Journal of Economics and Development Studies
December 2014, Vol. 2, No. 4, pp. 101-123
ISSN: 2334-2382 (Print), 2334-2390 (Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/jeds.v2n4a8
URL: http://dx.doi.org/10.15640/jeds.v2n4a8

Segmentation, Access to Finance Constraints and the Credit Monopolistic Power of Financial Institutions in Nicaragua

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Abstract

Access to finance has been the focus of significant interest in recent years as there are warning signs suggesting that lack of access to credit has an adverse effect on growth and poverty alleviation. Furthermore, recent studies have shown that access to finance is positively correlated with productivity and competitiveness; therefore, it is an important consideration in terms of the poverty trap evident in developing countries. Using endogenous and exogenous variables from data derived from the Living Standards Measurement Study (LSMS 2005), this paper examines a conceptual background on the basis of new statistical evidence concerning access to credit and segmentation in Nicaragua. The core contribution of this study lies in the critical revision of the main constraints in terms of increasing financial access for the broad range of Nicaraguan households. Likewise, our analysis produces new empirical indications that challenge the monopolistic power that financial institutions have in this country.

Keywords: Financial Development; Financing Constraints and Bank Concentration

I. Introduction

Strategic and academic concern about access to finance has increased in line with the growth of data supporting the analysis that a financial system available to all people is not only correlated with a strong economy, but essentially grounds economic growth (World Bank, 2012).

According to Claessens (2006), access to finance can generally be defined as the ticket to financial products and services at a rational cost. For this reason, many countries have adopted the goal of universal financial access. Since 2006, the United Nations (UN) has insisted on central banks and countries adding the goal of universal "financial inclusion" to the traditional goals of prudential regulation. In addition, they state that financial inclusion represents a shift away from the early "micro credit only" perspective to embrace an array of products and services that poor and low income people need (Bebczuk, 2009).

Despite a large and still developing literature on access to finance, there is no single measure of financial inclusion that can be applied in different countries. Although there is a huge body of literature on the finance-growth relationship, not many empirical studies exist in the area of financial access. This is due to lack of data on many access variables at the country level.

Furthermore, there is a common denominator in the dearth of empirical research of access to finance, the use of micro, small and medium-sized enterprises (MSMEs[3]) as a study variable.

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The reason why MSMEs are used is mainly because the household credit obtained tends to be channelled into financing MSME initiatives. This study uses recently available databases from the World Bank Living Standards Measurement Study (Word Bank/LSMS, 2005) to build a relationship between access to finance and segmentation in the financial markets of Nicaragua. Hence, the focus of the paper is on household credit.

According to Moll, Ruben, Mol, and Sanders (2000), there is an apparent harmonic segmentation[4] in Latin American financial markets, where formal and informal lenders seem to "co-exist" vis-à-vis the different interest rates charged by the financial institutions. Furthermore, several studies in the developing world provide evidence that household credit is more difficult to obtain when compared to that provided to outsized firms (e.g. Beck, Demirgüç-Kunt&Maksimovic, 2003 and 2005). Nicaragua is no exception as household economic activities generate 80% of the country's employment (Ministry of Commerce and Industry of Nicaragua - MIFIC, 2014). As a result, it is imperative to recognize the diverse causes that can facilitate or deter creation and development.

According to Le (2012), lack of competition, non-price-based operations, as well as lax banking policies and regulations could impair the progress of the banking sector in any developing country.

According to the Bank of Nicaragua, private enterprises contribute more than 30% of the gross domestic product (GDP) (BCN, 2011; however, they only receive less than 10% of the lending capital due to laborious lending procedures and vice distorting policy among banks, leading the actual interest rate to be higher than expected. This 10% of credit is distributed primarily for the acquisition of inventory and machinery in the case of semi-industrialized businesses. Even though the government and international development agencies have applied economic incentive programs for the promotion of financial services since 1991, as of today, it is not easy for any member of a community to obtain access to finance. The participation of micro enterprises in the financial system is incipient; according to the recent MSME survey of the Central Bank of Nicaragua (2011), only 12% of MSMEs/households reported being able to access capital.

Of the MSMEs/households that had no access to credit, 63% reported that they did not request a loan because they considered it too expensive and 37% because they feared that it would not be granted because of the variability of their income and lack of collateral.Another difficulty found in Nicaragua appears to be inefficient capital mobility, which has adversely affected further micro investment expansion. Therefore, the problem to be addressed in this research is to investigate the factors that determine access to credit. This study makes two contributions. First, it provides empirical evidence of the determinants of access to finance and segmentation. Thus, it complements the existing literature, recognizing that the majority of research studies have based their results on the usage of credit as opposed to access. Second, our assessment of credit constraints based on hard data (LSMS, 2005) has larger descriptive robustness in terms of the observations calculated than several papers written on access to finance which have used Enterprise Survey data and thus have focused only on perception measurements.

The paper is organized as follows: the next section includes a theoretical overview. Section 3 presents the country context in relation to access to finance. In section 4 the data, research methodology and variables are detailed.

The following section describes which factors influence credit availability based on discrimination, parametric analysis and a probit model. Section 6 presents the conclusions regarding credit availability.

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[3] MSMEs are categorized by the number of employees. According to the Enterprise Survey (2010) for Nicaragua a micro enterprise has 1 to 5 employees, small 1–20 employees, medium 21–99 employees, and Large 100 or more.

[4] Market segmentation involves dividing a broad target market into subsets of consumers who have common needs and priorities (Moll, Ruben, Mol & Sanders, 2000).

II. Literature Review

The significant function of the financial sector in the expansion or contraction of an economy has been documented extensively. Researchers have also identified the position of this sector in propagating real economic crises (Bernanke, 1983) and in contributing to economic growth (Rajan & Zingales, 1998). In general, the body of literature on the link between finance and growth is vast. Furthermore, the subject of access to finance has been analysed from many different points of view.

According to De La Torre (2012), a vast number of recent studies have highlighted the lack of access to finance for households. In developing countries, such studies include:

Kumar (2005) for Brazil, Srivastava and Basu (2004) for India, Atieno (2009) for Kenya, Aliou and Zeller (2001) for Malawi, Caskey, Ruiz Duran, and Solo (2004) for Mexico, Beegle, Dehejia, and Gatti (2003) and Satta (2002) for Tanzania, Bebczuk, R. (2009) for Guatemala and Nicaragua. In addition, Halac and Schmukler (2004) have provided robust indications related to lack of access to finance for various Latin American countries. Furthermore, the studies of Beck, Demirgüç-Kunt, and Maksimovic (2002), Francisco and Kumar (2004), Tejerina (2004), and Schulhofer-Wohl (2004) focused on measuring access to finance for micro and small enterprises using household-level data based on the assumption that MSMEs in developing countries are mostly represented by household business schemes. A more precise analysis of household surveys that compile data on access to financial services across countries is found in Peachey and Roe (2004) and Claessens (2006). An interesting common denominator in these studies is that among credit services, the one exception where access appears to be widening at a fast pace is consumer credit (including the micro variety).

Moll, Ruben, Mol& Sanders (2000) suggest that to explore segmentation issues in a particular country, a two-sided analysis should be adopted. For the supply side, the differentiation of products offered by the lenders should be considered and on the demand side, the characteristics of the borrowers should be analysed.

According to Bebczuk (2009) and the World Bank Financial Sector Assessment Handbook (2012), some consensus has been built around the problems in accessing credit in relation to the supply side:

- In many developing countries, the system suffers from asymmetric information syndrome, in which lenders are unable to distinguish clearly good credit from bad.
- Poor households are unable to provide the collateral that banks often require to award a loan.
- There is a lack of registered property titles, which is an extra barrier given that land cannot be used as collateral. There are several different types of property title, all of which are unclear; moreover, the cost of determining and certifying ownership can be onerous. In the case of Nicaragua, the Real Property Registry is inefficient and its information is often outdated; often it is not integrated with cadastral data (World Bank, 2012). Theory suggests that by improving information and certainty about land tenure, several benefits could be produced, particularly for smallholders for whom land is often their most valuable asset (World Bank, 2012).
- Loan evaluation, monitoring and collection involve considerable fixed costs. Hence costs are large relative to the loan volume.
- Inadequate institutional support mechanisms mean that leasing, factoring and credit guarantee funds are not aware of normal and effective channels to raise household funds (Aliou & Zeller, 2001).
- Household-level MSMEs have a priori a higher chance of defaulting. Given the low expected survival rate of MSMEs, interest rates are high because of the higher risk for the bank to recover the loan.

- Intermediation and bankruptcy costs present a barrier to finance. The spread between the deposit and the loan interest rate represents the expected cost of bankruptcy. This spread is extremely wide and is not controlled by regulators in the country.
- There is a lack of access to a reliable, cost-effective transactional technology infrastructure.
- An efficient and functioning legal infrastructure is lacking.
- On the demand side, Garegnani (2006) highlights the following issues as exerting considerable influence
- Suboptimal investment decisions: usually investors and entrepreneurs prefer to go into a business with low risk and higher profits. Indeed, given the lack of access to credit and the high interest rates for MSMEs, some are tempted not to take any risk at all (Bastiaensen & Marchetti, 2011).
- Formality and external control costs: MSMEs have to meet many accounting requirements. Therefore, they have to expend a considerable amount of time and money without the certainty of getting the credit at the end of the process. According to the Central Bank of Nicaragua (BCN, 2011), 90% of MSMEs, do not keep accounting records of their operations, 9% have some and only 1% has formal records.

In addition, several studies in international trade have also reflected that credit constraints negatively affect firms' ability both to export and import. Certain contributions have focused on distinguishing between these supply and demand effects using bank-level data (Bernanke & Blinder, 1992), firm-level data (Kashyap, Stein, & Wilcox, 1993) and bank lending survey data (Hempell& Sorensen, 2010). Based on these issues found in the literature, a specific point is addressed: access to credit and credit constraints. The slight difference in words and concepts belies the huge difference in praxis. According to Ayyagari, Thorsten, &Demirgüç-Kunt. (2007) the distinctiveness of the borrower and connection are likely to be more important determinants of collateral/commitment protection than loan and lender characteristics. Small firms principally borrow funds in the informal financial market, whereas larger firms attain funds in the formal market. In some cases, larger firms access credit in the formal market and then convey the loan to smaller firms at a high interest rate (Le, 2012). Finally, this paper contributes to the literature at the country level and addresses the policy determinants of access to finance in Nicaragua. Moreover, based on the dearth of information on financial constraints, an empirical approach is adopted to identify the impact of high interest rates on access to finance.

III. Detoxifying Access to Finance – Country Context

According to recent work completed by the Superintendent of Banks and Other Financial Institutions (SIBOIF, 2013), access to finance has been improved in Nicaragua.

Progress has been made with the creation of private credit bureaus and the rapid enlargement of the microfinance industry,[5] which has attained a loan portfolio that accounts for 16.7% of total financial system assets (as compared to 11% in 2003). However, the rapid expansion of the microfinance sector has not been accompanied by a linear regulation structure and is currently facing some stress on its sustainability. In addition, this sector has also been deterred by lack of governance, legal issues and unfavourable external economic conditions. On the other hand, the Nicaraguan banking system has undergone significant reforms since its new beginning in the 1990s. Nonetheless, many challenges remain to be addressed. Despite fundamental structural changes, the mobilization and allocation of resources by the financial sector are still limited.

The Financial Sector and Recent Performance

Nicaragua's financial system is predominantly operated by international banking groups and is extremely concentrated when compared to that of its neighbouring countries.

[5] For the purposes of this analysis, the microfinance industry is divided on the basis of microfinance service providers into three groups: (i) commercial banks with microcredit and micro savings products, (ii) regulated microcredit institutions and (iii) financial cooperatives.

Most of the financial services in Nicaragua are provided by formal institutions, including banks, finance companies, microfinance institutions, insurance companies, other smaller participants and a whole range of quasi-formal nonbank institutions. The Nicaraguan financial system is dominated by the banking sector.

Table 1. Nicaraguan Financial System Assets

Financial Entities	2010 US$ million	% GDP	% system
Banks	4,189.7	63.95	92.09
Microfinance*	233.5	3.56	5.13
Insurance companies	108.3	1.65	2.38
Bonded warehouses	11.6	0.18	0.25
Securities trading	4.4	0.07	0.10
Stock exchange	1.7	0.03	0.04
Central depository	0.3	0.01	0.01
Total	**4,549.5**	**69.44**	**100.00**

Information on microfinance institutions affiliated to the Nicaraguan Association of Microfinance Institutions (ASOMIF). Source: Authors' analysis using World Bank (2012) data based on SIBOIF and ASOMIF information.

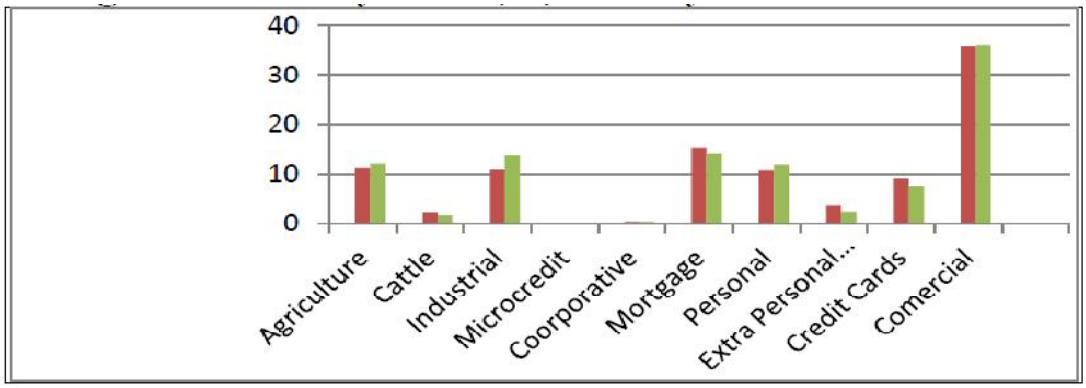
As shown in Table 1, more than 90% of the formal financial system assets correspond to the banking sector. The second most important segment is microfinance, which represents approximately 4% of GDP. Insurance companies, bonded warehouses, securities trading, the stock exchange and central bank deposits account for the remaining 6%. There is almost no information on quasi-formal institutions.

The three largest banks are in command of more than 70% of assets, loans and deposits in the financial system. Adding the following two largest banks, the five banks together control 90% of the market share. Commercial banks are important players as their assets and deposits combined reached 63.95% of GDP as of December 2010. Furthermore, the securities market in Nicaragua is one-dimensional and practically all securities (96%) are issued by the government. These figures represent an important indication of the position of financial services in the economy as they account for nearly more than two thirds of the country's GDP.

On the other hand, the microfinance industry in Nicaragua includes a diverse set of institutions that can be classified into three groups: (i) banks and finance companies that offer small and micro loans, supervised by the SIBOIF; (ii) for-profit microfinance companies and microfinance non-governmental organizations (NGOs); (iii) credit unions and cooperatives. These can all be called microfinance institutions (MFIs) in the sense that they all share a focus on the small end of the borrower spectrum, but they serve a large variety of clients. With regard to the third category, in Nicaragua, as elsewhere, credit unions tend to be small, atomized institutions that lack the expertise and economies of scale needed to operate cost effectively.

As shown in Figure 1, according to the SIBOIF (2013), loans to the commercial sector amounted to 35.84% of the total credit portfolio in 2012 and 2013. The remaining share was directed to other activities: i) productive (agriculture, cattle, industrial, microcredit and corporate) and ii) consumer (mortgage, personal, credit cards and extra personal).

Figure 1: Credit by Sector (%) for the Years 2012 and 2013



Source: Author's analysis based on the "Informe del SistemaFinancieroNacional" (SIBOIF, 2013)

Household Loans

Household loans account for only a small share of bank credit. Understanding how trends in the provision of these loans have affected firms of different sizes is difficult given the limited information available.

However, the SIBOIF recently collected data on the size of household loan portfolios defined by each institution. All banks and most finance companies presented data for 2008 to 2011. These data indicate that the total portfolio of supervised financial institutions changed very little over the period 2008–2010. Household lending represented approximately 8% of the loan portfolio and firm lending approximately 12% of the portfolio. Lending contracted slightly in the wake of the global economic slowdown, but less than other bank types of lending. Both have since recovered and were somewhat higher in 2011 than in 2008. Lack of bank competition, key deficiencies in the financial infrastructure and unclear credit norms contribute to low access to financial services in Nicaragua. When nearly 25% of micro businesses say that access to finance is a major constraint, the question is why Nicaraguan banks are not lending more to this segment. One of the most likely answers comes from evidence that Nicaragua's banking system lacks rigorous competition and thus banks are less compelled to venture into this market or any other market that requires them to invest in technology or personnel for example. Deficiencies in the financial infrastructure, particularly the lack of positive credit information sharing and an inefficient system for securing moveable property create another set of significant barriers to lending. Regulations that create uncertainty about how to evaluate and classify loans also hinder penetration. Table 2 presents some of the reasons why financial institutions and other providers of these services are discouraged from giving credit to this segment. This also shows that the majorities of businesses have found attractive investment opportunities but are unable to borrow because they consider the interest for credit and requirements too high.

Table 2. Limitations to Loan Access in Nicaragua

Business perspective	Financial institution perspective
• Loans fees are high • Interest rates are considered high • Time to process the loan application is extensive • Too many collateral requirements • Complicated bank loan requirements • Low level of training • Lack of leasing approaches	• Operating in many/most cases as informal businesses • Carry out small financial transactions, representing higher administrative expenses for financial institutions • Lack financial statements and credit records • Lack access to risk mitigation instruments • Lack assets that could be used as guarantees • Deterioration of credit culture • Legal uncertainty

Source: Authors' analysis based on FELABAN (2011)

The World Bank (2012) points out that the detection of supply- and demand-side drivers of credit constraint has implications sketched in a large body of literature on the impact of such problems on the real economy. For instance, Campello, Graham, and Harvey (2010) showed that firms when confronted by financial constraints adopt measures to cut spending on employment, technology and marketing, as well as capital expenditure.

Who has Access to Finance?

According to the World Bank composite indicator of access to finance (2010), only 6% of the adult Nicaraguan population has access to banking services. The country is at the lower limit threshold for nations with low to medium access to banking/financial services. In 2012, the total number of bank branches reached 311, showing an increase of 13 in one year. In terms of coverage or financial breadth (branches + ATMs), the indicator for the Nicaraguan banking system is 2.61 points per 100,000 inhabitants. The country is therefore below the Latin American average (23.5 points of service per 100,000 inhabitants).

Demand for and Use of Financial Services by Firms

It is difficult to grasp the universe of Nicaraguan firms due to the considerable number of informal and unregistered production units. Fortunately, the country's Social Security Institute (INSS) has been making an effort to track a larger number of firms. While the data presented have many shortcomings, they suggest some interesting patterns. According to this database (Table 3), the majority of Nicaraguan firms operate informally (82% do not pay taxes nor are they registered in INSS). According to the Central Bank of Nicaragua (BCN, 2011), 90% of the Nicaraguan firms are not even registered in the Unique Tax System. Among the formal firms, small and micro enterprises account for more than 17% of the total, while medium-sized and large firms represent slightly more than 1%. Taking into consideration the significance of the informal sector of the Nicaraguan economy, a study based on the LSMS is more robust in terms of checking on the determinants of access to finance than a study using data from enterprise surveys conducted with small samples.

Table 3. Formal/informal MSMES in Nicaragua

Formal Businesses (INSS)	Number of firms	Number of employees	Main financing sources
Large	1,133	396,750	Local and international banks
Medium	2,390	125,393	Private banks and cooperatives
Small	12,913	156,304	Some private banks and cooperatives
Micro	35,824	78,502	MFIs, NGOs and financial companies
Informal	237,000	n.a	NGOs, informal lenders, credit cards
Total number of businesses	289,260		

Source: Authors' analysis based on INSS (2011)

IV. Methodology

Most of the studies on access to credit in Nicaragua rely on data drawn from the Enterprise Surveys conducted in 2006 and 2010 or on micro data provided by the LSMS (2005). The main constraint of the Enterprise Surveys is that they do not provide hard data for informal firms, despite the size of the informal sector in the Nicaraguan economy. Therefore, the Enterprise Survey measurement for the determinants of credit availability is rather limited. In contrast, the LSMS dataset covers a very large sample of households and the content of the questionnaire is very closely linked to the objectives of this research. Thus, the rationale for using the information from household surveys rather than enterprise surveys in this study is based on two reasons: the lack of sufficient information in the Enterprise Surveys to undertake an analysis on the demand side and the lack of information concerning the decision-making nature of micro, small and even medium-sized enterprises in Nicaragua.

In addition, the LSMS is used because it has national statistical representativeness in all geographical regions of Nicaragua (Pacific, Central and Atlantic),[6] as well as in rural and urban areas. In the development of the theoretical framework, empirical studies that include data and methodological approaches useful for the statistical testing of bank concentration and the credit market were identified. Kruger (2007), Narvaez and Meza (2010) and Chica (2007) used the LSMS to calculate the demand for a good as well as to determine impediments to welfare measurement.

It is very important to emphasize the idiosyncratic characteristics of the country. According to the LSMS (2005), decision-makers in the credit market are highly influenced by the family context and this influence is so great that it is very difficult to separate business management from the household economy. According to the BCN (2011), micro enterprises are usually owned by households. MSMEs represent the highest concentration of small establishments in the capital city of Managua at 34.1%, the remaining 65.9% being located in the rest of the country (16 departments). In addition, the BCN(2011) reported that MSMEs have a relative number of persons employed: 50.8% accounted having two to three employees, 39% only one and 10.2% had four to six workers.

Descriptive Statistics

Since the first LSMS publication in Nicaragua in 1993 and subsequent publications in 1998, 2001, 2005 and 2009, its sections have not changed to any great extent. The main information provided by the surveys include: housing characteristics, utilities, demographics, health, education, economic activities, basic food consumption, income and household assets, among others. However, the latest study, conducted in 2009, did not include a credit section, which usually corresponded to section IX of the previous surveys. Thus, in this study the LSMS (2005) is used.The 2005 survey has a sample of 6,882 households and 36,612 people nationwide. Accordingly, this allows us to extrapolate the results of 5,142,098 million people represented in the last Nicaraguan census published in the same year.

The LSMS sections mainly used in this study are: section II on the composition and characteristics of households, section V, which refers to economic activities, and section IX on access to credit. The LSMS (2005) was conducted nationwide and Table 4 presents the descriptive statistics used in the analysis of this study.

Table 4. Descriptive Statistics

Statistical measure	Monthly income	Annual interest rate	Years of education	Age	Family income
Obs.	117195	117195	117195	117195	86808
Mean	4346.63	76.31	7.55	42.57	10188.32
Std. Dev.	7536.54	171.76	5.12	11.73	36664.05
Variance	56,800,00.00	29500.81	26.25549	137.53	1,340,000,00.00
Skewness	12.46	5.56	0.24	0.51	8.523609
Kurtosis	208.21	35.14	2.08	3.30	78.6135

Source: Authors' calculations based on the LSMS (2005)

The average income of an individual in terms of the credit demand is C$4,346.63. In addition, this individual has a family income of C$10,188.32. In this sense, all the variables show a high degree of variability, so the proposed model takes into account a possible credit market segmentation caused by the credit-providing institutions.

[6] INIDE (2007) General Household Survey Report for measuring the standard of living.

Only 25% of the total households in Nicaragua received at least one loan during the year, of which 64% were taken out by the head of household. Furthermore, of the credits received, over 30% were obtained from informal credit lines (individuals, friends, neighbours or relatives), followed by 22.76% of loans provided by financial institutions (including microfinance). On the other hand, the participation of private banks in the household loan portfolio reached only 5%. This provides strong evidence that household access to highly formal credit is almost nil, as seen in Table A appendix 3.In total, 37% of the loans were used for household consumption and 28.06% of credits were used for primary production materials, business investment and purchase of vehicles or machinery. The remaining 35.25% was channelled to emergencies or illness, housing, or buying household goods, inter alia, as shown in Table B Appendix 3.

Of the loans given, 58% were in the urban area. In gender terms, 52% of the loans were drawn by women, although this differs by area of residence. For example, in rural areas 60% of loans were received by men and 54% of the informal credits were received by men.

In both cases, for men and women, higher frequencies revealed that the main use of their loans was categorized as consumer loans. Furthermore, 14.38% of the loans obtained by men were for agricultural activities, while in the case of women most were to buy trade merchandise.The credit uses involving the lowest transaction costs (registered expenses and commissions) were for buying vehicles. However, in percentage terms of the amount invested, agricultural activities had the higher costs as shown in Figure 2 Appendix 4.

Estimation Approach

Microeconomic theory begins from certain functional forms that describe consumer preferences and tastes, assuming these are complete, transitive and continued (Nicholson, 2002).[7] Therefore, to study the determinants of demand, an analysis of tastes and preferences based on which individuals make choices and measure their satisfaction contrasted with the amount consumed in a given basket of goods is performed. This inquiry is represented by a utility function. The choice of how much to consume is given when the utility function interacts with the budget constraint (i.e. the consumer's available income to buy different goods in the basket). Thus, in a maximization process, an optimum consumption point for each good in the basket can be reached. Figueroa (2011) presented an extended a broad theoretical framework of models predicting that the bank credit market works on the basis of collateral and rationing as shown in Table C in Appendix 3. The table refers to a large number of studies that applied statistical verification of hypotheses using as the theoretical anchor an empirical approach. Hence, for this study, a logically empirical framework is derived and a particular model is developed. According to Nicholson and Snyder (2011), one method for solving constrained maximization problems is the Lagrange multiplier. This involves an excellent mathematical method that is very useful in a variety of economic circumstances. This method starts by setting up the following Lagrangian expression:

$$(1)\ \mathcal{L} = U(x_1, x_2, \ldots, x_n) + \lambda(m - P_{x_1} - P_{x_2} - P_{x_3} - \ \ldots - P_{x_n})$$

By using the Lagrangian method (L), a utility function U (x_1, x_2, …, xn) subject to a budget (m-P_ (x_1)-P_ (x_2)-P_ (x_3) - ...-P_ (xn)) can be maximized.

Furthermore, by considering the primal problem, the optimal consumption of each good x_1 ^ *, x_2 ^ *, …,xn ^ * can be generated. This allows the consumers to obtain the greatest possible satisfaction given their income as, according to Nicholson and Snyder (2011), the optimal consumption is a function of income and the price of each good respectively (based on the Marshallian demand function).

[7] Axioms of rational choice.

Hence, the index and parameters of the model are defined as follows:

Index
i: is a set of goods from 1 …. to….. n.
Parameters
X: is a decision variable which defines the amount of credit.
P: represents the interest rate.
m: represents the income.
U: is the set of loans.
£: represents the Lagrange multipliers.

Nicholson and Snyder's (2011) assumed that the amount consumed by the individuals went through the process of maximization and consumption, which is reflected in a survey itself. Therefore, the optimal consumption of the good is prearranged by the primal problem. From this, the points of consumption of the individuals reveal their utility function and therefore their preferences given their income and the prices of all the goods in the basket. Finally, to estimate these parameters, the model utilizes the consumer surplus and the revealed preferences to observe their utility functions indirectly and calculate the welfare changes that affect consumer satisfaction with respect to shifts in prices or income. The LSMS contains relevant information on access to finance. It presents information for rural and urban areas and it also reveals the amount of a loan that an individual obtained from a given source. According to the neoclassical school of economics this information could be used as the equivalent to the consumption of a good. It also reflects the interest rate of the loan, which would represent the price of the good (Stiglitz and Weiss, 1981). This allows us to estimate the Marshallian demand for this analysis. Let us assume a Cobb-Douglas utility function,

$$U = x_1^{\alpha} x_2^{1-\alpha} \tag{2}$$

where *x* is the amount of loan and α is the constant return to scale. The following Marshallian demand function is derived:

$$x_1^* = \frac{\alpha m}{P_{x_1}} \tag{3}$$

where x_1 ^ * is the optimal consumption credit, m is the individual's income and P_ (x_1) is the price of the good or interest rate. This function can easily be linearized by using its natural logarithm estimated by ordinary least squares (OLS) (Villa, 2004).[8] (See Wooldridge, 2012 for a detailed explanation of the OLS method.)Subsequently, Demirgüç-Kunt and Maksimovic (2012) and Guiso, Sapienza and Zingales (2006) empirically include social variables, such as area of residence, sex and age, among others, as a way capturing the structural environment of the individual, as well as family background. Once the Marshallian demand and the optimal consumption functions are estimated, a method of assessing changes in welfare is employed, based on the analysis of consumer surplus variations as shown by Beck, Demirgüç-Kunt, and Maksimovic (2005). Under this premise, the consumer surplus reflects the difference between what consumers should pay for the amount of the loan and what they actually pay on the credit market. The subtraction of the initial surplus from the final surplus is considered the exceeding function. The calculation is implemented considering the theory on integrals for the initial and final rates:

[8] In the case of using a Cobb Douglass production function equivalent, the parameter "A", refers to total factor productivity (TFP) and is not included for consumer theory, but the linearization function and its estimate are ceteris paribus.

(4)

$$VEC = \int_{P_{initial}}^{P_{final}} x_i^* f(m, P_{x_i})\, dP_{x_i}$$

In addition, the Marshallian demand function estimation allows us to calculate the price or interest rate and income elasticity of demand.

This reflects the sensitivity of the amount of credit subject to changes in prices or income, respectively. The income elasticity shows evidence of the type of good (normal or inferior). The price elasticity reflects the sensitivity of demand with respect to price movements and estimates the monopolistic power of the product; in this case, it refers to financial institutions or moneylenders. In absolute terms, the lower the elasticity the greater the monopolistic power of the credit provider. This shows that an interest rate rise is not significantly converted into a variation in consumers' request for credit. Monopolistic power is the ability of a lending institution to fix the interest rate. Even though an institution could have high costs and low profits, this does not mean it has monopolistic power. Thus, to test for the presence of credit monopolistic power in the market, the Lerner index is modified so that the maximum value could be 1 and not infinite. Hence, the following calculation is used:

(5) $$PM = \frac{1}{1+\varepsilon_{pd}}$$

where Epd is the elasticity of demand for credit.

In summary, the Lagrangian model is used as the main empirical framework to estimate the effects of supply and demand factors on accessing finance. In addition, the Cobb Douglas and the Marshallian demand functions are used to analyse demand elasticises in terms of monopolistic power for the Nicaraguan financial institutions.

Selection Bias

According to Heckman (1979), the problem of selection bias is present when one works with data from non-random samples. In practice, bias selection can occur for two reasons: first, it may be caused by data auto-selection made by individuals; second, the selection of the samples made by researchers often leads to bias problems.

Within the framework of neoclassical consumer theory, it is assumed that the problem with selection bias is caused by the auto-selection process in the individual's decision whether to borrow or not. If the individual obtains a loan, the survey reflects information on the amount and the interest rate, but if the individual decides not to obtain a loan the survey does not reflect whether the individual was willing to obtain credit but the willingness to pay for the credit was below the market interest rate.

[9]One drawback found in section IX of the 2005 LSMS is the lack of a question requesting information about whether or not the individual has applied for credit. Instead, the following question is used to filter respondents: "In the last 12 months, did any of the household members receive a loan from an institution, company or individual?" Therefore, in this analysis the determinant of the probability that the person wants credit is identified with the use of new variables explained in the next section of this study.

[9] The consumer decision making by comparing their reserve rate, which is the price they are willing to pay and the market interest rate, which is the prevailing market rate.

To control these biases the most recommended approach for this kind of study is the Heckman method, which consists of estimating two models simultaneously. This implies controlling for biases stemming from reverse causation and omitted variables. The first part comprises the use of a probit model where obtaining credit depends on certain variables; the second model relies on the amount borrowed (according to the aforementioned socioeconomic variables as determinants of Marshallian demand). Hence, in line with Heckman (1979), the inverse Mills ratio is introduced as a variable to the loan amount probit model to eliminate selection bias. This also takes into consideration the fact that a person may not have obtained a loan even if the income and other requirements to acquire a loan were met. With the purpose of attaining the variance of the regressions in the first stage of this process, the model of the loan amount and the probit model are estimated simultaneously by using the maximum likelihood method (Greene, 2003).[10] Therefore, the variances of the regressions are well estimated.

Variables

Based on our review of existing studies, whether or not a firm obtains credit is usually analysed as function of the firm characteristics (size, age, machinery and land).

However, individual distinctiveness (such as size, age, legal status and number of bank relationships) is not included. By using a set of control variables, the probit[11] model considers as its independent variable "whether or not credit was obtained".

To determine some causes of the likelihood of obtaining a loan having applied for one, access to credit is used as the study variable; however, our dataset does not include detailed information on the productivity and performance of the borrower. Based on Leitner and Stehrer's (2012) methodology, the dependent variable is scaled at the 0 and 1 levels. Thus, a probit approach with heteroskedasticity-robust estimates is applied.

The aim of this study is to highlight correlations between access to credit and supply and demand attributes. To attain this objective, the following set of explanatory variables is employed: gender (Sex), whether or not the person lives in a rural region (Rural), age (Age), years of education[12] (Educ), number of people living in the home (N2), distance from home to the road (Distance), monthly family income (Income), marital status (Single), loan term (Maturity) and dummies for the sources of loans (Private Banks, Cooperatives and NGOs). A full description of these variables is given in Appendix 1. In addition, a set of country-level variables is included (collateral). These variables are important because borrowers with insufficient internal funds and no collateral face considerable credit constraints from the banking sector and therefore need to look for other external sources (Leitner & Stehrer, 2012).

V. Results

The Marshallian demand function derived from consumer theory was employed. The dependent variable, the natural logarithm of the loan amount received, was consolidated as a function of the interest rate, (here considered the price) and the income of the individual. The two coefficients were significant at 0.1% as expected, as shown in Table 5. A positive elasticity in the case of income and a negative elasticity for the interest rate were found. On the other hand, the magnitude of the inelasticity parameter for both differentiated by -0.26. The price elasticity of demand shows that an increase in interest rates causes a reduction in credit demand, which is less than proportional to the amount of credit provided. This represents an advantage to the credit providers.

[10] For a more detailed reading of the Maximum Likelihood Method.

[11] The probit coefficients are not interpretable; hence we derive the normal function and focused on the average values. However, it just interprets the signs and compares them to our a priori formulation.

[12] t was considered that the basic technical requirement for education is to have at least eight years of formal study. For the average technical level, the period is nine years of formal education, for senior technicians 12 years, for university level 16 years, and for master's and doctoral levels 17 years and 22 years respectively.

In the case of the income elasticity, a significance of 0.48 was found. Hence the proportion is more sensitive to the credit amount than to the interest rate.

For the Ln maturity and the dichotomous collateral variables, neither years of education, area of residence, age or sex influence the credit amount when controlling for income. In other words, this suggests that women could be in a disadvantageous situation in the credit market. However, this disadvantage is the result of the labour market salaries. Therefore, if income is controlled, no other discrimination mechanisms are present. In the same way, the variables of education and area of residence are absorbed by income.

In the second model, the variable of maturity and the dichotomous variable of whether or not the consumer has collateral are significant. Maturity had the greatest coefficient of the variables introduced and also attained the expected positive sign. This suggests that a higher loan term results in a request for a higher loan amount. The collateral variable is highly significant and provides evidence of a positive effect on the demand for credit. The issue could be that financial institutions have a tendency to offer just a restricted array of services. The requirements to get those services ask for substantial security backups. For this reason, only rich or medium income households can get bigger credits at a lower cost from formal banks. Additionally, there are some poor households that have the capacity to present formal collateral requirements to the financial institutions, nevertheless they prefer not to opt for a credit, because the of losing their properties in a worst case scenario (WB2012). As Beck, Demirgüç-Kunt, and Maksimovic (2008) put it, the fact that an individual has more assets and can demand greater credit is evidence that credit could restrict the mobility of individuals across social groups. According to the World Bank (2012), the collateral used as an insurance for the loans was very nearly multiplied its request amid the global economic crisis, recommending to firms to utilize outer financing mechanism as the local credit conditions got restricted . Also this situation could be related as measurement to counteract the "No Pago" movement effect.There is a further constraint related to collateral: banks and finance companies lending to small enterprises report a lack of adequate information as their main challenge to increasing this portfolio. The private credit bureaus and the public credit bureau managed by the SIBOIF are operational. However, data on debtors with amounts overdue from the SIBOIF are not available. Information on prospective borrowers is also scarce due to high levels of informality.

Informal firms are not constituted legally as businesses and so the household finances of their owners and often members of their extended families are intertwined. Trying to understand and analyse how the debt levels and incomes of different family members affect the business is costly. Informal businesses also tend to have much less documentation on revenues and expenditures; indeed, most lack even basic accounting systems. Thus, credit officers have to build financial statements from the bottom up based on assumptions and inferences about business activities (WB 2012).

For the formal sector, accounting and auditing standards in Nicaragua are sophisticated, but they are used primarily by larger enterprises. MSMEs find it hard to comply with the full set of International Financial Reporting Standards (IFRS), which are mostly conceived for larger enterprises. Furthermore, due to financial illiteracy, small firms consider these financial mechanisms an unnecessary cost, thus hindering their motivation to access financial services. Finally, under the current norm for evaluating and classifying credit risk,[13] banks and finance companies have discretion in how they evaluate and classify small business loans, which can allow excessive risk-taking on the one hand and overly tight credit rationing on the other. Banking institutions could technically classify a US$25,000 loan to an entrepreneur as consumer lending, for example by authorizing an unsecured increase in the borrower's credit card limit based on a relatively simple assessment of the borrower's cash flow and credit card repayment history.

[13] Resolution N° CD-SIBOIF-547-1-AGOST20-2008.

It could also be classified as a commercial loan, for which banks often require collateral guarantees and have stricter documentation requirements. Commercial loan evaluation standards are the same independent of the size of the business. This can put borrowers at a disadvantage when it comes to limits on leverage.[14]

It is important to mention that with the inclusion of socioeconomic variables, the price elasticity of demand and income become even more inelastic. Therefore, before including socioeconomic, collateral and maturity variables, the price elasticity of demand showed less vulnerability. For the third and the following models, two stages of estimation[15] were implemented, the first relating to the probability of obtaining credit and the second denoting the loan amount.

The probit models showed high significance for the socioeconomic variables, even when the income effect was considered. For example, higher age shows an increased probability of accessing credit; however, it also exhibits significant diminishing returns for the age-squared variable. The number of people living in the household negatively affects the probability of accessing credit. The gender variable shows a negative sign, meaning that women are less likely to gain access to credit.

Table 5. Results

Variables	Dependent variable = amount of credit					
	1	2	3	4	5	6
Ln(Interest Rate)	-0.262*** (-6.96)	-0.094** (-2.68)	-0.098** (-2.83)	-0.098** (-2.82)	-0.148*** (-4.11)	-0.182*** (-5.65)
Ln(Income)	0.489*** 11.75	0.433*** 10.8	0.397*** 9.48	0.397*** 9.49	0.410*** 9.85	0.206*** 11.15
Sex		0.006 0.07	0.061 0.79	0.066 0.82	0.033 0.41	0.150 1.67
Years of Education		0.003 0.39	-0.017 (-1.54)	-0.017 (-1.55)	-0.014 (-1.26)	0.056 5.91
Rural		0.068 0.8	0.087 1.01	0.084 0.96	0.059 0.67	-0.162 (-1.67)
Age		0.03 1.86	-0.032 (-1.19)	-0.033 (-1.21)	-0.026 (-0.94)	0.142 0.177
Age^2		0 (-1.18)	0 1.53	0 1.55	0 1.23	-0.001 (-0.00)
Collateral		0.360*** 4.3	0.353*** 4.25	0.353*** 4.25	0.167 1.81	0.115 0.99
Ln(Maturity)		0.636*** 13.42	0.640*** 13.65	0.639*** 13.62	0.655*** 14.06	0.635*** 14.88
Ln(Family Income)				-0.003 (-0.27)	-0.002 (-0.16)	0.002 0.21
Ln(it)*Private Banks					0.099*** 4.09	0.134*** 7.10
Ln(it)*Cooperatives					0.116*** 3.71	0.141*** 5.25
Ln(it)*NGOs					0.076* 1.69	0.078 1.91
Constant	5.795*** 14.86	4.549*** 9.35	7.434*** 6.65	7.465*** 6.68	7.138*** 6.25	5.367** 3.74
Probit						
	1	2	3	4	5	6
Income			0.000*** 6.22	0.000*** 6.23	0.000*** 6.15	0.099*** 14.82
Sex (Men=0, Women=1)			-0.095* (-2.49)	-0.095* (-2.49)	-0.096* (-2.51)	0.229*** 5.70
Years of Education			0.040*** 8.93	0.040*** 8.93	0.040*** 8.92	0.029*** 6.89
Age			0.130*** 17.1	0.130*** 17.09	0.130*** 17.1	0.087*** 12.53
Rural			-0.037 (-0.85)	-0.037 (-0.85)	-0.036 (-0.84)	-0.035 (-0.86)
Age^2			-0.001*** (-15.09)	-0.001*** (-15.09)	-0.001*** (-15.09)	-0.000*** (-10.60)
Distance			-0.001*** (-5.00)	-0.001*** (-5.01)	-0.001*** (-5.01)	-0.001*** (-6.02)
Single			-0.277*** (-6.41)	-0.277*** (-6.42)	-0.275*** (-6.33)	-0.183*** (-5.08)
N2			-0.036*** (-4.94)	-0.036*** (-4.91)	-0.036*** (-4.89)	-0.011** (-2.02)
Family Income			0.000* 2.33	0.000* 2.34	0.000* 2.37	0.000* 2.34
Ln (Income)						0.262*** 10.67
Ln (Family Income)						-0.007 (-1.09)
Constant			-4.483*** (-25.75)	-4.484*** (-25.75)	-4.485*** (-25.74)	-5.426*** (-20.82)
athrho			-0.589** (-3.01)	-0.596** (-3.05)	-0.519* (-2.50)	-0.1629 (-0.61)
lnsigma			0.017 0.20	0.02 0.23	-0.025 (-0.30)	-0.103 (-2.33)***
R-squared	0.228	0.429				
Chi-squared			454.105	454.187	486.832	403.526
Observations	704	704	28258	28258	28258	28258

* p<0.05, ** p<0.01, ***p<0.001, Coefficient/standard error

[14] Larger corporations generally have more alternatives to debt (especially short-term debt), for example by issuing bonds or raising quasi-equity.
[15] This refers to the method of obtaining the maximum likelihood parameters.

Conversely, in the sixth model, a functional shape variation for the household was undertaken. This showed a linear logarithmic advantage for women in accessing credit. However, this relationship becomes inconsistent once it is observed that the sign of family income is negative but not significant. Nonetheless, this pertinent discovery is in contrast to 25 years of implementation of gender programmes by international cooperation agencies in which their main strategies have aimed to achieve responsible money management through the empowerment of women in the household economy. Furthermore, the gender variable is significant in the probit model. It is observed that in general men have more access to credit, but the loan amounts are the same between genders. Therefore, most credit loan amounts at a household level, especially those obtained from microfinance institutions, do not discriminate between sexes. Another result presented by the model is that for those living in a rural area the probability of obtaining credit is lower. This reinforces the selection for the distance variable (from home to the nearest road) as the farther the road is from the house, the lower the possibility is of gaining credit. As might be anticipated, the more education an individual has, the greater the possibility of getting credit. However, it should be noted that a higher level of education usually entails that the individual is older.

Furthermore, the marriage condition also absorbs certain effects of the age variable. It can also be seen that the age variable positively affects the amount a person may borrow. The results show that for each year of age an individual advances, the amount of the loan obtained increases by 0.68%. This represents a challenge given the population composition in Nicaragua. According to the World Bank (2013), 53% of the population is below 25 years old (30% aged 4–14 years old and 23% aged 15–25 years old). The relationship observed in the model shows that as an individual grows older they tend to face better labour market conditions. Thus, legal and financial requirements pertaining to credit can more readily be met. These findings demonstrate very conclusive evidence that socioeconomic variables have a direct effect on access to finance.The inverse Mills ratio (athrho and lnsigma) was introduced in the last four models. This mechanism shows significance at the 5% interval, rejecting the hypothesis that there is no self-selection problem in the model; thus the ratio is applied in the subsequent models. In the fourth model, price elasticity is relatively stable as family income had a considerable effect on the amount of credit. Finally, a model variation was performed and credit demand was fragmented to look for barriers for entry from one segment to another.

The segments were divided into the following:

- Formal private institutions (commercial banks and micro-financial institutions)
- Government (as the survey shows that the interest rate charged is zero, the government was not included in the regression or the results)
- Cooperatives and associations (rural credit unions, producer associations and cooperatives)
- NGOs or social projects
- Informal private lenders (informal credit lines, neighbours, friends, traders, etc.)

Based on these segments, a fifth model was employed using the methodological approach stated in formula (5). It revealed that the only group with no statistically significant differences in credit elasticity was social projects. All other segments of the market showed significant differences.

Table 9. Price elasticity and monopolistic power by institution

Institution(s)	Price elasticity	Monopolistic power
Private/formal	-0.041	0.96
Cooperatives, unions	-0.024	0.98
NGOs	-0.064	0.94
Private/informal	-0.148	0.87

Source: Authors' calculation based on the LSMS (2005)

Formal private lenders have more inelastic demand than informal credit providers and therefore greater monopolistic power. This relevant finding provides empirical support for our analysis that the Herfindahl Hirschman Index (2011) of Nicaragua (2.370) is greatly above the critical level of concentration (0.18). Nicaragua's financial sector is clogged, inefficient and has a highly oligopolistic structure. Furthermore, the depositdistribution shows an elevated focus in a few clients as 15% of the portfolio is accountable for 96% of the total deposits in Córdobas and 86% in dollars (BCN, 2011). Another limitation of the depth of the financial sector is the relatively scarce availability of credit funds for medium- and long-term loans as 50% of the total deposits are pegged to a 12-month term of indenture. De la Torre (2012) surveyed 45 banks in 12 countries, characterizing the degree and determinants of bank involvement.

They found that the competitive pressures faced by banks are the main factor in explaining why some have moved aggressively and in a sustained fashion (even through the global financial crisis) toward different segmented customers. On the other hand, cooperatives and credit unions are closely tied to their stakeholders; hence, this study generally found greater economic commitment to the provision of credit amongst these institutions. One of the most important determinants of the amount of credit provided is the interest rate. Fulfilling the demand law, it is observed that higher interest rates reduce the amount borrowed. This occurs for two reasons: first, as noted above, distance is an important factor in choosing between microfinance and banking institutions; second, the consumer has few options to choose from, giving the microfinance/banking institutions remarkable market power, reflected in the inelastic interest rate. This significant empirical finding is congruent with our analysis that the returns and operating margins of credit providers (especially banks) are high compared to the rest of Central America. Except for the period 2009–2010, when these institutions were adjusting to stricter loan classification norms issued by the SIBOIF, the Nicaraguan banks have been the most profitable in Central America by a significant margin.

Nicaraguan banks have consistently earned a relatively high ROA despite being among the most inefficient banks in the region. While administrative costs have recently come down, they remain the second highest in Central America. Higher returns among Nicaraguan banks have been driven by greater margins. There is a trend for implicit interest margins, which represent the percentage difference between interest income on loans and interest expense on deposits. At 12.6% in 2011, Nicaragua nearly tied with Honduras for the highest implicit intermediation margins in Central America, which were substantially higher than those of other neighbouring countries. The profitability and inefficiency of Nicaraguan banks is thus borne out in the cost of lending. That they are able to maintain profitability levels which are higher than in other countries means that they have little incentive to invest in new product development, such as information technology, risk management techniques, or staff training programmes.

Estimation Fitness

In general, the models presented initial problems with heteroskedasticity and functional specification. For this reason, to retain their significance, the robustness was enhanced using the standard errors approach.
In addition, the functional specification problem was alleviated by allowing a quadratic function to return the data to their original scale. The rate of interest and income variables remained as linear functions in logarithmic form for theoretical and mathematical reasons. Despite the fact that a negative log-likelihood does not have a probabilistic interpretation, a numerical optimization for the parameters was used until it found values that minimized the negative log-likelihood of the data set. Hence, the errors were normally distributed; then the maximum likelihood is virtually identical. According to theory, there may be differences in some estimates, but these are usually trivial, especially if sample sizes are large. It is important to note that the variables' fitted values and densities are rigorous, as presented in Appendix 2.

VI. Conclusion

The analysis carried out in this study confirms that access to finance is still an important constraint with regard to economic performance in Nicaragua. Both demand and supply side factors contribute to low lending levels.

On the supply side, different types of credit are offered by formal and semi-formal institutions and others (relatives/friends) at different levels and in various contractual forms. It is possible to conclude that credit provided by banks (formal institutions) is allocated to the segment of large farm/business-oriented households. Semi-formal institutions (MFIs, NGOs and cooperatives) focus their credit lines on the segment of smaller farms/business-oriented households. Credit provided by others (relatives and friends) falls within a short-term framework and is a financing mechanism used by the majority of Nicaraguan households. While scale, lack of adequate information and regulatory bottlenecks in the use of collateral are raised by financial institutions as impediments to lending on the supply side, complicated procedures, high fees and interest rates and excessive collateral requirements are purported by firms to be important barriers to borrowing on the demand side. This paper breaks from the general literature as our findings relate to all aspects of access to finance in Nicaragua. It provides direct evidence of micro-level lending channels through which financial problems can exacerbate the effect on demand for financing. It also highlights that the lack of competition in Nicaragua's banking sector is a complex problem. However, simple actions may have an important impact in the short term.

For example, requiring banks to report loans that have been repaid on time and changes to disclosure requirements would be meaningful first steps toward transparent pricing, which contributes to greater competition.[16]

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[16] MFTransparency.org publishes a popular tool for calculating the full cost of any particular loan product.

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Online Resources

www.bcn.gob.ni
www.inide.gob.ni
www.dgi.gob.ni
www.inss.gob.ni
www.siboif.gob.ni

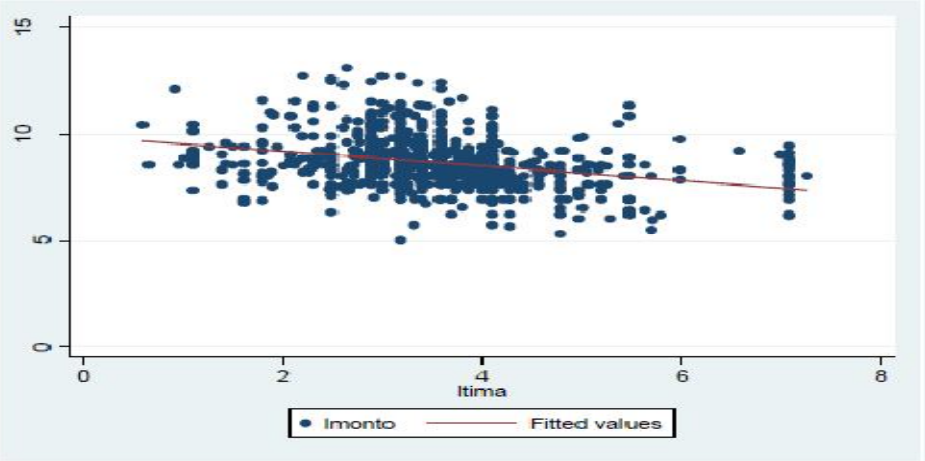
Appendix 1

Definition and Sources of Variables

Variable	Definition	Source
Interest Rate	Are high interest rates an obstacle? (1) a minor obstacle, (2) a moderate obstacle, (3) a major obstacle Details of costs by Banks in Nicaragua	LSMS 2005 BCN 2013 Database
Sex	Gender	LSMS 2005
Years of Education	It was considered that the basic technical requirement for education is to have at least eight years of formal studies. For the average technical level, the figure is nine years of formal education, for senior technicians 12 years, for university level 16 years, and for master's and doctoral levels 17 to 22 years respectively.	LSMS 2005
Rural	Rural area	LSMS 2005
Age	Age stratification	LSMS 2005
Bank Concentration	Banking spread or HH index	BCN 2013 Database
Collateral	House Ownership Are the collateral requirements of banks/financial institutions (1) no obstacle, (2) a minor obstacle, (3) a moderate obstacle, (4) a major obstacle?	LSMS 2005
Distance	Accessibility to the nearest main road.	LSMS 2005
Single	Marital status, also taking into consideration domestic partners	LSMS 2005
N2	Household size, number of people living in one house	LSMS 2005
Maturity	Banks' terms for loan portfolio	BCN 2013 Database
Family Income	Sum of income in a family of five people	LSMS 2005
Ln(it)*Private Banks	Interest rate for open market operations	BCN 2013 Database
Ln(it)*Cooperatives	Interest rate – cooperatives	LSMS 2005
Ln(it)*NGOs/Projects	Interest rate – NGOs or projects	LSMS 2005

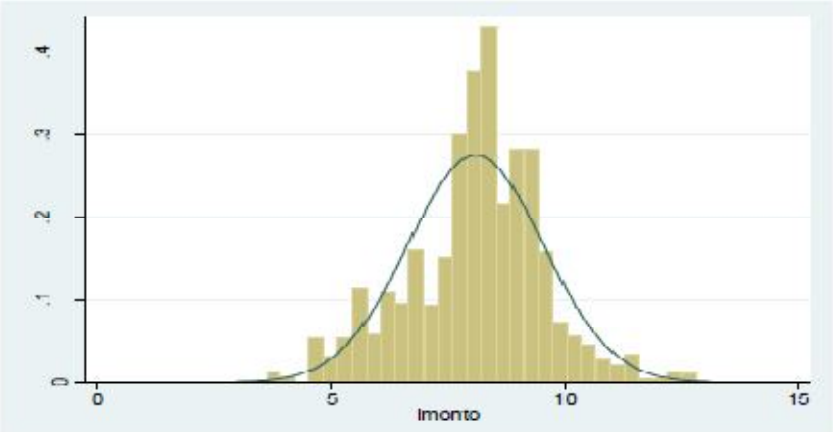
Appendix 2

Fitted Values

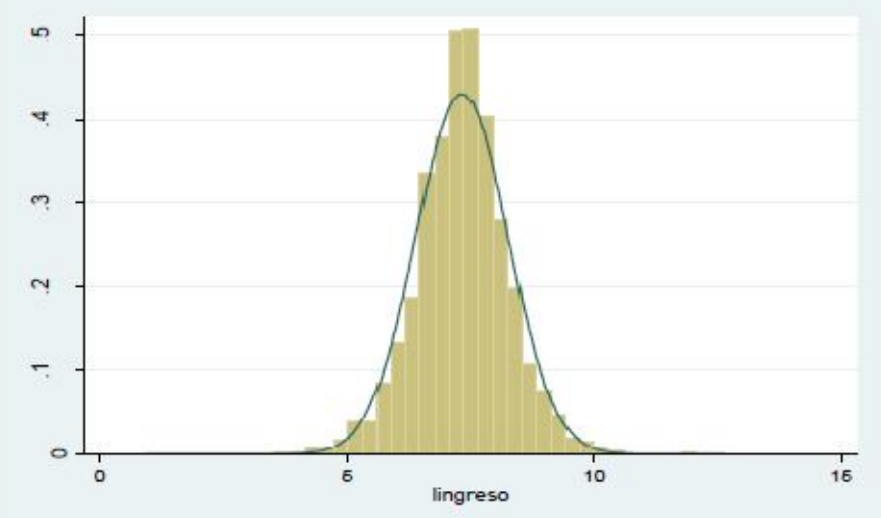


Densities

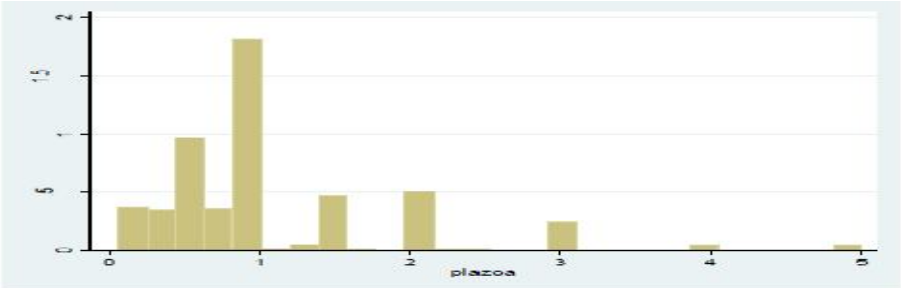
Credit Amount



Ln Income



Maturity



Appendix 3

Table A. Household Loan Portfolio

Provider(s)	No. Credits	Percentage
Private bank	7,494	2.63
Government or MAGFOR Programme	1,408	0.49
Financial entities	64,934	22.76
Credit cards or credit lines	7,978	2.8
Savings and Credit Cooperative	17,254	6.05
Other cooperatives	3,409	1.2
Associations of local producers	2,635	0.92
Nonconventional banks	5,494	1.93
NGO projects	10,767	3.77
Particular moneylenders	6,130	2.15
Friends, relatives and neighbours	15,571	5.46
Rural banks – Cajas rurales	1,528	0.54
Merchants	49,332	17.29
Acopiador – stock keepers, collectors	1,357	0.48
Local farmers	40	0.01
Informal credit lines	85,331	29.91
Other	4,602	1.61
Total	**285,264**	**100**

Source: Authors' calculation based on LSMS (2005)

Table B. Credit Purpose

Credit purpose	No. credits	Percentage
Investment in agricultural activity	19,505	6.85
Productive Agropecuarian Unit Expenses	14,014	4.91
To buy merchandise (non-agricultural business)	37,952	13.3
Other uses of non-agricultural business	7,692	2.7
To buy a personal vehicles	2,517	0.88
To buy a vehicle for business activities	882	0.31
To buy goods for the home	36,779	12.89
Home expenses	104,641	36.68
Emergency or illness	10,877	3.81
Housing	14,953	5.24
Other home expenses	35,452	12.43
Total	**285,264**	**100**

Source: Authors' calculation based on LSMS (2005)

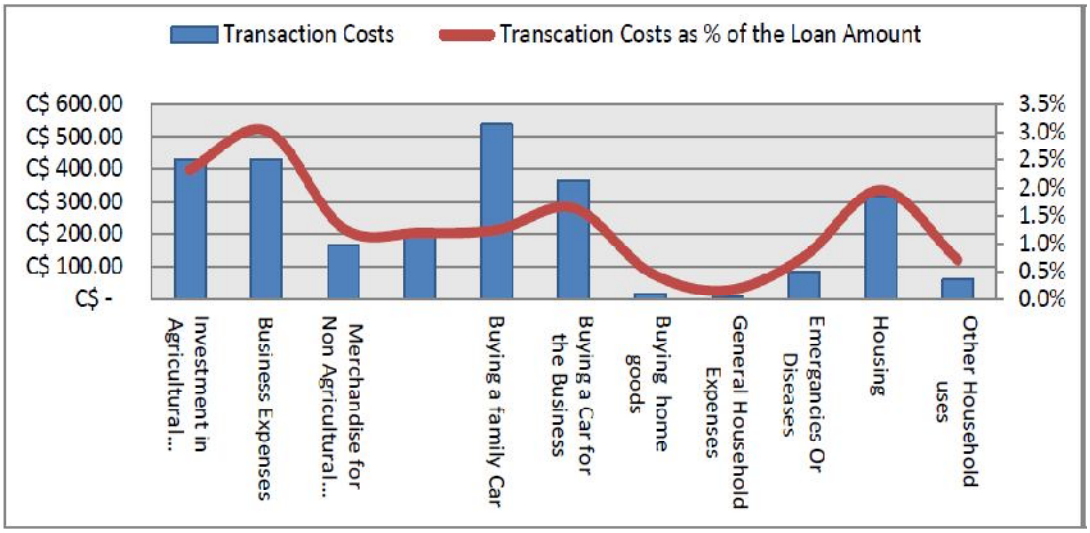
Table C. The Empirical Approach: Relevant Theoretical Frameworks and Studies

Walrasian theories	Fixed price theories	Asymmetric information theories	No empirical approach
Krugman and Wells (2006)	Backhouse (1981)	Mishkin (2007) Inderst and Mueller (2007)	Djankov, McLiesh and Shleifer (2005)
Barro (1997)		Villas-Boas and Schmidt-Mohr (1999)	Shleifer (2005
		Stiglitz and Weiss (1981)	Morduch (1999)
		Fried and Howitt (1980)	Berger and Udell (1995)

Source: Authors' analysis based on Figueroa (2011)

Appendix 4

Figure 2. Transaction Costs as % of the Loan



Source: Authors' calculation based on the LSMS (2005)