1) Δ log (Household Credit)	(2) Δ log (Housing Credit)	(3) Δ log (Consumer Credit)
Post*Spanish Share$_{2011}$	-0.267***	-0.258***	-0.209***
	(0.0370)	(0.0712)	(0.0436)
Observations	1,998	1,908	1,998
Number of municipalities	999	960	999
R-squared	0.684	0.660	0.624
Mun. Fixed-effects	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

(b) Regressions based on the sub-sample with low share of Spanish banks in the non-tradable credit market

VARIABLES	(1) Δ log (Household Credit)	(2) Δ log (Housing Credit)	(3) Δ log (Consumer Credit)
Post*Spanish Share$_{2011}$	-0.228***	-0.423***	-0.120*
	(0.0605)	(0.124)	(0.0620)
Observations	758	701	758
Number of municipalities	379	354	379
R-squared	0.626	0.594	0.624
Mun. Fixed-effects	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of credit to households on the treatment variable $Post \cdot Spanish\ Share_{2011}$ in the presence of municipality and time fixed effects. Data from two periods are used - June 2012 and June 2013. The variable *Post* indicates June 2013 and the exposure to Spanish banks is measured by the municipality level share of Spanish banks in household credit in June 2011, almost an year prior to the introduction of Spanish regulations. The top table shows results for the full sample and the bottom tables shows the results for the sub-sample of municipalities with very low exposure to Spanish banks for non-tradable firms. The municipality fixed-effect controls for any municipality level trends and the coefficient of the treatment variable indicates a drop in the growth of household credit in municipalities with a high Spanish share.

Table 7: Effect of Spanish regulations on sector level credit

(a) Full-sample

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Δ log(Non-trad.)		Δ log(Non-trad.+Const.)		Δ log(Tradable)	
	OLS	WLS	OLS	WLS	OLS	WLS
Post*Spanish Share$_{2011}$	-0.440**	-0.436*	-0.287*	-0.219	-0.0560	0.0382
	(0.186)	(0.226)	(0.173)	(0.165)	(0.249)	(0.274)
Observations	1,998	1,998	1,998	1,998	1,741	1,741
Number of municipalities	999	999	999	999	933	933
R-squared	0.432	0.461	0.445	0.479	0.514	0.496
Mun. Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level

*** p<0.01, ** p<0.05, * p<0.1

(b) Sub-sample

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Δ log(Non-trad.)		Δ log(Non-trad.+Const.)		Δ log(Tradable)	
	OLS	WLS	OLS	WLS	OLS	WLS
Post*Spanish Share$_{2011}$	-0.797**	-1.035**	-0.470	-0.437	-0.461	-0.396
	(0.321)	(0.464)	(0.305)	(0.411)	(0.593)	(0.921)
Observations	758	758	758	758	424	424
Number of municipalities	379	379	379	379	233	233
R-squared	0.422	0.442	0.407	0.391	0.544	0.427
Mun. Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level

*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of credit to specific sectors on the treatment variable $Post \cdot Spanish\ Share_{2011}$ in the presence of municipality and time fixed effects. Data from two periods are used - June 2012 and June 2013. The variable *Post* indicates June 2013 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011, almost a year prior to the introduction of Spanish regulations. The top table shows results for the full sample and the bottom tables shows the results for the sub-sample of municipalities with limited exposure to Spanish banks for non-tradable firms. I report OLS and WLS results for the changes in lending to firms in different sectors as explained by the exposure to the Spanish banks in household credit.

Table 8: Elasticity of investments in the non-tradable sector to changes in household credit for the full sample

(a) First Stage

VARIABLES	(1) Δ log (Household Credit)	(2) Δ log (Household Credit)	(3) Δ log (Household Credit)
Post*Spanish Share$_{2011}$	-0.267***	-0.267***	-0.245***
	(0.0370)	(0.0370)	(0.0436)
Observations	1,998	1,998	1,336
Number of municipalities	999	999	667

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

(b) Second Stage

VARIABLES	(1) Δ log (Non-trad.)	(2) Δ log (Non-trad. + Const.)	(3) Δ log (Tradable)
	2SLS	2SLS	2SLS
Δ log (Household Credit)	1.649**	1.077*	0.135
	(0.711)	(0.651)	(1.262)
Observations	1,998	1,998	1,336
Number of municipalities	999	999	668
F-stat	52.07	52.07	26.15
Mun. Fixed-effects	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show IV regressions results of changes in log-levels of credit at a sector level on changes in log-levels of credit to households for the entire sample of 999 municipalities in Mexico. The changes in log-levels of household credit are instrumented by the exposure to the supply shock proxied by the share Spanish banks in household credit in June 2011. Data from two periods are used - June 2012 and June 2013. The variable*Post* indicates June 2012. The exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011. The top table shares the first stage results which show a very high F-stat and the bottom table shows the elasticity of investments in different sectors to changes in access to household credit at a municiplaity level.

Table 9: Elasticity of investments in the non-tradable sector to changes in household credit for the sub-sample

(a) First Stage

VARIABLES	(1) Δ log (Household Credit)	(2) Δ log (Housing Credit)	(3) Δ log (Consumer Credit)
Post*Spanish Share$_2$011	-0.228***	-0.228***	-0.265**
	(0.0605)	(0.0605)	(0.110)
Observations	758	758	348
Number of municipalities	379	379	174

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

(b) Second Stage

VARIABLES	(1) Δ log (Non-trad.)	(2) Δ log (Non-trad. + Const.)	(3) Δ log (Tradable)
	2SLS	2SLS	2SLS
Δ log (Household Credit)	3.488**	2.059	2.487
	(1.708)	(1.446)	(2.603)
Observations	758	758	348
Number of municipalities	379	379	174
F-stat	14.28	14.28	5.83
Mun. Fixed-effects	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show IV regressions results of changes in log-levels of credit at a sector level on changes in log-levels of credit to households for the sub-sample sample of 379 municipalities in Mexico with a very low exposure to the presece of Spanish banks in the non-tradable sector. The changes in log-levels of household credit are instrumented by the exposure to the supply shock proxied by the share Spanish banks in household credit in June 2011. Data from two periods are used - June 2012 and December 2013. The variable*Post* indicates June 2012. The exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011. The top table shares the first stage results which show a high F-stat and the bottom table shows the elasticity of investments in different sectors to changes in access to household credit at a municiplaity level.

Table 10: Effect of Spanish regulations on the average interest rate of the marginal credit issued to sectors

(a) Full sample

VARIABLES	(1) Avg. Int. (Non-Trad.)	(2) Avg. Int. (Tradable)
Post*Spanish Share$_{2011}$	-2.471**	-0.946
	(1.034)	(1.433)
Observations	1,361	989
Number of municipalities	811	604
R-squared	0.837	0.878
Mun. Fixed-effects	Yes	Yes
Time Fixed-effects	Yes	Yes

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(b) Sub-sample

VARIABLES	(1) Avg. Int. (Non-Trad.)	(2) Avg. Int. (Tradable)
Post*Spanish Share$_{2011}$	-4.257**	-1.972
	(1.820)	(1.712)
Observations	408	254
Number of municipalities	273	170
R-squared	0.819	0.919
Mun. Fixed-effects	Yes	Yes
Time Fixed-effects	Yes	Yes

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show difference-in-difference regression results of the average interest rate of marginal credit issued at a sectoral level in December 2012 and June 2011 on the treatment variable $Post \cdot Spanish\ Share_{2011}$. The variable *Post* indicates December 2012 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011, almost a year prior to the introduction of Spanish regulations. The top table shows results for the full sample and the bottom tables shows the results for the sub-sample of municipalities with very low exposure to Spanish banks for non-tradable firms. Results show a decline in the interest charged for newly issued credit to non-tradable firms in high Spanish share municipalities.

Table 11: Effect of Spanish regulations on credit lending in Mexico - Placebo

VARIABLES	(1)	(2)	(3)	(4)
	Δ log (Housing Credit)		Δ log (Non-trad.)	
	Full-sample	Sub-sample	Full-sample	Sub-sample
Post-Placebo*Spanish Share$_{1106}$	0.117	0.141	0.209	0.145
	(0.114)	(0.177)	(0.331)	(0.541)
Observations	1,889	689	1,959	728
Number of municipalities	951	350	998	379
R-squared	0.551	0.567	0.464	0.471
Mun. Fixed-effects	Yes	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level

*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of credit to households on a placebo treatment variable $Post-Placebo \cdot Spanish\ Share_{2011}$ in the presence of municipality and time fixed effects. Data from two periods are used - June 2011 and December 2011. The variable $Post-Placebo$ indicates December 2011 and checks for any evidence of treatment assuming the experiment took place in June 2011, a year before it actually took place. The exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011. The regression specification matches the one used for tables 6 and 7 and the treatment variable does not explain any changes in lending to households or to the nontradable sector in the placebo experiment.

Table 12: Effect of Spanish regulations on the average interest rate of the marginal credit issued by sector - Placebo

(a) Full-sample

VARIABLES	(1) Avg. Int. (Non-Trad.)	(2) Avg. Int. (Non-Trad.+ Const.)	(3) Avg. Int. (Tradable)
Post*Spanish Share$_{2011}$	-0.785	-0.492	2.576*
	(1.099)	(1.134)	(1.356)
Observations	1,359	1,481	978
Number of municipalities	818	868	594
R-squared	0.811	0.661	0.828
Mun. Fixed-effects	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

(b) Sub-sample

VARIABLES	(1) Avg. Int. (Non-Trad.)	(2) Avg. Int. (Non-Trad. + Const.)	(3) Avg. Int. (Tradable)
Post*Spanish Share$_{2011}$	-0.903	-0.145	0.546
	(2.124)	(1.861)	(1.809)
Observations	402	459	238
Number of municipalities	268	297	157
R-squared	0.788	0.796	0.904
Mun. Fixed-effects	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of the average interest rate of marginal credit issued at a sectoral level in December 2013 and June 2011 on the treatment variable $Post-Placebo \cdot Spanish\ Share_{2011}$. The variable $Post-Placebo$ varaible indicates December 2013 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011, almost a year prior to the introduction of Spanish regulations. Results show that there was no significant difference in the average interest rate of the marginal credit issued to firms in the non-tradable and tradable sector at a municipality level at December 2013 and June 2011. This is the placebo tests for the results in table 10 which show a drop in the average interest rate of marginal credit issued to non-tradable firms in high Spanish exposure municipalities in December 2012 vs the levels in June 2011.

Table 13: Effect of Spanish regulations on sector level credit - WLS results

(a) Full-sample

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Δ log (Non-trad.)				
	OLS	WLS			
		Pop.	GDP p.c.	GDP	Fin.
Post*Spanish Share$_{2011}$	-0.440**	-0.436*	-0.469**	-0.420	-0.440**
	(0.186)	(0.226)	(0.185)	(0.266)	(0.186)
Observations	1,998	1,998	1,998	1,998	1,998
Number of municipalities	999	999	999	999	999
R-squared	0.432	0.461	0.443	0.475	0.432
Mun. Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

(b) Sub-sample

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Δ log (Non-trad.)				
	OLS	WLS			
		Pop.	GDP p.c.	GDP	Fin.
Post*Spanish Share$_{2011}$	-0.797**	-1.035**	-0.776**	-0.985**	-0.797**
	(0.321)	(0.464)	(0.339)	(0.483)	(0.321)
Observations	758	758	758	758	758
Number of municipalities	379	379	379	379	379
R-squared	0.422	0.442	0.427	0.448	0.422
Mun. Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of credit to specific sectors on the treatment variable $Post \cdot Spanish\ Share_{2011}$ in the presence of municipality and time fixed effects. Data from two periods are used - June 2012 and June 2013. The variable *Post* indicates June 2013 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011, almost a year prior to the introduction of Spanish regulations. The top table shows results for the full sample and the bottom tables shows the results for the sub-sample of municipalities with very low exposure to Spanish banks for non-tradable firms. I WLS results from columns 2 to 5 by weighting observations at a municipality level by municipality level population, GDP per capita, GDP and an index of financial access given by the number of branches at the municipality level per 10,000 residents. The regression coefficient is robust to weighting the observations across these multiple dimensions.

Table 14: Effect of Spanish regulations on credit lending in Mexico - Placebo

(a) Full-sample

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Δ log (Non-trad.)				
	OLS	WLS	ex-DF	ex-DF/MX/MO	Area>200 sq. km.
Post*Spanish Share$_{2011}$	-0.440**	-0.436*	-0.433**	-0.427**	-0.435**
	(0.186)	(0.226)	(0.188)	(0.197)	(0.214)
Observations	1,998	1,998	1,966	1,728	1,400
Number of municipalities	999	999	983	864	700
R-squared	0.432	0.461	0.431	0.439	0.460
Mun. Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level

*** p<0.01, ** p<0.05, * p<0.1

(b) Sub-sample

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Δ log (Non-trad.)				
	OLS	WLS	ex-DF	ex-DF/MX/MO	Area>200 sq. km.
Post*Spanish Share$_{2011}$	-0.797**	-1.035**	-0.798**	-0.809**	-0.679*
	(0.321)	(0.464)	(0.321)	(0.329)	(0.379)
Observations	758	758	754	662	490
Number of municipalities	379	379	377	331	245
R-squared	0.422	0.442	0.422	0.440	0.459
Mun. Fixed-effects	Yes	Yes	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level

*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of credit to non-tradable sectors by firm-size on the treatment variable $Post \cdot Spanish\ Share_{2011}$ and in the presence of municipality and time fixed effects. Data from two periods are used - June 2012 and June 2013. The variable *Post* indicates June 2013 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011, almost a year prior to the introduction of Spanish regulations. The top table shows results for the full sample and the bottom tables shows the results for the sub-sample of municipalities with very low exposure of the non-tradable firms to Spanish banks. I find that the OLS and WLS coefficients are robust to dropping the observations of municipalities comprising Distrito Federal (DF or Mexico City), or that of municipalities in and around Distrito Federal (belonging to the states DF, Mexico and Morales). The results are also robust to restricting the regression to municipalities with a geographical expanse greater than 200 sq. km.

Table 15: Effect of Spanish regulations on lending to non-tradable sector by firm-size

(a) Full sample

VARIABLES	(1)	(2)	(3)
	Δ log (Non-trad.)		
Size, # of emp.	1-50	50-200	>200
Post*Spanish Share$_{2011}$	-0.479**	0.186	0.556
	(0.195)	(0.382)	(1.235)
Observations	1,978	519	218
Number of municipalities	991	266	113
R-squared	0.436	0.330	0.691
Mun. Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

(b) Sub-sample

VARIABLES	(1)	(2)	(3)
	Δ log (Non-trad.)		
Size, # of emp.	1-50	50-200	>200
Post*Spanish Share$_{2011}$	-0.680**	-1.080	-2.236
	(0.337)	(1.121)	(1.780)
Observations	750	100	28
Number of municipalities	376	52	15
R-squared	0.433	0.292	0.894
Mun. Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of credit to non-tradable sectors by firm-size on the treatment variable $Post \cdot Spanish\ Share_{2011}$ and in the presence of municipality and time fixed effects. Data from two periods are used - June 2012 and June 2013. The variable *Post* indicates June 2013 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011, almost a year prior to the introduction of Spanish regulations. The top table shows results for the full sample and the bottom tables shows the results for the sub-sample of municipalities with very low exposure to Spanish banks for non-tradable firms. I find that the drop in lending to the non-tradable sector is concentrated in firms with 1-50 employees. The credit to larger firms is unaffected by the exposure to Spanish banks.

References

Manuel Adelino, Antoinette Schoar, and Felipe Severino. Loan Originations and Defaults in the Mortgage Crisis: The Role of the Middle Class. Working Paper 20848, National Bureau of Economic Research, January 2015.

Sumit Agarwal, Liu Chunlin, and Nicholas S. Souleles. The Reaction of Consumer Spending and Debt to Tax Rebates-Evidence from Consumer Credit Data. *Journal of political economy*, 115(6):986–1019, 2007.

Philippe Aghion, Peter Howitt, and David Mayer-Foulkes. The Effect of Financial Development on Convergence: Theory and Evidence. *The Quarterly Journal of Economics*, 120 (1):173–222, 2005.

Shekhar Aiyar, Charles W. Calomiris, John Hooley, Yevgeniya Korniyenko, and Tomasz Wieladek. The international transmission of bank capital requirements: Evidence from the UK. *Journal of Financial Economics*, 113(3):368–382, 2014.

Mary Amiti and David E. Weinstein. How much do bank shocks affect investment? Evidence from matched bank-firm loan data. Technical report, National Bureau of Economic Research, 2013.

Thorsten Beck, ASLI DemirgÃŒÃ§-Kunt, and Vojislav Maksimovic. Financial and legal constraints to growth: does firm size matter? *The Journal of Finance*, 60(1):137–177, 2005.

Gianluca Benigno, Nathan Converse, and Luca Fornaro. Large capital inflows, sectoral allocation, and economic performance. *Journal of International Money and Finance*, 55: 60–87, July 2015.

Marianne Bertrand, Esther Duflo, and Sendhil Mullainathan. How Much Should We Trust Differences-in-Differences Estimates? *The Quarterly Journal of Economics*, 119(1):249–275, February 2004.

Francisco J. Buera, Joseph P. Kaboski, and Yongseok Shin. Finance and Development: A Tale of Two Sectors. *The American Economic Review*, 101(5):1964–2002, 2011.

Francesco Caselli and Wilbur John Coleman II. The U.S. Structural Transformation and Regional Convergence: A Reinterpretation. *Journal of Political Economy*, 109(3):584–616, June 2001.

Nicola Cetorelli and Linda S. Goldberg. Global banks and international shock transmission: Evidence from the crisis. *IMF Economic Review*, 59(1):41–76, 2011.

Nicola Cetorelli and Linda S. Goldberg. Banking globalization and monetary transmission. *The Journal of Finance*, 67(5):1811–1843, 2012.

Gabriel Chodorow-Reich. The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008-9 Financial Crisis. *The Quarterly Journal of Economics*, 129(1): 1–59, February 2014.

W. M. Corden. Booming Sector and Dutch Disease Economics: Survey and Consolidation. *Oxford Economic Papers*, 36(3):359–380, November 1984.

Michael B. Devereux and James Yetman. Leverage Constraints and the International Transmission of Shocks. *Journal of Money, Credit and Banking*, 42(s1):71–105, 2010.

Margarida Duarte and Diego Restuccia. The Role of the Structural Transformation in Aggregate Productivity. *The Quarterly Journal of Economics*, 125(1):129–173, February 2010.

Christoph K. Duenwald, Nikolay Gueorguiev, and Andrea Schaechter. Too much of a good thing? Credit booms in transition economies: The cases of Bulgaria, Romania, and Ukraine. 2005.

Gauti B. Eggertsson and Paul Krugman. Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo Approach. *The Quarterly Journal of Economics*, 127(3):1469–1513, 2012.

Edward L. Glaeser, Rafael La Porta, Florencio Lopez-de Silanes, and Andrei Shleifer. Do institutions cause growth? *Journal of Economic Growth*, 9(3):271–303, 2004.

Reuven Glick and Kevin J. Lansing. US household deleveraging and future consumption growth. *FRBSF Economic Letter*, 2009.

Reuven Glick and Kevin J. Lansing. Global household leverage, house prices, and consumption. *FRBSF Economic Letter*, 1, 2010.

Michael Greenstone, Alexandre Mas, and Hoai-Luu Nguyen. Do credit market shocks affect the real economy? Quasi-experimental evidence from the Great Recession and 'normal' economic times. Technical report, National Bureau of Economic Research, 2014.

Reint Gropp, John Krainer, and Elizabeth Laderman. Did consumers want less debt? consumer credit demand versus supply in the wake of the 2008-2009 financial crisis. Technical report, 2014.

Veronica Guerrieri and Guido Lorenzoni. Credit crises, precautionary savings, and the liquidity trap. Technical report, National Bureau of Economic Research, 2011.

Luigi Guiso, Paola Sapienza, and Luigi Zingales. Does local financial development matter? *The Quarterly Journal of Economics*, 119(3):929–969, 2004.

Ricardo Hausmann, Jason Hwang, and Dani Rodrik. What you export matters. *Journal of Economic Growth*, 12(1):1–25, December 2006.

Joel F. Houston, Chen Lin, and Yue Ma. Regulatory arbitrage and international bank flows. *The Journal of Finance*, 67(5):1845–1895, 2012.

Oleg Itskhoki and Benjamin Moll. Optimal Development Policies with Financial Frictions. Working Paper 19994, National Bureau of Economic Research, March 2014.

Rajkamal Iyer, Jose-Luis Peydro, Samuel da Rocha Lopes, and Antoinette Schoar. Interbank Liquidity Crunch and the Firm Credit Crunch: Evidence from the 2007-2009 Crisis. *Review of Financial Studies*, page hht056, October 2013.

Tullio Jappelli and Marco Pagano. Saving, Growth, and Liquidity Constraints. *The Quarterly Journal of Economics*, 109(1):83–109, February 1994.

Gabriel Jimenez, Steven Ongena, Jose-Luis Peydro, and Jesus Saurina Salas. Macroprudential policy, countercyclical bank capital buffers and credit supply: Evidence from the Spanish dynamic provisioning experiments. *National Bank of Belgium Working Paper*, (231), 2012.

Oscar Jorda, Moritz Schularick, and Alan M. Taylor. The great mortgaging: Housing finance, crises, and business cycles. Technical report, National Bureau of Economic Research, 2014.

Oscar Jorda, Moritz Schularick, and Alan M. Taylor. Betting the house. *Journal of International Economics*, 96, Supplement 1:S2–S18, July 2015.

Asim Ijaz Khwaja and Atif Mian. Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market. *American Economic Review*, 98(4):1413–1442, August 2008.

Paul Krugman. The narrow moving band, the Dutch disease, and the competitive consequences of Mrs. Thatcher: Notes on trade in the presence of dynamic scale economies. *Journal of Development Economics*, 27(1-2):41–55, October 1987.

Rafael La Porta, Florencio Lopez-de Silanes, Andrei Shleifer, and Robert W. Vishny. Legal determinants of external finance. *Journal of finance*, pages 1131–1150, 1997.

Ross Levine. Finance and growth: theory and evidence. *Handbook of economic growth*, 1: 865–934, 2005.

Ross Levine, Norman Loayza, and Thorsten Beck. Financial intermediation and growth: Causality and causes. *Journal of monetary Economics*, 46(1):31–77, 2000.

Alberto Martin and Jaume Ventura. Economic Growth with Bubbles. *American Economic Review*, 102(6):3033–58, 2012.

Enrique G. Mendoza and Marco E. Terrones. An Anatomy Of Credit Booms: Evidence From Macro Aggregates And Micro Data. NBER Working Paper 14049, National Bureau of Economic Research, Inc, 2008.

Atif Mian and Amir Sufi. What Explains the 2007-2009 Drop in Employment? *Econometrica*, 82(6):2197–2223, November 2014.

Virgiliu Midrigan and Thomas Philippon. Household leverage and the recession. 2011.

John Mondragon. Household credit and employment in the Great Recession. *Available at SSRN 2521177*, 2014.

Daniel Paravisini, Veronica Rappoport, Philipp Schnabl, and Daniel Wolfenzon. Dissecting the effect of credit supply on trade: Evidence from matched credit-export data. *The Review of Economic Studies*, 82(1):333–359, 2015.

Joe Peek and Eric S. Rosengren. The International Transmission of Financial Shocks: The Case of Japan. *The American Economic Review*, 87(4):495–505, 1997.

Jesse Perla, Christopher Tonetti, and Michael E. Waugh. Equilibrium technology diffusion, trade, and growth. Technical report, National Bureau of Economic Research, 2015.

Claudio Raddatz and Sergio L. Schmukler. On the international transmission of shocks: Micro-evidence from mutual fund portfolios. *Journal of International Economics*, 88(2): 357–374, November 2012.

Raghuram G. Rajan and Luigi Zingales. Financial Dependence and Growth. *American Economic Review*, pages 559–586, 1998.

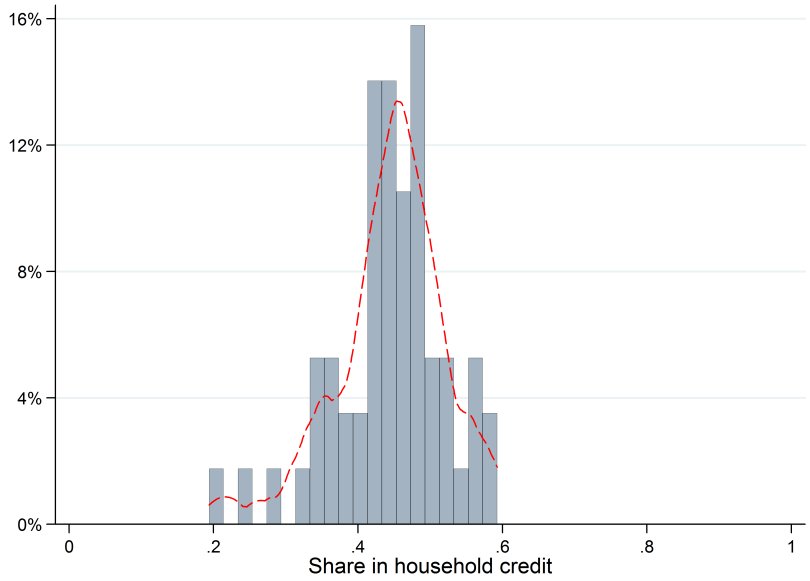
Jesus Saurina. Dynamic provisioning. 2009.

Philipp Schnabl. The International Transmission of Bank Liquidity Shocks: Evidence from an Emerging Market. *The Journal of Finance*, 67(3):897–932, June 2012.

A Additional empirical results

A.1 Results using metropolitan area credit aggregates

Figure A.1: Distribution of Spanish-share in household credit in Mexican municipalities in June 2011



Note : The figures above show the distribution of Spanish shares in household credit markets across the Mexican metropolitan areas

Table A.1: Effect of Spanish regulations on household credit lending in Mexican metropolitan areas

VARIABLES	(1) Gr(Household Credit)	(2) Gr(Housing Credit)	(3) Gr(Consumer Credit)
Post*Spanish Share$_{2011}$	-0.0770	-0.383*	0.0759
	(0.142)	(0.218)	(0.160)
Observations	114	114	114
Number of metropolitan areas	57	57	57
R-squared	0.593	0.732	0.499
Mun. Fixed-effects	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes

Clustered standard errors at a metro. area

*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of credit to households on the treatment variable $Post \cdot Spanish\ Share_{2011}$ in the presence of metropolitan area and time fixed effects. Data from two periods are used - June 2012 and June 2013. The variable *Post* indicates June 2013 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit at the level of the metropolitan area in June 2011, almost year prior to the introduction of Spanish regulations. The metropolitan area fixed effect controls for any municipality level trends.

Table A.2: Effect of Spanish regulations on sectoral credit lending in Mexican metropolitan areas

VARIABLES	(1) $\Delta \log$ (Non-trad.)	(2) $\Delta \log$ (Non-trad. + Const.)	(3) $\Delta \log$ (Tradable)
Post*Spanish Share_{2011}	-0.877	0.836*	-0.818
	(0.737)	(0.467)	(0.896)
Observations	114	114	114
Number of metropolitan areas	57	57	57
R-squared	0.435	0.457	0.420
Mun. Fixed-effects	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes

Clustered standard errors at a metro. area

*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of sectoral credit on the treatment variable $Post \cdot Spanish\ Share_{2011}$ in the presence of metropolitan area and time fixed effects. Data from two periods are used - June 2012 and June 2013. The variable *Post* indicates June 2013 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit at the level of the metropolitan area in June 2011, almost year prior to the introduction of Spanish regulations. The metropolitan area fixed effect controls for any municipality level trends.

A.2 Alternative definitions of non-tradable sectors

Table A.3: Effect of Spanish regulations on sector level credit

(a) Full-sample

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Δ log (Non-trad. + ...)					
	-	Const.	Wholesale	Trans.	Prof. Services	Other Services
Post*Spanish Share$_{2011}$	-0.440**	-0.287*	-0.140	-0.463**	-0.0857	-0.304*
	(0.186)	(0.173)	(0.180)	(0.180)	(0.174)	(0.182)
Observations	1,998	1,998	1,998	1,998	1,996	1,998
Number of municipalities	999	999	999	999	999	999
R-squared	0.432	0.445	0.410	0.434	0.462	0.416
Mun. Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

(b) Sub-sample

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Δ log (Non-trad. + ...)					
	-	Const.	Wholesale	Trans.	Prof. Services	Other Services
Post*Spanish Share$_{2011}$	-0.797**	-0.470	-0.363	-0.820**	-0.428	-0.621*
	(0.321)	(0.305)	(0.290)	(0.317)	(0.280)	(0.325)
Observations	758	758	758	758	758	758
Number of municipalities	379	379	379	379	379	379
R-squared	0.422	0.407	0.409	0.418	0.464	0.397
Mun. Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Clustered standard errors at a municipality level
*** p<0.01, ** p<0.05, * p<0.1

Note: The tables above show regressions results of changes in log-levels of a credit series to the non-tradable sector based on different definitions on the treatment variable $Post \cdot Spanish\ Share_{2011}$ in the presence of municipality and time fixed effects. Data from two periods are used - June 2012 and June 2013. The variable *Post* indicates June 2013 and the exposure to Spanish banks is measured by the share of Spanish banks in household credit in June 2011, almost a year prior to the introduction of Spanish regulations. The top table shows results for the full sample and the bottom tables shows the results for the sub-sample of municipalities with very low exposure to Spanish banks for non-tradable firms.