Effects of entry of microfinance institutions on market structure in the retail banking industry. Evidence from Colombia

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Abstract

Microfinance institutions (MFIs) focus on a segment of the population that is typically unattended by mainstream banks due to lower income, lack of collateral or unreliable information about payment behavior. In recent years, these institutions have undergone a transition from non profit organizations into regulated (for profit) financial establishments, transforming therefore their competitive interaction with formal loan providers in local markets. While the new scenario could be charactersized by increased business stealing between the two types of competitors, MFIs might also create positive spillovers on mainstream financial institutions, due to market expansion and information sharing. The magnitude of these spillovers may have an important impact on decisions regarding entering local markets, with important implications on market power and consumer welfare. To measure these spillovers I examine entry decisions of competitors across isolated markets in Colombia and estimate a structural model that identifies their impact on the profit and the stock of loans provided by incumbents of different types, taking into account the endogeneity of the decision of entry and the observed market structure. I find that entry of MFIs has a significant impact in terms of market expansion for mainstream loan providers. The magnitude of this effect turns out to be higher than the reduction associated to business stealing between the two types of financial institutions, particularly in rural locations, where mainstream banks are more likely to enter a local market if there is at least one microfinance institution.

Keywords: Entry models, Credit Markets, Microfinance institutions, Discrete choice models

1. Introduction

In recent decades, non profit organizations, as well as regulated financial institutions, have developed a whole set of financial services designed exclusively for potential customers who find it difficult to access traditional financial services due to lower income, lack of suitable collateral or absence of reliable information about their payment behavior. A

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great deal of previous research has focused on the role of these specialized institutions at improving the life conditions of their clients; Cull et al. (2014) provides an extensive review of empirical studies that suggest that access to credit facilitates the accumulation of capital over time, as small entrepreneurs are able to start independent productive projects as well as to overcome unpredictable situations that might put at risk the success of their ventures. Although evidence on long term effects of access to micro-loans is mixed (Banerjee (2013) provides a detailed review of empirical studies on the topic), governments in many countries have been enthusiastic at creating strategies to facilitate the provision of financial services for the low-income population segments, which has resulted in an increase of the number of non-profit private organizations and regulated financial institutions specialized in this segment.

MFIs are broadly understood as institutions that specialize in the supply of financial services for the poor. They operate under different regulatory settings, ranging from non profit informal platforms at a local level to well established banks with operations in many countries. In recent years, some of the biggest MFIs have transformed from non profit organizations depending on external subsidies into specialized banks, able to provide funding to small entrepreneurs and lower income households, under profitability conditions required by investors and clients from the deposit market. Cull et al. (2009a) compile evidence from a broad set of countries on the transition of non-profit microfinance institutions into regulated banks, free from subsidy, and how this process has affected the supply of microcredit. They find that MFIs that have undergone this transformation tend to offer products that are more comparable to those provided by mainstream loan providers.

As this transition allows MFIs to use deposits from the public as additional funding to expand their loan portfolio, an increased interaction with mainstream financial institutions is expected. On one side, the entry of a MFI can affect the profit a mainstream loan provider in a similar way as the entry of other competitor of its type, since MFIs compete to attract new clients both in the deposits and the loans markets. On the other side, there are several reasons why the entry of a MFI is likely to have a different effect on other competitors: first, as discussed by Banerjee (2013), the amount of learning involved in the credit relationship, both by the customer and the MFI, and the extent to which this knowledge can be used by others competitors in the market configure a potential externality. Second, inefficiencies in the loans supply might arise if there are barriers that tie a borrower permanently to a particular provider. Since these externalities can ultimately determine whether a financial institution enters or exits a market, it is worth examining whether MFIs contribute to expand the portfolio of financial products available for consumers in local markets by facilitating the entry of other loan providers. This question turns out to be particularly relevant in isolated locations where few competitors are willing to enter. Furthermore, accurately measuring these interactions among MFIs and mainstream institutions at a local level adds to the understanding of the nature of competition in the banking industry in the aggregate.

Financial institutions are more likely to enter markets where they perceive favorable demand conditions as well as a milder competitive response from incumbents and other potential entrants. This simultaneous determination of entry and market structure, as well

as the fact that some of the market/loan-provider characteristics that make entry profitable are likely correlated across different types of financial institutions and are often unobservable to the econometrician, create an endogeneity problem that needs to be addressed in order to obtain accurate measures of the spillovers that MFIs generate on incumbent institutions. In this paper I propose a structural model that allows to interpret the observed local market configuration as the equilibrium outcome of the competitive interaction among different types of potential entrants. Taking elements from industrial organization models that have been used to examine competition in retail sectors, I propose a static entry model with revenue equation, similar to the one developed by Schaumans and Verboven (2015) to identify the effects of entry on market expansion for different types of competitors in the retail banking industry. This model uses the variation in the number of competitors across locations to obtain measures of effects of entry of MFIs on loan providers. Their approach extends the model proposed by Bresnahan and Reiss (1990) with information about the local revenues, to disentangle the effects of entry on market power and market expansion.

In this paper I extend the model proposed by Schaumans and Verboven (2015) in order to allow for multiple type of competitors. Using an approach similar to the one developed by Mazzeo (2002), I introduce heterogeneity among loan providers and evaluate empirically different assumptions on the type of strategic interactions among MFIs and mainstream financial institutions. My approach is closely related to the one developed by Fernandez (2016), who investigates the presence of positive (bilateral) spillovers between bars and cafeterias and the consequences for urban planning. While she focuses on a case where firms offer complementary products, I consider a situation in which spillovers are strictly one sided (mainstream banks benefit from the entry of MFIs, but the opposite does not necessarily occur). This asymmetry is explained by the possibility of MFIs clients of accessing cheaper funding alternatives offered by mainstream banks once they have created information about their payment behavior.

Exploring the competitive interaction in the banking industry is a challenging task due to the complex structure of the profit of financial institutions and their dual role in the deposits and loans markets. For the purposes of this paper I abstract from some of the elements that have been recently discussed in the literature with respect to the spatial interaction across branches in the banking industry (Aguirregabiria et al. (2012) and Ho and Ishii (2011)), by modeling the entry decisions of financial institutions as independent from their decisions in other locations, and restricting my empirical analysis to small, geographically isolated markets. While this assumption could be inadequate in urban contexts where externalities among branches are significant due to greater proximity and higher mobility of clients (Huysentruyt et al. (2013)), some studies have found that evidence in favor of the independence of geographical isolated markets in the retail banking industry (de Juan (2003) and Berger and Mester (2003)). The cost of this decision is of course, the impossibility to extend my conclusions to other types of markets, such as big urban centers. Nevertheless, studying entry decisions in isolated geographic markets turns out to be particularly relevant from the a policy point of view, since these decisions have a great impact on the portfolio of financial services that become available for particularly vulnerable clients.

One of the advantages of my approach is that it does not rely on confidential individual data. Instead, I estimate a structural model that captures the strategic interaction among different types of loan providers using information of the number of competitors and the composition of the loan portfolio across 530 small isolated markets in Colombia in 2014. This country provides an interesting setting to evaluate the effects of entry of MFIs in the local retail banking industry because the conditions of micro loans, such as the type of liability, the frequency of payments and the total amount borrowed, are closer to the ones of the products offered by mainstream financial institutions. One feature of the Colombian banking industry that is critical for the aim of this study, is that the information about payment behavior of clients of these institutions is reported to credit agencies, therefore it becomes available to other competitors.

I find that the individual demand for credit for traditional banks is affected positively by the entry of institutions focused in microcredit or low-income households. This finding goes in line with the role of this type of institutions as a mechanism for consumers to overcome information problems that limit their possibilities to access cheaper funding. Furthermore, I find that spillovers towards mainstream institutions are stronger in rural isolated markets, where mainstream banks are more likely to enter if there is at least one MFI.

This paper continues as follows: Section 2 contains a brief review of the literature. In Section 3 outlines the important features of the MFIs and other financial institutions that compete in the retail banking industry in Colombia, and shortly summarize recent regulation changes that have had significant impact on the development of microfinance. Section 4 describes the data and provides summary statistics; Section 5 provides an overview of the methodology and Section 6 presents the results of the structural model. Section 7 contains final remarks.

2. Literature Review

This paper contributes to the literature that studies the interaction of MFIs and other loan providers in local markets. Furthermore, it relates to the growing number of studies that investigate the competitive interaction among loan providers in the retail banking industry.

Only in the last decade have studies directly addressed the effects of entry of microfinance institutions on other loan providers that participate in local loan markets. Most of the empirical studies have made use of data of non-profit institutions that offer group-liability loans using donations as a main source of funding; these institutions typically target the poorest segments of the population, whose only alternative source of funding are informal lenders. Therefore, a considerable number of studies have focused on the effects of MFIs on these type of loan providers, rather than on formal financial financial institutions. Demont (2016) analyzes the effect of entry of MFIs on informal sources of lending in rural villages in India using a model where MFIs use joint-liability contracts and informal moneylenders offer standard individual loans. Contrasting the predictions of the model with panel household survey for India he finds that MFIs can worsen the informational problems faced by

traditional lenders, leading them to increase the interest rate charged to low income clients. Similar evidence on the behavior of interest rate has been found by Kaboski and Townsend (2012) in Thailand, who interpret this rise as an indication of financial constraints of the households. These findings are consistent with a model where MFIs draw away better borrowers from the moneylender and/or where fixed costs are important in informal lending, such as the one proposed by Mookherjee and Motta (2016). Other studies have focused on the competition among MFIs. McIntosh et al. (2005) studies the effects of rising competition among the incumbent MFIs by examining the dropout and repayment rates of a sample of clients of one of the biggest microfinance institutions in Uganda, as it abandons its position as local monopolist in the supply of micro-loans. The identification strategy relies on group-level changes in outcomes that occurred subsequent to the entry of a new competitor in the market.

In recent years, however, the business model of many of these institutions has undergone structural changes that aim to achieve greater independence from donors while maintaining the rate of expansion of their portfolio. While the majority of MFIs today are still NGOs, several have already transformed into banks or other kinds of regulated financial institutions. Regulated MFIs include regional leaders such as Banco Compartamos in Mexico, Banco FIE in Brazil or Bandhan and SKS in India, which are among the largest MFIs in the world (D'Espallier et al. (2017)). The transition process implies the adoption of a shareholder ownership structure and most often it also includes becoming subject to prudential regulation by national banking authorities. These changes may translate into increased tensions between higher profit and outreach (Hermes and Lensink (2007)), as well as tougher competition among MFIs both in terms of attracting new clients and obtain funding from donors (Ly and Mason (2012)).

As noticed by Cull et al. (2009b), while regulated MFIs continue to provide services to segments of the population without access to traditional banking, their products are closer in their characteristics to the ones offered by financial institutions. Accordingly, D'Espallier et al. (2017) and Cull et al. (2014) find that regulated MFIs increase the size of their loans and tend to serve a lower percentage of women, while a majority of their loans have individual, rather than group liability. The increasing similarities have an effect on the competitive interaction between MFIs and mainstream financial institutions that have been scarcely studied. Descriptive evidence is provided by Cull et al. (2009a), who examine the effects of the presence of banks on the profitability and outreach of commercially oriented MFIs. They find evidence that greater bank penetration in the overall economy is associated with commercial banks specialized in microcredit (rather that microfinance non-profit institutions) entering poorer markets.

This paper provides new insights to this question by incorporating elements from empirical industrial organization models that have been used to study competition in other retail sectors. I extend the model proposed by Schaumans and Verboven (2015) to account for the differences between the loan providers that interact in local markets. This type of model has been used to analyze the competitive interaction among firms in other sectors, such as hotels, restaurants and bakeries (Fernandez (2016)). In order to include the possibility that competitors belong to different types, I use the framework proposed

by Mazzeo (2002), who analyzes product differentiation in an oligopoly context using data from a cross section of motel markets located along U.S. interstate highways. In later work, Cohen and Mazzeo (2010) use a similar approach to analyze competition for deposits in the retail banking industry in the U.S.

Furthermore, this paper contributes to the growing literature that make use of methods developed in empirical industrial organization to analyze competition in the banking industry. In particular, it relates to a number of studies that analyze the competitive interaction among different types of financial institutions using information from the market configuration observed across different locations. My approach is similar to the one proposed by Cohen (2004), who tests empirically different hypothesis about competitive interaction among banks and thrifts.

Competition among different types of financial institutions have been studied using spatial models that explicitly account for the consumer disutility from distance traveled as in (Ho and Ishii (2011)) and Huysentruyt et al. (2013). This approach has been used to study competition in the banking industry urban locations where cannibalization across branches of the same bank is more likely, or when banks with large networks face competition from single-market financial institutions (Adams et al. (2007) and Dai and Yuan (2013)). Furthermore, other studies have tried to capture externalities among the nodes of the same branching network related with geographical diversification of risk and liquidity considerations (Aguirregabiria et al. (2012) and Aguirregabiria and Wang (2016)). In contrast with these studies, I model the decision of entry in each market as independent from the decisions taken in other locations. Therefore, I argue that entry decisions are motivated by the local profit of the bank, rather than the aggregate profit across markets. This assumption seems suitable to model entry in remote geographically isolated markets, where spillovers towards neighboring markets is not very likely and where financial institutions tend to open only a reduced number of branches per market. Evidence in support of the independence of sub-markets is found by de Juan (2003), who uses information from small towns in Spain to conclude that banks decide to enter the markets mostly based on local conditions of demand.

Previous studies that have studied competition in the retail banking industry in Colombia, such as those by (Salamanca (2005) and Rozo et al. (2008)) have not taken into account the heterogeneity among loan providers, ignoring consequently, the potential spillovers that MFIs can generate on other financial institutions in terms of market expansion. By exploring the competitive interaction among these loan providers, this paper offers new insights about the role of MFIs at facilitating access to banking services in isolated locations, that can be used in the design of future policy interventions. By exploiting the cross sectional variation of the number of competitors and the loans portfolio composition I am able to identify the markets that might benefit the most from the entry of MFIs.

3. Background: The Colombian Banking Industry

In this section I provide a brief summary of the characteristics of MFIs and other loan providers that interacted in the retail banking industry in Colombia as of 2014, focusing

first on the general economic and regulatory environment, and later on the particular characteristics of MFIs and other lending institutions.

Colombia experienced favorable macroeconomic conditions that were accompanied by a significant expansion of the demand for loans in the period between 2006 and 2014, particularly in the households' sector. After a deep financial crisis at the end of the 90s that motivated stricter regulation with respect to risks management and capital requirements for financial institutions, the banking industry underwent a process of consolidation that resulted in a relatively concentrated market, where commercial banks with extended branching networks throughout the national territory represented a significant share of the market portfolio. The segments that experienced greater growth were the ones related with the provision of financial services towards households and micro-entrepreneurs. The potential for growth in Colombia in the niche of microcredit is thought to be still high, given the levels of poverty, inequality and financial restrictions faced by a significant portion of the population. According to Estrada and Rozo (2006), these restrictions are even more acute in rural areas, where financial services had been exclusively provided by a public bank and often tied to the existence of a productive project in the agricultural sector.

3.1. Microfinance institutions in Colombia

Microfinance institutions in Colombia started operations at the end of 80s. Before their entry, micro loans were provided exclusively by the government through development agencies. According to Barona (2004), during the 90s most of these institutions were non profit organizations that funded their loan operations with donations from private individual donors or foreign development agencies. Only after the effects of a deep financial crisis that country experienced at the end of the 90s attenuated, the number of non-profit organizations that offered loans to poor clients started to increase. Between 2000 and 2010 the number of institutions raised from 4 to 26. During this time, the biggest MFIs transitioned from non-profit organizations into specialized banks.

According to Banca de las Oportunidades, the government agency in charge of implementing the national strategy to promote financial access, in December 2014 there were 18 no profit MFIs, 5 non-banks regulated financial institutions and 4 banks specialized in microfinance (Banca de las Oportunidades (2014)). In addition, there was one public bank that intermediated government resources to provide funding for small productive projects in the agricultural sector. The share of this bank in the total stock of micro loans reached 42% in 2014. Among the private institutions that provided this type of loans the most important institutions were banks specialized in microfinance (27%) and non profit MFIs (31%). These institutions had registered a sustained expansion in previous years, both in terms of their number of clients and size of their portfolio. Between 2007 and 2014 the number of clients nearly tripled, raising from nearly 600.000 clients to 1,8 millions, while the share of the total stock of loans increased from 0.7% to 3%.

MFIs in Colombia offer different types of microloans depending on the characteristics of the client, such as the availability of credit history and the purpose of the loan. The vast majority of them are individual, rather than group liability loans, and they comply with the legal definition of microcredit, introduced by the government in 2007. This definition

specifies i) a maximum amount that can be borrowed by a single client (around US7500), ii) a cap on the total debt that the client can have with the financial system (nearly US36000) and ii) all costs (different from the interest rate) and commissions that financial institutions can charge for the product. The average amount of a micro loan in 2014 was nearly US2000 (PPP) and the time of repayment was nearly 2 years on average. Most of these loans have a monthly frequency of payments.

While some of these characteristics are similar to those observed for loans given to higher income households by mainstream financial institutions, the interest rate of this type of loans is significantly higher (34% e.a. for microcredits vs. 19% e.a. for other loans). Furthermore, there are important differences in the ways that MFIs value the available collateral and their methods of monitoring clients. In order to maintain low levels of default and reduce associated loses MFIs rely on higher provisions and close monitoring of the productive projects of the clients, which often includes additional services for entrepreneurs, such as guidance on marketing and basic accounting. The implementation of these measures is costly and often requires a higher number of employees. Branching networks are often complemented with mobile agents to reach clients in isolated locations, where there is a limited supply of financial services by mainstream institutions. In fact, microcredits are the type of loans with greater geographical diversification. In 2014, 62% of these loans where given to clients in locations different from the 13 biggest cities in the country, while only 5% of the loans in other categories were given to clients outside these locations. One particular feature of regulated MFIs in Colombia as of 2014 is that they did not capture deposits from the public. Therefore they funded their operation using external loans almost exclusively. As a consequence, their interaction with other regulated financial institutions occurs only in the loans market.

A regulatory change that facilitated the expansion of microcredit in Colombia was a relaxation of the interest rate ceiling that applied for this type of loans in 2007. Figure 1 shows the evolution of this cap as well as the average interest rate of microcredits supplied by regulated financial institutions. Both rates have increased significantly in recent years, particularly after 2011. The relaxation of the interest rate ceiling, as well as favorable macroeconomic conditions translated into higher demand for loans from households and entrepreneurs and contributed to speed the transition of several non profit MFIs into banks.

3.2. Other financial institutions

Commercial banks are the most important institutions in the loan retail market in Colombia, both in terms of market share and size; the loans provided by private banks represented 95.3% of the total credit to the private sector, and 93.6% of the total assets in December 2014. These institutions have a diverse portfolio that includes services for business clients, households and micro-entrepreneurs. The greater share of their portfolio corresponds to commercial loans (58% on average), followed by non-collateral loans and mortgages. Microcredits account for less than 5% of their total stock of loans. However, there is significant heterogeneity in the composition of the loan portfolio of these institutions, with some smaller banks focusing in non collateral loans to households or commercial loans, exclusively. Banks rely heavily on the loan activity in order to obtain their profits.

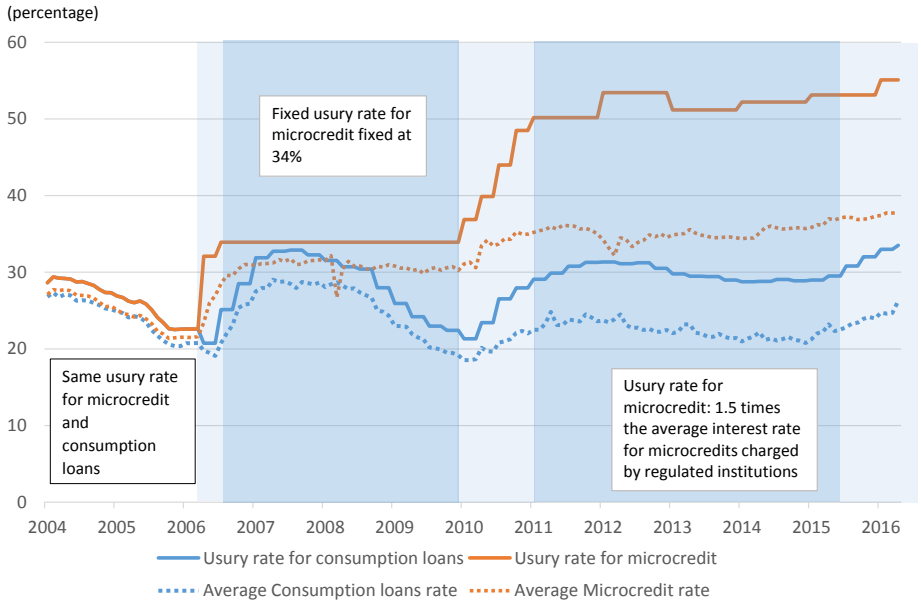

Figure 1: Effective annual usury rate 2004-2016
2

Loans represented 65,7% of their assets while net interest obtained from loan operations accounted for 62% of their total revenue.

Other institutions that compete in the retail loan market include financial institutions regulated by the financial supervisory authority (Superintendencia Financiera de Colombia), and several organizations that offer loans to particular groups of the population such as credit unions and employees associations that provide loans to their members. These institutions are more specialized, both in terms of their geographic location and the range of products they offer, focusing often in urban markets. Employees associations and credit unions are included in what is known as "solidarity sector", and are not regulated by the financial supervisory authority. These organizations are not allowed to capture deposits from the public and cannot provide loans to external members. Since most of these organizations are formed by individuals with formal employment, they are not considered as a source of founding for independent entrepreneurs with low income.

Figure 2 presents the evolution of the number and value of new microcredit in recent years. As seen from the graph, after the relaxation of the usury rate that applied for microcredit there was a significant increase in the value of new loans given by MFIs, but not to the same extent by other financial institutions. While 11,7% of the new microcredits were given by mainstream banks in 2008, this percentage was just 5,4% in 2014. In contrast, these institutions have increased their funding options for low income households in the form of non collateral loans such as credit cards after the relaxation of the usury rate.

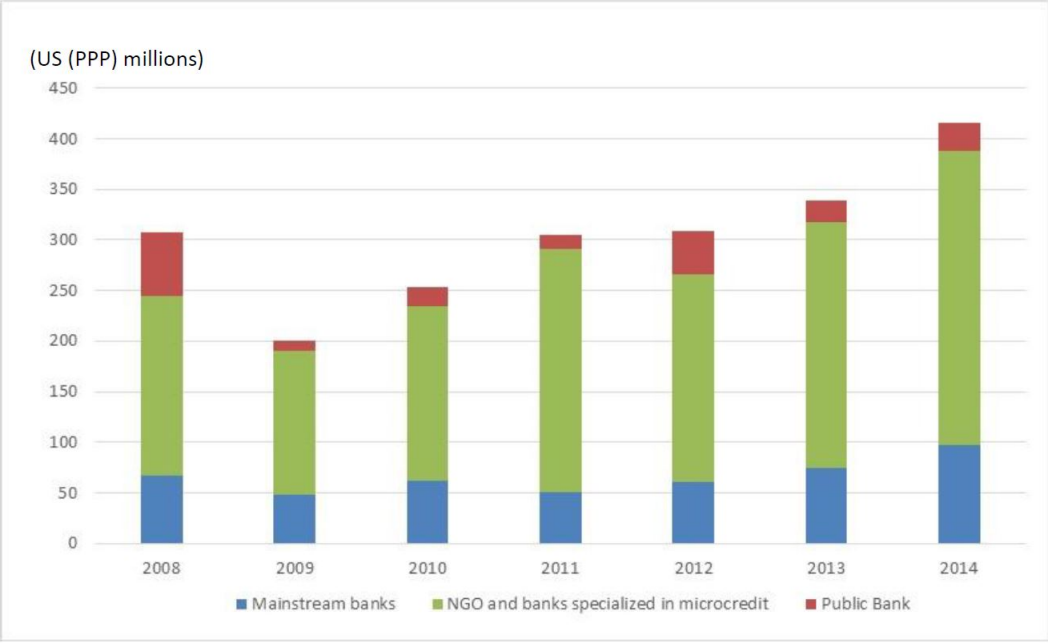

Figure 2: Number and value of new microcredits

4. Methodology

The model I propose here is an extension of the one proposed by Schaumans and Verboven (2015) that allows to incorporate heterogeneity among competitors. This model follows the approach developed by Bresnahan and Reiss (1990), who uses the variation in the number of competitors across locations to obtain measures of the toughness of competition. First, I examine the decisions of banks about entry, assuming that they take the market structure in each location $\bar{N}_j$ as given. Later, I describe how the observed market structure can be understood as the equilibrium outcome of a game where different competitors decide about entry.

4.0.1. Assumptions on banks and markets

Banks are firms able to operate in multiple markets. Their type, either mainstream banks (b) or MFIs (m), cannot be chosen after entry in each particular market, therefore it is the same across geographic locations [3]. There is a fixed number of geographic markets M where banks can decide to enter, and banks are able to operate simultaneously in all of them if it is profitable. Decisions about type and entry are irrevocable.

Since I assume that there are no externalities across markets, the aggregate profit of a bank that operates in multiple places is calculated the sum of the profit obtained in each individual location. Entry decisions are therefore based on each particular market

[3]Microloans represent more than 80% of the total loan porfolio in all the markets considered in the sample, whereas this share is lower than 30% for mainstream banks.

conditions only. Although this assumption is difficult to hold in many retail industries, there are several arguments in support of this conjecture in the case of the Colombian retail banking industry, particularly if we restrict our attention to small, geographically isolated markets. On the demand side, clients need to approach personally to a branch in order to ask for a loan, since many of them still do not have the possibility of performing this type of operation using virtual or mobile platforms. Although internet access is possible in most of the cities and towns in Colombia, a significant share of the population in those places do not have internet access at home. Furthermore, the use of virtual platforms to make transactions is still not familiar to many customers, who prefer to approach a traditional branch, as they perceive this channel as safer and more reliable. A second argument is that clients might not demand loans from nearby towns, due to higher travel expenses and lower probability to obtain funding (monitoring costs for banks also increase with distance, particularly for financial institutions offering microcredits).

On the supply side, I assume that there are not significant economies of scope across markets. Therefore, the cost of operation of a branch does not reduces if the number of branches in adjacent markets is bigger. In the banking industry, the costs of operation of branches is less likely to be affected by the location of other nodes of the branching network, compared to other industries such as retail chain stores, where those features can translate in changes in distribution and storage costs (see for example Holmes (2011)). There exists however, the possibility that the reallocation of funds obtained in the deposit market creates interdependence across geographic locations. While I cannot rule out this possiblity , I think it is reasonable to assume instead that financial institutions invest the excess of deposits that are obtained in a particular market in an outside option that is independent from the markets that are included in the sample (this can be a portfolio investment, providing loans in external markets or lending in the interbank market). Also, I assume that the markets are small enough such that the local market structure does not have a significant effect on the interest rate that competitors set for each type of loan at the national level. This an assumption consistent with the situation observed in the Colombian banking industry, where big metropolitan areas (excluded from the sample) concentrate an important share of the total loan portfolio[4]. Therefore, the decision of entry depends only on the local demand for loans and local supply of deposits.

4.0.2. Entry conditions

The profit function of a bank of type i in a market j can be written as follows:

$$\Pi_{ij}(\bar{N}_j) = (r_i^l(\bar{N}_j) - r_i^d(\bar{N}_j))L_{ij}(\bar{N}_j) + \tag{1}$$

$$(r_i^o - r_i^d(\bar{N}_j)) \max\{D_{ij}(\bar{N}_j) - L_{ij}(\bar{N}_j), 0\} - \tag{2}$$

$$F_{ij}(\bar{N}_j), \tag{3}$$

[4]The sample of markets that are included in the estimation represent 6,7% of the aggregate stock of loans and 6,1% of the total stock of deposits.

where $\bar{N}_j$ is a vector that contains the number of financial institutions of each type in market j; $r_i^l(\bar{N}_j)$ is the ex post return obtained from the current stock of loans, $L_{ij}(\bar{N}_j)$, and $r_i^d(\bar{N}_j)$ is the return of the deposits stock, $D_{ij}(\bar{N}_j)$, that banks need to pay to their clients.

I assume that banks can make use of deposits obtained from an outside source to provide funding for the local demand of loans in case that the local deposits are not enough. In that case, those resources would be remunerated at the same rate as local deposits ($r_i^d(\bar{N}_j)$). When there is a local surplus of deposits, banks can invest it in an outside option that has a return denoted by r_i^o. Interest rates set by multimarket banks for loans and deposits are usually the same across locations, therefore they do not depend on the local market structure[5]. The ex post return rate $r_i^l(\bar{N}_j)$, however, may vary across markets depending on the portfolio composition and the materialization of credit risk, which in turn, may be affected by the market structure. Entry of new competitors might lead to incumbents to shift towards a particular type of loans; similarly, greater competition among loan providers might imply lower payments from loans if the excessive supply of credit to risky clients translates into higher default rates. Finally the variable $F_{ij}(\bar{N}_j)$ captures the operative costs of the branch, which do not depend on the scale of the operation. Again, this variable might be affected by market structure if the entry of new competitors generate spillovers on the development of basic infrastructure needed to attract clients, such as ATM networks and debit/credit card payment terminals.

I consider a competitor as active in the market if there exists at least one "brick and mortar" branch in the market that reports non-zero stocks of deposits or loans. Therefore, $\bar{N}_j$ is a vector that contains the number of competitors per type rather than the number of branches that each financial institution operates in each market. Hence, I'm not able to capture the effect of competition among branches of the same competitor, or the relative advantage of competitors with more than one branch in the local market; this is likely not be an important limitation since banks and other financial institutions operate just one branch per market in most of the cases[6].

The profit function can be rewritten as follows:

$$\begin{aligned} &\Pi_{ij}(\bar{N}_j, \phi_{ij}, l_{ij}) = \\ &\left((r_i^l(\bar{N}_j) - r_i^d(\bar{N}_j)) + (r_i^o - r_i^d(\bar{N}_j))\max\{\phi_{ij}(\bar{N}_j), 0\}\right) l_{ij}(\bar{N}_j)S_j - F_i(\bar{N}_j), \end{aligned} \tag{4}$$

[5]In Colombia, financial institutions do not discriminate prices across markets, therefore, interest rates are not likely to respond to the changes in the market structure of a single small market. Evidence of this type of pricing behaviour is also found in other countries where banks operate across different geographic markets (Berger and Dick (2007)

[6]Financial institutions have only one branch per market in 89.8% of locations. Transaction terminals such as post offices and retail stores that offer banking services in agreement with banks (known as banking correspondents) are not taken into account to define entry because it is not possible for new clients to ask for loans or opening standard saving accounts. Furthermore, since financial institutions use existing branching networks from other firms, the decision on entry is not strictly based on the local profit for the financial institution.

where $\phi_{ij}(\bar{N}_j) = \frac{d_{ij}(\bar{N}_j)}{l_{ij}(\bar{N}_j)} - 1$ is the relative surplus of deposits, $l_{ij}(\bar{N}_j)$ is the demand for loans per capita, $d_{ij}(\bar{N}_j)$ is the local supply of deposits per capita and S_j is the population of market j.

If a financial institution decides to enter a location where the market structure is given by $\bar{N}_j$, it must be that the profit of entering the market, $\Pi_{ij}(\bar{N}_j + I_i)$ (where the indicator vector I_i indicates whether there is an additional competitor of type i in the market), is greater than the outside option payment, which I normalize to zero. This condition can be written in logarithms using equation 4 as:

$$\ln\left(\frac{\mu_{ij}(\bar{N}_j + I_i)}{F_{ij}(\bar{N}_j + I_i)}\right) + \ln l_{ij}(\bar{N}_j + I_i) + \ln S_j > 0, \tag{5}$$

where $\mu_{ij}(\bar{N}_j + I_i) \equiv (r_i^l(\bar{N}_j + I_i) - r_i^d) + (r_i^o - r_i^d)\max\{\phi_{ij}(\bar{N}_j + I_i), 0\}$ is a measure of the markup that the financial institution obtains in market j[7], while the second term, $l_{ij}(\bar{N}_j + I_i)$, refers to the local demand for loans per capita. Both terms above depend on market structure $\bar{N}_j$, but they are also determined by economic and demographic characteristics of the market such as income, distance to metropolitan areas, etc. Let X_j be a vector that capture all the relevant demographic characteristics of market j. I use linear functions to capture these relations as follows:

$$\ln l_{ij}(\bar{N}_j) = X_j\beta_i + \alpha_i(\bar{N}) + \varepsilon_{ij}, \tag{6}$$

$$\ln \mu_{ij}(\bar{N}_j) = X_j\lambda_i + \delta_i(\bar{N}) - \eta_{ij}, \tag{7}$$

where ε_{ij} and η_{ij} are characteristics that vary across markets and types of competitors, unobservable to the econometrician.

The effects of market structure in the revenue of bank of type i in market j are captured by the function $\alpha_i(\bar{N})$, which is defined as follows:

$$\alpha_i(\bar{N}_j) = \alpha_i\hat{N}_{ij}. \tag{8}$$

Here, $\hat{N}_{ij}$ is the number of competitors that firm i faces in the market. For example, if there are two types, $\bar{N} = \{N_i, N_k\}$ the number of competitors for a firm of type i is $\hat{N} = \{N_i - 1, N_k\}$. This functional form assumes that the effect of all competitors of the same type is the same. Similarly,

[7]The value of the deposits is smaller than the value of the loans in most of the markets considered in the sample.

$$\delta_i(\bar{N}_j) = \delta_i \hat{N}_{ij}. \tag{9}$$

A more flexible specification of the functions $\alpha(N_b, N_m)$ and $\delta(N_b, N_m)$ can be defined as follows:

$$\alpha_b(N_b, N_m) = \alpha_{b1} d_{bb1} + \alpha_{bba} \max\{N_b - 2\} + \alpha_{1m} d_{bm1} + \alpha_{bma} \max\{N_m - 1, 0\} \tag{10}$$
$$\alpha_m(N_b, N_m) = \alpha_{m1} d_{mb1} + \alpha_{bba} \max\{N_b - 1, 0\} + \alpha_{1m} d_{mm1} + \alpha_{mma} \max\{N_m - 2, 0\}, \tag{11}$$

and,

$$\delta_b(N_b, N_m) = \delta_{b1} d_{bb1} + \delta_{bba} \max\{N_b - 2, 0\} + \delta_{1m} d_{bm1} + \delta_{bma} \max\{N_m - 1, 0\} \tag{12}$$
$$\delta_m(N_b, N_m) = \delta_{m1} d_{mb1} + \delta_{bba} \max\{N_b - 1, 0\} + \delta_{1m} d_{mm1} + \delta_{mma} \max\{N_m - 2, 0\}, \tag{13}$$

where d_{bb1} and d_{bm1} are dummy variables that indicate whether there is at least one competitor of type b or m, from the perspective of a firm of type b. Similarly, d_{mb1} and d_{mm1} indicate whether a MFI faces a at least one competitor of type b or m. The parameters $\{\alpha_{bba},\ \alpha_{bma},\ \alpha_{bba},\ \alpha_{mma}\}$ and $\{\delta_{bba},\ \delta_{bma},\ \delta_{bba},\ \delta_{mma}\}$ capture the effect of additional competitors of each type on markup and market expansion. This specification allows to evaluate whether the effect of the first competitor of each type is different from the one related to the entry of additional firms.

If the market structure described by the vector $\bar{N}_j$ is observed, individual rationality of competitors indicate that those that are active in the market are obtaining profits higher that the ones that they would obtain in the outside option. Substituting equations 6 and 7 in 5, I obtain,

$$X_j \gamma_i + \ln S_j + \theta_i(N_j^*) - \omega_{ij} > 0. \tag{14}$$

Similarly, any additional firm should get negative profit if it decides entering the market, otherwise, it should have entered the market already. Therefore,

$$X_j \gamma_i + \ln S_j + \theta_i(N_j^* + I_i) - \omega_{ij} < 0. \tag{15}$$

If these conditions are met for all types of competitors, we can interpret the observed market structure $\bar{N}$ as an equilibrium outcome N^*. Therefore, the following conditions should be met at the equilibrium market structure N^* for each type of competitors:

$$X_j \gamma_i + \ln S_j + \theta_i(N^* + I_i) < \omega_{ij} < X_j \gamma_i + \ln S_j + \theta_i(N^*) \tag{16}$$

where,

$$\gamma_i = \lambda_i + \beta_i$$
$$\theta_i = \alpha_i + \delta_i$$
$$\omega_{ij} = \eta_{ij} - \varepsilon_{ij}.$$

This is a simultaneous ordered probit and demand model, under the assumption that the entry of a new competitor always reduces profit of incumbents ($\gamma_i < 0$). In markets where there are no competitors of type i ($N_i^* = 0$), $l_{ij}(\bar{N}_j, X_j)$ is not observed; hence, only one inequality must hold for that type:

$$X_j\lambda_i + \ln S_j + \delta_i(N^* + I_k) < \omega_{ij}, \tag{17}$$

while when there is at least one competitor of type i ($N^*(i) > 0$), two conditions must be satisfied:

$$\ln l_{ij}(N^*, X_j) = X_j\beta_i + \alpha_i(N^*) + \varepsilon_{ij} \tag{18}$$
$$X_j\gamma_i + \ln S_j + \theta_i(N^* + I_i) < \omega_{ij} < X_j\gamma_i + \ln S_j + \theta_i(N^*). \tag{19}$$

There is an endogeneity problem due to the fact that firms are more likely to enter markets where they expect higher demand. Following the solution proposed by Schaumans and Verboven (2015), I use the population variable (S_j) as an exclusion restriction that helps to achieve identification as it affects the overall profit, since firms are more likely to enter in large markets, but it does not affect per-capita demand for loans[8]. The model can be estimated by maximum likelihood, provided that the distributions of the unobservable terms η_{ij} and ε_{ij} are known.

This is an extension of the entry model proposed by Bresnahan and Reiss (1990) that allows to identify the effects of entry on credit expansion from those related to market power in the context of retail banking industry. This feature is particularly useful as it allows to obtain evidence about the role of this type of institutions at facilitating access to clients towards cheaper funding alternatives.

4.1. Entry game for two types of competitors

As noted by Mazzeo (2002), when there are different types of competitors in the market it is necessary to introduce additional assumptions that allow to interpret the distribution of firms across types as the result of a rational individual decision of potential entrants. Therefore, I impose some structure on the type of interaction between financial institutions,

[8]An OLS regression of the stock of loans per capita on demographic characteristics of the market reveals that after controlling for income and distance to closest market, population doesn't contribute to explain the variation of this variable across markets.

such that the observed market structure can be interpreted as the outcome of an entry game under complete information.

Consistent with the structure of the retail banking industry in Colombia I classify the loan providers in two categories: mainstream financial institutions (b) and institutions specialized in microfinance (m). The public bank is not included in any of the categories above. Instead I consider its presence as an exogenous characteristic of the market [9].

Similar to the investment game proposed by Mazzeo (2002) I assume there is a pool of potential entrants of the two types that make irrevocable decisions about entry. Potential entrants of the same type are identical and play in a sequential manner. Firms anticipate that subsequent firms will make decisions about entry and product type once they have committed to their choice. The last firm of each product type finds entry profitable taking the number of competitors of each type that are active in the market as given. Additional entry, in either product type, is not profitable.

Different equilibrium market structures can be achieved depending on the type of interaction between mainstream institutions and MFIs. Cleeren et al. (2010) analyzes a case where competitors are substitutes, while Fernandez (2016) studies a case where firms provide complementary goods, so bilateral positive spillovers arise. I consider here a third case, in which the relation among the two types of competitors is not symmetric, resulting in one-sided positive spillovers. To see why this can be the case in the context of MFIs and mainstream banks, notice that limited business stealing between mainstream banks and MFIs is expected, particularly from the second group towards the first, since mainstream institutions offer relatively cheaper alternatives of credit for clients with lower default risk, and their share of microcredit in the loan portfolio is small. On the deposits side, many MFIs do not capture resources from the public, funding most of their operation with external loans. Positive spillovers for mainstream institutions, derived from the entry of a MFIs may occur instead, since MFIs' clients might become eligible for accessing cheaper loans offered by mainstream institutions once they have build some credit history, amassed some collateral or simply become more aware about the benefits of formal financial services. To simplify notation I will drop the sub-index j, to focus on the features of the interaction of competitors of types b and m in a given market.

4.1.1. Types are substitutes

If $\Pi_b(N_b, N_m + 1) < \Pi_b(N_b, N_m)$ and $\Pi_m(N_b + 1, N_m) < \Pi_m(N_b, N_m)$, then the types are substitutes. Furthermore, if the entry of a competitor of the same type reduces the profit of an incumbent more than the entry of a competitor of other type, then a Nash equilibrium exists and can be represented by the pair $\{N_b, N_m\}$ for which the following inequalities hold:

[9]The public bank is present in most of the markets included in the sample, due to its historic role at distributing the currency in remote places. The branches of this bank started their operations years before the entry of other competitors in most of the markets, and there are no significant changes in the branching network of this bank during the period analyzed here.

$$\pi_b(N_b+1, N_m) < \omega_b < \pi_b(N_b, N_m) \tag{20}$$
$$\pi_m(N_b, N_m+1) < \omega_m < \pi_m(N_b, N_m), \tag{21}$$

where $\pi_i(N_b, N_m) = X_j\gamma_i + \ln S_j + \theta_i(N_b, N_m)$ for $i = \{b, m\}$. This equilibrium is not unique, however, as there is a sub-region of the area defined by inequalities above that is consistent with the outcome $\{N_b+1, N_m-1\}$. This subregion is defined by the following inequalities:

$$\pi_b(N_b+1, N_m) < \omega_b < \pi_b(N_b+1, N_m-1) \tag{22}$$
$$\pi_m(N_b+1, N_m) < \omega_m < \pi_m(N_b, N_m). \tag{23}$$

In order to obtain a unique equilibrium in terms of the number of firms of each type, Mazzeo (2002) introduces additional inequalities related to the optimal selection of types in each market. Given that types are given in the context of this paper, I assume instead that potential entrants of the type b have a competitive advantage with respect to financial institutions that are specialized in microcredit. This means that in markets that are attractive for both types, but where at most one additional competitor can enter, the outcome $\{N_b+1, N_m-1\}$, rather than $\{N_b, N_m\}$ is obtained. This assumption is in line with the fact that mainstream institutions have been active in the retail banking industry for a longer period and are bigger in terms of assets and market share. Given these assumptions, the resulting equilibrium is unique in terms of the number of competitor in each category, and the likelihood contribution of a market with $\{N_b, N_m\}$ competitors can be calculated as follows:

$$\begin{aligned} L(\{N_b, N_m\}) = &\int_{\pi_b(N_b+1,N_m)}^{\pi_b(N_b,N_m)} \int_{\pi_m(N_b,N_m+1)}^{\pi_m(N_b,N_m)} f(\omega_b, \omega_m) d(\omega_b, \omega_m) - \\ &\int_{\pi_b(N_b+1,N_m-1)}^{\pi_b(N_b+1,N_m)} \int_{\pi_m(N_b+1,N_m)}^{\pi_m(N_b,N_m)} f(\omega_b, \omega_m) d(\omega_b, \omega_m), \end{aligned} \tag{24}$$

where $f(\omega_{bj}, \omega_{mj})$ is the distribution function of the duplet (ω_b, ω_m).

Figure 3 presents an example with two players of each type. The delimited areas in the plane represent the set of values of $\{\omega_b, \omega_m\}$ that are consistent with each possible market outcome.

4.1.2. One-sided complementarity

Alternatively, if the effect of entry of MFIs on market expansion is big enough such that $\Pi_b(N_b, N_m+1) > \Pi_b(N_b, N_m)$ then this type of loan providers acts as complement of mainstream institutions. I assume that positive spillovers are one-sided, therefore, MFIs do not benefit from the entry of a mainstream loan provider ($\Pi_m(N_b+1, N_m) \leq \Pi_m(N_b, N_m)$).

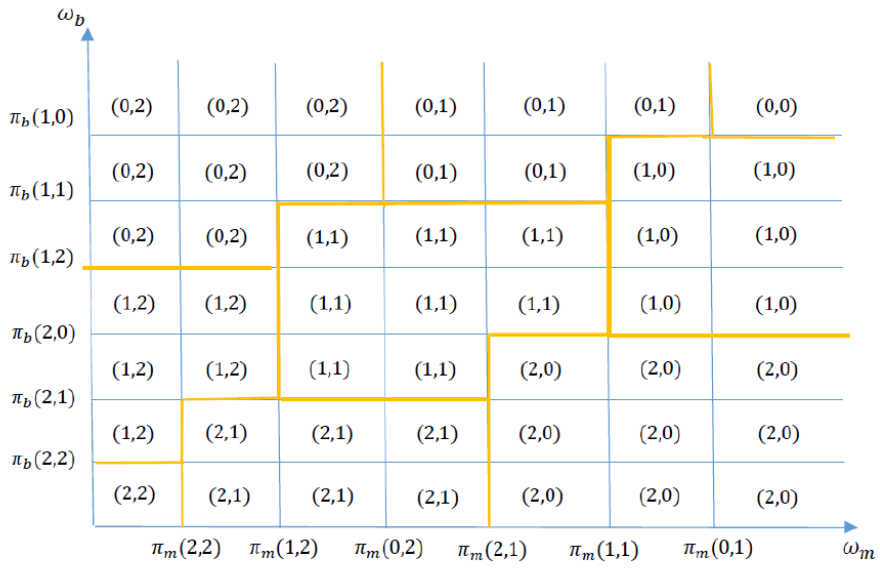

Figure 3: Substitutes case: equilibrium outcomes

A Nash equilibrium of the game exists in this scenario under the assumption that such spillovers on mainstream institutions are smaller than the effect of the entry of another competitor of the same type: $\Pi_b(N_b+1, N_m+1) < \Pi_b(N_b, N_m)$ for all N_m.

Figure 2 presents the predicted outcomes of the game for different values of (ω_b, ω_m) when there are only two competitors of each type. The outcome $\{N_b, N_m\} = \{1, 1\}$ is obtained in the area defined by the equations 22, but also in the area where the following inequalities hold:

$$\pi_b(2,0) < \omega_b < \pi_b(2,1) \tag{25}$$

$$\pi_m(2,1) < \omega_m < \pi_m(1,1). \tag{26}$$

In this area, an additional competitor of type b can enter only if there is at least one MFI in the market. But the MFI only enters the market if the type b doesn't enter. Since entry of type b reduces the profit of the MFI, an additional competitor of this type cannot enter and the result $\{1, 1\}$ is obtained.

Therefore, under this scenario, the likelihood contribution of a market with $\{N_b, N_m\}$ is:

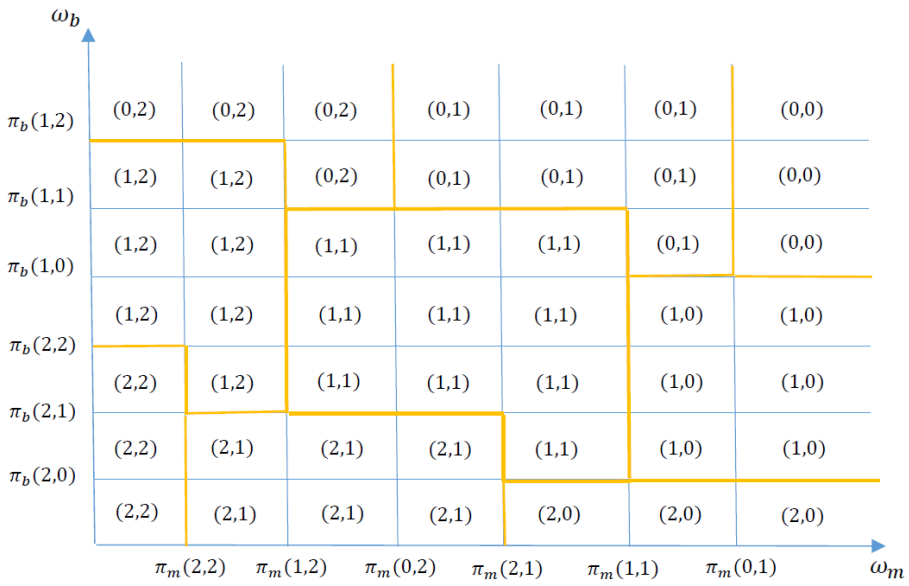

Figure 4: One-sided complementarity case: equilibrium outcomes

$$L(\{N_b, N_m\}) = \int_{\pi_b(N_b+1,N_m)}^{\pi_b(N_b,N_m)} \int_{\pi_m(N_b,N_m+1)}^{\pi_m(N_b,N_m)} f(\omega_b, \omega_m) d(\omega_b, \omega_m) + \int_{\pi_b(N_b+1,N_m)}^{\pi_b(N_b+1,N_m+1)} \int_{\pi_m(N_b+1,N_m)}^{\pi_m(N_b,N_m)} f(\omega_b, \omega_m) d(\omega_b, \omega_m) \tag{27}$$

As shown above, the assumptions on the strategic interaction among competitors of different types has consequences on the likelihood contribution attributed to each market outcome. Therefore, following the approach developed by Mazzeo (2002) I can compare the log-likelihood across models to decide which one captures better the observed strategic interaction in local markets.

4.2. Econometric Specification

The model is estimated by maximum likelihood, imposing assumptions on the distribution of the unobservable variables ω_{ij} and ε_{ij}. I assume that these variables follow a joint normal distribution and can be correlated. Correlation is also possible across different types of banks that operate in the same market.

Hence, $(\varepsilon_b, \varepsilon_m, \omega_b, \omega_m) \sim N(0, \Sigma)$, where

$$\Sigma = \left[\begin{array}{c|c} \Sigma_{\varepsilon\varepsilon} & \Sigma_{\omega\varepsilon} \\ \hline \Sigma_{\omega\varepsilon} & \Sigma_{\omega\omega} \end{array} \right]. \tag{28}$$

The individual likelihood contribution a market j where there are no competitors in the market is given by:

$$L_j(N_b, N_m) = \int_{\pi_b(1,0)}^{\infty} \int_{\pi_m(0,1)}^{\infty} f(\omega_b, \omega_m) d(\omega_b, \omega_m) \tag{29}$$

where the duplet $\{\omega_b, \omega_m\}$ is distributed normal with zero mean and variance equal to $\Sigma_{\omega\omega}$.

If there is a competitor of type $k \in \{b, m\}$ in the market, then the stock of loans for this type is competitor is observed; therefore, it is necessary to calculate the likelihood individual contribution of the market using the joint normal distribution of the duplet $\{\omega_b, \omega_m\}$, conditional on the realization of ε_{kj}. This gives rise to four different cases for the conditional variance matrix of the joint distribution function. As an illustration I will consider here the case where the number of competitors is positive for all types.

When $N_b > 0$ and $N_m > 0$, the conditional distribution of the duplet $\varepsilon \equiv \{\varepsilon_{bj}, \varepsilon_{mj}\}$ can be inferred from 16, given the observed value of (l_{bj}, l_{mj}). Hence probability of a market structure described by (N_b, N_m) is given by the following expression if types are substitutes:

$$\begin{aligned} L_j(N_b, N_m) = f(\varepsilon_{bj}\varepsilon_{mj})\Big(& \int_{\pi_b(N_b+1,N_m)}^{\pi_b(N_b,N_m)} \int_{\pi_m(N_b,N_m+1)}^{\pi_m(N_b,N_m)} f(\omega_b, \omega_m|\varepsilon_b, \varepsilon_m) d(\omega_b, \omega_m) - \\ & \int_{\pi_b(N_b+1,N_m-1)}^{\pi_b(N_b+1,N_m)} \int_{\pi_m(N_b+1,N_m)}^{\pi_m(N_b,N_m)} f(\omega_b, \omega_m|\varepsilon_b, \varepsilon_m) d(\omega_b, \omega_m)\Big), \end{aligned} \tag{30}$$

or, in the case with one-sided complementarity,

$$\begin{aligned} L_j(N_b, N_m) = f(\varepsilon_{bj}\varepsilon_{mj})\Big(& \int_{\pi_b(N_b+1,N_m)}^{\pi_b(N_b,N_m)} \int_{\pi_m(N_b,N_m+1)}^{\pi_m(N_b,N_m)} f(\omega_b, \omega_m|\varepsilon_b, \varepsilon_m) d(\omega_b, \omega_m) + \\ & \int_{\pi_b(N_b+1,N_m+1)}^{\pi_b(N_b+1,N_m)} \int_{\pi_m(N_b+1,N_m)}^{\pi_m(N_b,N_m)} f(\omega_b, \omega_m|\varepsilon_b, \varepsilon_m) d(\omega_b, \omega_m). \end{aligned} \tag{31}$$

The conditional probability density $f(\omega_b, \omega_m|\varepsilon_b, \varepsilon_m)$ is a multivariate normal density with mean equal to:

$$\mu(\omega_b, \omega_m|\varepsilon_b, \varepsilon_m) = \mu_\omega - \Sigma_{\omega\varepsilon}\Sigma_{\varepsilon\varepsilon}^{-1}\left(\varepsilon - \mu_\varepsilon\right), \tag{32}$$

where $\mu_\omega = \mu_\varepsilon = 0$, and variance $\Sigma_{\omega|\varepsilon}$:

$$\Sigma_{\omega|\varepsilon} = \Sigma_{\omega\omega} - \Sigma_{\omega\varepsilon}\Sigma_{\varepsilon\varepsilon}^{-1}\Sigma_{\omega\varepsilon}. \tag{33}$$

Identification of the elements of the variance-covariance matrix is possible given the restriction on the population coefficient, which is set to be equal to one.

4.3. Measures of competition intensity

One measure of the competitive interaction proposed by Bresnahan and Reiss (1990) is the entry thresholds ratio. This is the change in the size of market necessary to sustain an additional competitor. The changes in the entry thresholds across different market structures is informative about the nature of competition among the different types of loan providers. To illustrate, consider the minimum size of market necessary to sustain a MFI, given that there is mainstream institution already in the market. For such market size, $\hat{S}_{mj}$ the following conditions must hold:

$$\begin{aligned} \Pi_{mj}(1,1) = \mu_m(1,1)R_m(1,1)\hat{S}_{mj} - F_m(1,1) = 0 \\ \hat{S}_{mj} = \frac{F_m(1,1)}{\mu_m(1,1)R_m(1,1)} \\ \ln \hat{S}_{mj} = \ln(F_m(1,1)/\mu(1,1)) - \ln R_m(1,1). \end{aligned} \tag{34}$$

Therefore, the entry threshold ratio for a MFI given that there is a mainstream institution already operating in the market can be calculated as:

$$\ln\left(\frac{\hat{S}_{mj}(1,1)}{\hat{S}_{mj}(1,0)}\right) = \theta_m(1,1) - \theta_m(1,0). \tag{35}$$

Next, I calculate the changes in profit generated by the entry of a MFI as a percentage of the markup that the mainstream bank would have obtained as a monopolist in a market, as well as the effects on the supply of loans (market expansion). Using equation 7 the markup drop is calculated as,

$$\ln\left(\frac{(\mu_{bj}(1,1)/f_{ij})}{(\mu_{bj}(1,0))/f_{mj})}\right) = \delta_b(1,1) - \delta_b(1,0). \tag{36}$$

Where $\delta_b(1,0) = \theta_b(1,0) - \alpha_b(1,0)$. Similarly, the effect of entry on the local supply of loans per capita can be estimated as:

$$\ln\left(\frac{l_{bj}(1,1)}{l_{bj}(1,0)}\right) = \alpha_b(1,1) - \theta_b(1,0). \tag{37}$$

5. Data and summary statistics

Since the public bank is the oldest institution in the market, available in almost all towns in the country, I consider its presence as an exogenous characteristic of the market[10]. Therefore, I restrict my analysis to the competitive interaction among private competitors. Based on the composition of the portfolio and the regulation that applies for each financial institution I classify loan providers into two categories: i) mainstream banks an other regulated financial institutions[11] and ii) MFIs. The last category includes all private regulated institutions whose share of microcredit loans exceeds 60% of their loans portfolio and the two biggest microfinance non profit institutions that operated in Colombia in December 2014[12].

Table 1 presents some characteristics of the loan providers of each type. There are 43 mainstream financial institutions and 6 MFIs. The latest are particularly important in the provision of microcredit. The share of the market for this type of institutions reaches 40.33% of the total stock of microcredit.

MFIs have a significant number of employees and branches, consistent with their strategy of intense monitoring. In contrast, some of the products offered by mainstream banks are less intensive in terms of employees and branches, as clients make use of virtual transaction channels and monitoring is less frequent in the presence of collateral. The differences in the credit risk management strategies is also shown in some indicators of credit risk of the microcredit portfolio of different types of competitors. The share of non-performing microcredits is higher for mainstream banks (8,06%) than for MFIs (4,47%). Similarly, the loan loss provisions ratio is higher for MFIs institutions than for mainstream banks or the public bank, suggesting that the former institutions are better at managing credit risk for this type of loans.

5.1. Markets

I use a cross-sectional data set that contains information from 953 cities and towns in Colombia (from a total of 1102) in December 2014. The number of branches and the value of the loan portfolio of all financial institutions are published by Superintendencia Financiera, while the demographic variables per market are taken from the Municipalities Panel Data Set from Universidad de los Andes, which contains information from several official sources.

[10]While this institution is an important provider of microcredit in Colombia, there are important differences with respect to other MFIs. Most of its loan operations are covered by a public insurance that is subsidized by the government, which translates into significant differences between the default rate of this bank compared to the one of other MFIs. Furthermore, these operations are mostly funded with public resources or mandatory investments from other financial institutions

[11]Financial institutions that do not participate in the retail loan market are excluded, as well as government development agencies, credit unions and other associations that provide credit.

[12]I include these two institutions because the size of their portfolio is similar to that of the banks specialized in microcredit. Furthermore, these institutions share information with credit score agencies and offer similar products to those offered by regulated institutions specialized in this niche. Other institutions that are not included due to unavailability of information provide less than 8% of microcredits

Type/Niche	Mainstream banks	Microcredit	Public Bank
Competitors	43	6	1
Markets with at least one branch	843	271	617
Employees	6573	1844	2465
Total share of the market	0.9531	0.0152	0.0317
Share of market - Microcredits	0.1232	0.4033	0.4735
Share of microcredit - own portfolio	0.0541	0.9874	0.6781
Non performing loans	0.0806	0.0447	0.0835
Provisioning ratio	0.9327	0.9732	0.8534

Table 1: Descriptive Statistics of Competitors per Type

Market Definition: I define a market as a group of administrative municipalities that fulfills two characteristics: its population is below 100.000 inhabitants, and the distance to the closest urban center is larger than 40 kilometers[13]. If two or more municipalities are less than 25 kilometers apart from each other, they are considered as a single market, whenever the total population is below 130000. I obtained 538 markets, 427 of which are single towns or cities. In terms of participation in the total stock of loans and deposits in the country (including regulated institutions and non profit organizations), these markets account for $6,7\%$ and $6,1\%$ respectively. Despite the limited share in the total portfolio of mainstream financial institutions, this sample of markets concentrates a significant proportion of the Colombian population (37.4%), as well as the majority of the stock of microcredits ($59,7\%$).

I include in the model some variables may help to predict the size of the market and individual demand for credit, such as population, income per capita, distance to the closest urban center, share of population under the poverty line, share of the GDP from agricultural activity, and presence of the public bank. Table 2 presents summary statistics of the main variables in 2014. The markets included in my sample are greater than the ones used by Bresnahan and Reiss (1990) and Schaumans and Verboven (2015) in terms of population; however, the number of competitors is small, which suggest that entry thresholds are higher for this industry. Furthermore, descriptive statistics on the distance between markets and their closest urban center, as well as on the total number of competitors, suggest that markets are mainly non-urban areas, where overlapping of markets is not very likely.

Table 3 presents descriptive statistics on the average number of competitors, branches and portfolio composition per market for three groups of markets based on the population size. While the number of branches and competitors increases with market size, the loan portfolio of mainstream institutions and MFI does not change significantly as the market size increases. Finally, the deposits-loans ratio is higher for mainstream loan providers than for MFIs. For the first group the stock of deposits doubles the stock of loans in two of the markets categories, while for MFIs, the ratio is around 10%. This suggests that

[13]This distance corresponds to the shortest path between towns using the current road network, provided by Open Source Routing Machine Project.

Statistic	Mean	St. Dev.	Pctl(25)	Median	Pctl(75)
Adult population	19,431.30	17,671.79	8,108.85	14,293.50	23,909.50
Rural population (percentage)	0.59	0.20	0.45	0.61	0.75
GDP per capita (US PPP)	12,423.91	11,277.48	6,503.35	10,748.81	14,692.28
Population in poverty (percentage)	47.86	19.08	33.62	46.25	60.64
Agricultural GDP (percentage)	0.27	0.18	0.13	0.24	0.37
Industry GDP (percentage)	0.29	0.18	0.17	0.26	0.40
Services GDP (percentage)	0.44	0.17	0.33	0.45	0.56
Distance to closest urban center (km)	115.90	217.99	63.64	94.40	132.11
Theft from stores (events per 10000 inhabs.)	1.64	2.38	0.00	0.93	2.35
Competitors	2.85	2.91	1	1	2
Mainstream banks	0.97	2.14	0	0	1
MFIs	0.44	0.72	0	0	0
Public Bank	0.79	0.41	1	1	1

*The sample contains 538 markets

Table 2: Descriptive Statistics of the markets

the revenue for this group of institutions relies on the interest payments of the local stock of loans, while mainstream banks use the deposits obtained locally to fund investments elsewhere.

	$I-2014$	$II-2014$	$III-2014$
Mainstream financial institutions			
Competitors	0.37	1.48	4.56
Branches	2.16	3.95	7.97
Commercial loans (share)	0.39	0.34	0.35
Mortgages (share)	0.13	0.13	0.14
Consumption loans (share)	0.43	0.47	0.46
Microcredits (share)	0.05	0.05	0.05
Deposits-loans ratio	2.035	1.4370	2.1360
MFIs			
Competitors	0.05	0.44	1.56
Branches	1.31	1.43	2.21
Microcredits (share)	0.99	0.99	0.97
Deposits-loans ratio	0.0921	0.0808	0.1022

I: Less than 20000 inhabs., II: Between 20000 and 60000 inhabs., III: More than 60000 inhabs.

Table 3: Characteristics of competitors per type of market (averages)

5.2. Market Structure

The market structure is described by the number of competitors of each type that operates in a market (excluding the public bank). Table 3 presents a summary of the market structure in credit local markets in 2014: 311 out of 538 markets have no competitors, and it is more likely to observe a mainstream bank, rather than a MFI, acting as a monopolist. The first group of competitors are monopolists in 33 markets, while the number of markets with a MFI as monopolist was 43.

MFIs (N_m) / Other competitors (N_b)	$N_b = 0$	$N_b = 1$	$N_b > 1$	Total
$N_m = 0$	311	43	20	374
$N_m = 1$	33	28	74	135
$N_m > 1$	1	2	26	29
Total	345	73	120	538

Table 4: Market Structure in 2014 (number of markets)

5.3. Government Intervention

The Colombian government has developed an extensive program aimed to increase the access of low income population to financial services. As part of this strategy, the government has offered economic or technical support to financial institutions in order to promote entry in some small towns and low income neighborhoods in bigger cities. Therefore, I include a dummy variable that takes the value of 1 if the government has implemented any of these measures in the market during the period 2007-2014.

6. Results

Table 5 presents the results of the estimation of the model described in equations 15, 16 and 17 under different assumptions about the competitive interaction across types[14].I include variables that capture the economic and demographic characteristics of the market, such as distance to closest urban center, share of the population in rural areas, income per capita, number of companies in the market in all specifications , etc. Appendix 1 contains the full estimation results. I will focus here in the effects of entry of different types of loan providers on the loan supply, markup and overall profit. To facilitate interpretation the competitive effects on markup, loan supply and profit are presented as a proportion of the value that would have been obtained if the institution would have been a monopolist in the market.

The magnitude and signs of the coefficients are similar between the two specifications. However, when the types are assumed to be substitutes, I find that the effect of MFIs on the profit of mainstream loan providers (first column) is very close to zero, i.e., the the profit of a mainstream bank is almost the same after the entry of a MFI. In contrast, I find that the profit of a mainstream loan provider is significantly greater when a MFI enters the market in the model that assumes one sided complementarity across types. This result indicate that the restriction imposed on this parameter is binding. Furthermore, the log-likelihood levels for the two models suggest that the specification that assumes one-sided complementarity achieves a better fit to the data. Therefore, I will focus in the results from this later model (Columns 3 and 4 of Table 5).

[14]Standard errors are calculated using the delta method

The first section of Table 5 contains the estimated value of markup for different market structures, relative to the one that would have been obtained in a monopoly scenario, for the two types of competitors. The new markup of mainstream providers is 52% the monopoly level if another competitor of the same type enters the market, while in the case of MFIs the profit after the entry of another MFI is just 24,3% the monopoly level. This result indicates that MFIs' profit is more sensitive to the entry of a competitor of the same type, compared to mainstream banks.

	Substitutes		One sided complements	
	(Mainstream Banks)	(MFI)	(Mainstream Banks)	(MFI)
Markup after entry relative to monopolist level				
Mainstream banks	0.5517**	0.9482	0.5405**	0.9583
	(0.018)	(0.0334)	(0.0162)	(0.0335)
MFIs	0.9331**	0.2499**	1.0707**	0.2527**
	(0.0078)	(0.004)	(0.0074)	(0.0032)
Loan supply after entry relative to monopolist level				
Mainstream banks	1.0848**	1.0111	1.0809**	1.0114
	(0.0158)	(0.0159)	(0.0163)	(0.0174)
MFIs	1.0716**	1.2359**	1.0682**	1.2408**
	(0.0185)	(0.0248)	(0.0222)	(0.0311)
Profit after entry relative to monopolist level				
Mainstream banks	0.5984**	0.9633	0.5842**	0.9696
	(0.0149)	(0.0299)	(0.0144)	(0.0301)
MFIs	0.9999	0.3089**	1.1438**	0.3135**
	(0.0254)	(0.0079)	(0.0334)	(0.0094)
Log-likelihood	968.5722	968.5722	925.6567	925.6567

Standard errors in brackets
'**' and '*' indicate whether the new value differs significantly from 1 (1% and 5% significance level.

Table 5: Effects of entry on profit, loan supply and markup

The second section of Table 5 presents the effect of different market structures on loan supply (measured as the value of the stock of microloans per capita). The results indicate that the presence of competitors of both types contributes to larger loan supply, even after controlling for observed and unobserved characteristics of the market. The magnitude of this effect on the loan supply of MFIs depends of the type of competitor present the market: there is no significant difference in the loan supply if there is one mainstream institution, compared to the benchmark case of monopoly. In contrast, the loan supply is 24,08% larger that in the benchmark scenario if there is another MFI in the market. These results indicate that the presence of mainstream institutions do not contribute to the market expansion of the segment of clients that are relevant for MFIs. This is an expected result, given that MFIs focus on potential clients that are often considered as not eligible by traditional banks.

In contrast, the loan supply of mainstream institutions is greater than in the monopoly cases in market with competitors of any type. This is an interesting result, given that MFIs specialize in a segment of the population that is not targeted by mainstream banks due to credit risk considerations, and it is consistent with the argument that MFIs facilitate the access of higher risk clients to traditional banking services.

How much of this expansion is directed towards new clients is a question that deserves further exploration. With the data available here I can only provide an indirect answer. If greater indebtedness of existing clients translates into higher materialization of credit risk, or additional costs in order to achieve expand the stocks of loans or deposits (additional advertising, higher remuneration for deposits or lower interest rates for loans), then the markup of of mainstream banks should decrease after entry of MFIs. I find instead that the markup is higher after entry of MFIs; therefore, mainstream institutions seem to be more profitable in markets where there is at least one microfinance institution in the market.

The results obtained under a more flexible specification for the competitive interaction across types, defined by equations 10 and 12 are shown in Table 6. The direction of the changes on markup and loan supply after entry are consistent with the ones presented in table 5. However, the effect of entry of the first MFI in the market on the loans supply of mainstream banks is different from the one related to subsequent entrants. While the first competitor of this type generates significant market expansion, the effect of entry of additional competitors becomes not significant. These results are consistent with greater competition in markets with a higher number of competitors. As loan providers compete to attract new clients, there is an increased pressure to extend their services towards clients with higher default risk, or to incur into higher advertising expenditures in order to achieve greater indebtedness (or deposits) from low risk clients. The higher risk may translate into lower payments from interests if it materializes, reducing the markup.

Now I look further into the competitive interaction of financial institutions in different types of markets, according to population size. The effect of entry on markup and loans supply are shown in Table 7. The results indicate that MFIs are more effective at generating market expansion in small markets, while the opposite occurs in bigger markets, where loan supply expansion is greater after entry of mainstream institutions[15]. Furthermore, I find that in the case of mainstream loan providers, the markup drop is smaller after entry of competitors of the same in small markets. This indicates that competitive interaction is less tough than the one observed in larger markets, where the markup after entry is just 0.38 times the monopolist level.

6.1. Changes in market structure after modifications of the usury rate

The modifications in the calculation of the usury rate for microcredit in 2008 and 2010 translated into a significant rise of the average interest rate charged by both, mainstream institutions and MFIs, for this type of loans, as shown in Figure 1. The subsequent

[15]In these markets, there is at most one MFI, therefore, I am not able to identify the parameters that capture competitive interaction among competitors of this type

increase of the scale of operation of MFIs, in terms of the stock of loans and the size of their branching network indicates that under the new interest rate cap scheme these institutions have been able to cover the additional costs of reaching higher risk clients who only had access to informal funding sources, typically onerous. Furthermore, the increased scale of operations have allowed them to fulfill the capital requirements needed to operate as banks, which has opened to them the possibility of capturing deposits from the public and access to mechanisms that prevent liquidity shortages (interbank market and central bank as lender of last resort). On the other side, mainstream loan providers have started to offer financial services for the low income segment of the population such as microcredits and small-amount credit cards in latest years. These changes are likely to have a significant impact in the competitive interaction between mainstream institutions and MFI, as well as their ability to generate market expansion. The structural model that I propose here allows to gather evidence of the changes that the regulatory measure may have generated on market structure.

Table 8 compares the results for 2007, one year before a new ceiling for the microcredit rate, fixed at 34%, was introduced, with those for 2010, months before the new ceiling was removed and replaced for a cap that is calculated as 1.5 times the average interest rate charged by financial institutions[16]. The first two columns of Table 8 show that there was no significant interaction among mainstream loan providers and MFIs, since both the estimated markup and the loan supply are similar to the ones that would have been obtained under monopoly. This result is consistent with the fact that mainstream institutions' portfolio of services for low income clients was very limited. Moreover, most of the institutions that offered microcredit were non profit institutions that did not report payment information of their clients to credit agencies, which may have made it more difficult for mainstream institutions to have access to payment information from their clients.

There is a significant change in the competitive interaction of MFIs between 2007 and 2010, after they where allowed to charge a higher interest rate for microcredits. The markup drop after entry of another MFI was smaller than the one observed in 2007, suggesting less intense competition than the one evidenced in 2007, while the effect of entry on loan supply seems to be larger, indicating that MFIs where able to generate greater market expansion in this period. Comparing the results for 2010 and 2014, when the interest rate cap for microcredit started being calculated as 1.5 times the average rate of the niche, we can see that the estimated effect of entry of a MFI on the loan supply of other competitors of the same type is larger for the latest year, while the markup after entry is smaller, indicating greater competition among this type of loan providers.

[16]I estimate the model that assumes sustituibility and one sided complementarity and chose the one with the higher log-likelihood in each case. In both years, the later assumption seem to capture better the interaction across types

	(Mainstream Banks)	(MFI)
Markup after entry relative to monopolist level		
First Mainstream bank	0.442**	0.8036
	(0.0341)	(0.1926)
Additional Mainstream bank	0.3528**	0.7239
	(0.0319)	(0.2134)
First MFI	1.1782**	0.2532**
	(0.0837)	(0.0716)
Additional MFI	0.9455	0.1690**
	(0.1009)	(0.017)
Loan supply after entry relative to monopolist level		
First Mainstream bank	1.3853*	1.1783
	(0.2898)	(0.2632)
Additional Mainstream bank	1.4787*	1.2079
	(0.3417)	(0.3021)
First MFI	1.1295**	1.3907*
	(0.0615)	(0.3004)
Additional MFI	1.0742	1.3746
	(0.1315)	(0.3672)
Profit after entry relative to monopolist level		
First Mainstream bank	0.6118**	0.9469
	(0.0713)	(0.2621)
Additional Mainstream bank	0.5216**	0.8744
	(0.049)	(0.2899)
First MFI	1.3307**	0.3521**
	(0.0803)	(0.0782)
Additional MFI	1.0156	0.2323**
	(0.1047)	(0.0253)

Standard errors in brackets
'**' and '*' indicate whether the value after entry effect differs significantly from 1 (1% and 5% significance level).

Table 6: Effects of entry on profit, loan supply and markup under flexible especification

Type of institution	Less than 30000 Inhabs. Mainstream	MFI	More than 30000 Inhabs. Mainstream	MFI
Markup after entry relative to monopolist level				
Mainstream	0.7171**	0.7396**	0.3822**	0.8082**
	(0.1354)	(0.1258)	(0.0858)	(0.0673)
MFI	0.9554	-	1.0607	0.6158**
	(0.0635)	-	(0.0908)	(0.1251)
Loan supply after entry relative to monopolist level				
Mainstream	1.1235**	1.0814	1.2768**	1.0497**
	(0.0415)	(0.0643)	(0.0278)	(0.0335)
MFI	1.2567**	-	1.0350	1.1538**
	(0.0878)	-	(0.0265)	(0.0207)
Profit after entry relative to monopolist level				
Mainstream	0.8056**	0.7998**	0.4879**	0.8483**
	(0.1154)	(0.0558)	(0.0558)	(0.0673)
MFI	1.2006**	-	1.0948	0.7105**
	(0.0873)	-	(0.0808)	(0.0951)

Standard errors in brackets
'**' and '*' indicate whether the value after entry effect differs significantly from 1 (1% and 5% significance level).

Table 7: Competitive interaction of loan providers in different markets

	2007 Mainstream	MFI	2010 Mainstream	MFI
Markup after entry relative to monopolist level				
Mainstream	0.6348**	0.9733	0.5294**	0.9775**
	(0.0339)	(0.0431)	(0.0351)	(0.0171)
MFI	1.0338	0.1638**	0.9873	0.3538**
	(0.0265)	(0.0351)	(0.0718)	(0.0091))
Loan supply after entry relative to monopolist level				
Mainstream	1.1243**	0.9835	1.0635**	1.0575**
	(0.0158)	(0.0458)	(0.0097)	(0.0211)
MFI	1.0047	1.0873**	1.0385	1.1334**
	(0.0235)	(0.0362)	(0.0283)	(0.0432)
Profit after entry relative to monopolist level				
Mainstream	0.7137**	0.9572	0.5630**	1.0358**
	(0.0301)	(0.0441)	(0.0241)	(0.0128)
MFI	1.0387	0.1781**	1.0253**	0.4009**
	(0.0251)	(0.0341)	(0.0442)	(0.0223)

Standard errors in brackets
'**' and '*' indicate whether the value after entry effect differs significantly from 1 (1% and 5%).

Table 8: Competitive interaction of loan providers in different markets

7. Final Remarks

The model presented here allows to measure the impact of entry of MFIs on the profit of incumbent formal financial institutions in geographic isolated markets. The results indicate that these institutions are able to generate market expansion that benefits all competitors in the market. Furthermore, I find that size of these spillovers exceeds the business stealing effect, generating therefore, an increase on the profit, particularly in rural markets. If these expected gains materialize in entry of mainstream lending establishments in isolated markets, then MFIs would contribute to the consumer welfare by facilitating access to financial products that are beyond their own portfolio. This new insight about the competitive interaction among MFIs and other formal loan providers could help in the design of policies oriented towards financial inclusion.

The model I presented also provides insights about the toughness of competition in the retail banking industry in Colombia and how it has changed during recent years after the relaxation of the interest rate cap that applies for microcredit. I find that microfinance institutions have increased their ability to generate market expansion after the relaxation of the interest rate cap applied to microcredits in 2007 and 2010. The result indicates that the presence of an interest rate cap hindered the possibility to offer financial services to low income segments of the population and might have reduced competition among loan providers. The magnitude of the effect is hard to interpret, since there have been important technological and regulatory changes that might have had also an effect in the competitive interaction among competitors in the retail banking industry. In order to disentangle these effects it is necessary to introduce additional structure on the profit function of the loan providers.

One limitation of my approach is the impossibility to identify the mechanisms behind the positive spillovers associated to the entry of MFIs. Although they could be associated with the creation of information about payment behavior that becomes available for other institutions, there are alternative explanations. One possibility is that the interaction with MFIs help clients to increase their levels of financial literacy and awareness or trust in formal institutions, which may lead them to demand more products offered by mainstream financial institutions, particularly those related with deposits. Finally, the timely access to funding is likely to have an important impact on the rate of success of productive projects, translating into sustained improvements in the economic conditions of clients, which would allow them to demand other types of financial services in the future. Exploring these alternative mechanisms requires more detailed information about the portfolio choices of the consumers in those markets over time, and therefore it is left for future research.

One important factor that affect the competitive interaction in the retail banking industry and the supply of microcredit is technological change, in the form of virtual and mobile channels that facilitate the access to financial products without a traditional 'brick and mortar' branch. These innovations are likely to have an important impact in the way competitors interact in these markets and represent a challenge for econometricians and policy makers, since accurate measures of competition need to take into account the potential interaction of competitors across markets and platforms. In Colombia, most of these

innovations are still not available in small remote towns, and the presence of a traditional branch continues being necessary for the provision of loans, particularly in the case of microcredit, since most of the specialized loan providers perform close monitoring of the clients ventures. However, important steps have been taken both by the government and the private sector in order to facilitate access to financial services in the absence of traditional branches, which highlight the need to study the strategic complementarities among transaction channels and their effect on the competitive interaction among loan providers.

Moreover, the use of virtual and mobile transaction channels for capturing deposits and perform transactions have important consequences on the relations between the deposits and the loan market that I have not taken into account in this paper. So far, the banking industry has been faster at developing interaction platforms that facilitate the use of deposits, than at implementing tools that facilitate remote monitoring of credit risk, particularly in the case of microfinance. As highlighted by Aguirregabiria et al. (2012), these differences have a significant impact in the way that loan providers obtain funding for their operations, exposing financial institutions to different degrees of geographical risk, and may ultimately reduce the possibility of consumers in far locations to get loans, as financial institutions might find it profitable to concentrate their loan operations in the biggest markets.

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Appendix

Tables 9 and 10 present the complete results of the structural model. Table 9 presents effects on the overall profit for different types of competitors, while 10 contains the results for the loan supply equation. The coefficients of market characteristics are as expected for the two types of financial institutions. Income per capita and the share of population with formal employment have a positive and significant impact on profit for both types of loan providers, while the share of population in poverty condition has a negative impact. The share of GDP derived from agricultural activities has a negative impact on entry for mainstream institutions, while positive for MFIs, suggesting that these institutions focus on providing funding for clients in this sector.

The second part of Table 10 presents the coefficients estimated for the loan supply equation. The results suggest that there is significant market expansion after the entry of an additional competitor of either type. For both types of loan providers the effect is greater after the entry of a competitor of the same type. The results in terms of demographic characteristics of the markets are similar to those obtained for the profit equation. In this equation however, the coefficient obtained for the share of GDP related to agricultural activities, as well as the presence of a public bank, is positive for both types of loan providers.

	Substitutes		One sided complements	
	Mainstream Banks	MFI	Mainstream Banks	MFI
Mainstream banks	-0.5134**	-0.0437	-0.5374**	-0.0514
	(0.03)	(0.0334)	(0.0278)	(0.0335)
MFI	-0.0001	-1.1748**	0.1343**	-1.16**
	(0.0078)	(0.0131)	(0.0065)	(0.0101)
Rural population (share)	1.0388**	0.265**	0.992**	0.2701**
	(0.0115)	(0.004)	(0.0106)	(0.0038)
Number of firms (real sector)	0.1636**	0.0556**	0.1562**	0.0566**
	(0.0076)	(0.0082)	(0.008)	(0.0098)
Share in national GDP	-0.0989**	-0.0047	-0.0945**	-0.0048
	(0.0077)	(0.0087)	(0.007)	(0.0087)
Distance to urban center	-0.0242	-0.0102	-0.0231	-0.0105
	(0.0495)	(0.0553)	(0.0411)	(0.0488)
GDP per capita	0.4921**	0.4441**	0.4699**	0.4525**
	(0.032)	(0.0362)	(0.0282)	(0.0318)
Share of population in poverty	-0.4401**	0.5188**	-0.4203**	0.5284**
	(0.0073)	(0.0067)	(0.0068)	(0.0078)
Agricultural GDP (share)	-0.8946**	0.9256**	-0.8544**	0.9426**
	(0.0169)	(0.0135)	(0.0192)	(0.016)
Robbery	-0.0301**	-0.2201**	-0.0287**	-0.2241**
	(0.0049)	(0.0054)	(0.0054)	(0.0066)
Public bank	-0.047**	0.3128**	-0.0448**	0.3185**
	(0.0137)	(0.0162)	(0.0162)	(0.0202)
Government support	-0.011	0.0612*	0.021	0.0485
	(0.0187)	(0.0262)	(0.0362)	(0.0262)

Table 9: Results of the complete model: profit equation

	Substitutes		One sided complements	
	Mainstream Banks	MFI	Mainstream Banks	MFI
Mainstream banks	0.0814**	0.0111**	0.0778**	0.0113*
	(0.0054)	(0.0058)	(0.0058)	(0.0073)
MFI	0.0692**	0.2118**	0.066**	0.2158**
	(0.0173)	(0.0201)	(0.0208)	(0.0251)
Rural population (share)	-1.9332**	-1.7113**	-1.893**	-1.6776**
	(0.0333)	(0.0343)	(0.0319)	(0.0329)
Number of firms (real sector)	0.6814**	0.298**	0.6851**	0.295**
	(0.0121)	(0.0142)	(0.0121)	(0.0158)
Share in national GDP	0.0878**	0.1659**	0.0828**	0.1741**
	(0.0032)	(0.0036)	(0.0031)	(0.0038)
Distance to urban center	-0.1268**	-0.2278**	-0.1174**	-0.2387**
	(0.0074)	(0.0083)	(0.0064)	(0.0077)
GDP per capita	-0.5013**	-0.7437**	-0.4807**	-0.7628**
	(0.0068)	(0.0071)	(0.0063)	(0.0074)
Share of population in poverty	-6.9591**	-2.2988**	-7.0173**	-2.2846**
	(0.0797)	(0.0759)	(0.0821)	(0.0839)
Agricultural GDP (share)	-0.3058**	-0.7602**	-0.2846**	-0.8165**
	(0.0267)	(0.0298)	(0.0236)	(0.0288)
Robbery	0.1057**	0.0895**	0.1032**	0.0889**
	(0.0055)	(0.0061)	(0.0054)	(0.0063)
Public bank	-0.4433**	0.3569**	-0.4693**	0.3865**
	(0.0106)	(0.0116)	(0.0097)	(0.012)
Population	0.4009**	0.4473**	0.3829**	0.4556**
	(0.0156)	(0.017)	(0.016)	(0.0183)
Government support	0.091	0.1312*	0.0871	0.1148**
	(0.0287)	(0.0571)	(0.0393)	(0.0427)
Log-likelihood	-968.5722	-968.5722	-925.6567	-925.6567

Table 10: Results of the complete model: Loan supply equation