

Formal and Informal Household Credit in Colombia

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Abstract

This paper provides evidence on the determinants of household credit, formal and informal, in both urban and rural areas in Colombia. We also study the factors that affect the likelihood that a household is in arrears. Results show that the probability that a household has credit is positively related to marital status (married), education, income, household size, home ownership, and labor market participation. Estimates indicate that income and education are positively correlated with the probability of having a formal loan, and negatively related to the likelihood of having informal credit. Finally, household income, credit usage, and unexpected events increase the probability of credit default.

Keywords: household debt, formal credit, informal credit, credit default, Colombia.

JEL classification: C25, G21, D12, R22.

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1. INTRODUCTION

Access to credit enables households to use resources to meet their consumption requirements, purchase a home, or make profitable investments, which can contribute to an accumulation of assets and a reduction in poverty. Moreover, credit can play an important role in rural sector development. According to Jia et al. (2015), access to credit enables farmers to take greater risks in more profitable projects instead of investing in less risky, but probably inefficient ones. Thus, as pointed out by Ibrahim et al. (2007), understanding the factors that determine households' access to credit is important for designing policies aimed at reducing poverty, especially in low-income countries. However, such efforts have been hindered by the absence of household-level data.

Households can also face credit constraints, due to institutional factors as well as household-specific characteristics (for example low income, few assets) that might not allow them to smooth their consumption, make profitable investments, or cope with shocks that could destabilize the household. As a consequence, households need to turn to other sources of funds to meet their credit requirements. Hence, the coexistence of formal and informal credit markets, which is widespread in emerging countries.

In Colombia, household credit obtained from the formal sector has been increasing as a proportion of gross domestic product (GDP), rising from 9% in 2005 to 20% in 2015. Nevertheless, this percentage is low when compared to other countries. According to total credit statistics from the Bank for International Settlements, in 2014 average total household debt as a percentage of GDP was 72% in advanced economies and 31% in emerging ones. Furthermore, concerning some other Latin American countries, Colombia's percentage is lower than that of Brazil (25%) and Chile (38%), but higher than those of Argentina (6%) and Mexico (15%).

According to the Financial Capabilities Survey in Andean Countries (Mejía et al., 2015), rates of financial product holdings among households in Colombia are very low, with a general lack of knowledge about the characteristics of such products. There are also significant differences among population segments, such as between rural and urban areas, between women and men, and among age groups. Education and income are the two most important factors explaining such differences.

This paper aims to provide empirical evidence on factors that affect the likelihood of households having credit in urban or rural areas using data for middle- and low-income households in Colombia obtained from the Colombian Longitudinal Survey of the University of the Andes (ELCA). Since households can have credit simultaneously from the formal as well as the informal sector, the paper also investigates the possible factors determining whether a household has a loan, taking into account the origin of such resources. Moreover, it analyzes the probable determinants of the likelihood of households being in arrears given that a deterioration in the portfolio could affect the stability of the financial system and households' standards of living.

The results do not generally display any significant differences between urban and rural areas. The likelihood of a household having a loan is positively and significantly related to the marital status of the household head (married), education, income, household size, labor market participation, home ownership, and shocks faced by the household. In particular, households use formal credit to set up a business and finance both productive and investment activities. Meanwhile, they use formal and informal loans to pay debts. In urban areas, households use both sources of funds to purchase clothes or food, whereas in rural areas these requirements are mostly met with informal credit. Finally, the results show that income, credit usage, and unexpected events mainly explain the likelihood of being in arrears.

The paper is divided into five sections, including this introduction. Section 2 reviews domestic and international literature. Section 3 describes data employed in the paper and provides some descriptive statistics. Section 4 discusses the empirical strategy of the study and presents the results of the estimations. Section 5 gives the main conclusions.

2. REVIEW OF THE LITERATURE

The theoretical framework for household borrowing decisions dates back to the life cycle theory (for example Ando and Modigliani, 1963; Modigliani, 1966) and the permanent income hypothesis (Friedman, 1957). As mentioned by Vandone (2009), the standard theory is based on the reasoning that consumers seek to improve their

standard of living by smoothing consumption at different times in their lives. Households make their borrowing decisions while taking into account their wealth, available income, and expectations regarding future income. In these models, therefore, credit supply and demand are determined by sociodemographic, economic, and institutional factors. They also assume households do not face constraints in getting credit, an aspect that has been considered in other related studies.¹

Households' participation in the credit market, as well as the constraints they face, have been the subject of extensive empirical study in international literature with an emphasis on developing countries.² The formal and informal rural credit market in Vietnam, for instance, has been analyzed by Barslund and Tarp (2008), who find that formal credit demand mainly depends on land ownership, whereas informal credit is negatively associated with age and education, and positively associated with a bad credit history and the number of dependents. Meanwhile, Nguyen (2007) and Duy et al. (2012) study the determinants of formal credit in rural areas of Vietnam, finding that among the most important factors are family size, the household head's work in the agricultural sector or community involvement, marital status (married), distance to the market center, a household's capital endowments, and the region where they are located.

Also, Vaessen (2001) finds that the likelihood of access to rural credit in Northern Nicaragua is positively related to formal education, family size, non-agricultural activities, and access to networks of information. For the case of Egypt, Mohieldin and Wright (2000) study the determinants of formal and informal credit in four villages of the Kalyoubbiya province. In these villages, the people that work in agriculture and own land (loan guarantee) are more likely to get a loan, while larger families are more inclined to have formal credit, although this effect declines as family size increases.

¹ For further details on pioneering literature about credit rationing, see for instance Baltensperger (1978), Stiglitz and Weiss (1981), and Jaffee and Stiglitz (1990).

² For a detailed review of the literature, see for instance Vandone (2009), Pastrapa and Apostolopoulos (2015), and the references mentioned therein.

As for urban areas of developing countries, Doan and Tuyen (2015) find that for peripheral urban areas of Ho Chi Minh City (Vietnam), household size, phone ownership (as a proxy for wealth), labor income, and households' dwelling location have a positive impact, while age and marital status (married) have a negative effect on the likelihood of taking part in the credit market. For Ethiopia, Ibrahim et al. (2007) analyze the determinants of credit constraints and the amount borrowed by urban households. The authors find that households' resources, number of dependents, and geographic location are the most important factors.

In the case of developed countries, Crook (2001) investigates the determinants of debt requested by households in the United States. The results show that a household demands less debt when the head of household is aged over 55 and is relatively risk averse. Moreover, a household demands more debt when its income is higher, when it owns its own home, when the family size is larger, and the head of the household is working. Del Rio and Young (2006) examine the determinants of household participation in the unsecured debt market in the United Kingdom (UK). They find that the main determinants of the decision to participate in the credit market are the age of the borrower, their income, education, job status, and the amount borrowed (in the case of mortgages).

Meanwhile, Magri (2007) analyzes the determinants of Italian households' participation in the debt market. The author shows that the age of the household head increases the probability of requesting a loan up to a certain threshold. Moreover, household income increases the likelihood of having credit, while it reduces credit rationing. For Portugal, Costa and Farinha (2012) find that the probability of households having debt increases with income levels and real wealth, and decreases with their level of financial wealth. In addition, households with children are more likely to have mortgages, whereas larger households have a higher probability of having other debts. Age also has a negative impact on debt market participation.

The literature on household indebtedness has also studied the probability of households defaulting on their loans. For instance, Bridges and Disney (2004) analyze arrears on debt among low-income households in the UK, while Holló and Papp (2007) study the main factors affecting households' credit risk in Hungary, and Alfaro and Gallardo (2012) examine debt default behavior of households in Chile.

For the case of Colombia, literature that studies households' access to credit is very scarce.³ Recently, with the higher availability of data, this topic has begun to be studied given the impact household indebtedness could have on the economy's financial stability.⁴ For instance, Murcia (2007) studies the determinants of credit access for Colombian households (credit cards and mortgage loans), using data from the 2003 standard of living survey. The author finds that variables such as income, wealth, geographic location, access to social security, education, and age affect the probability of using such financial services. Furthermore, González and León (2007) employ data from financial accounts provided by the Banco de la República and individuals' income tax statements to examine the main variables influencing household borrowing decisions during the period 1993-2004. The authors find that collateral, carried debt, and financial burden are the principal drivers of household indebtedness.

Besides, Cano et al. (2015) use the 2012 Financial Capabilities-Survey to empirically assess the determinants of access to financial products from the demand side. In the particular case of credit, the authors find that the variables making a positive contribution to credit are education, marital status (married), the economic variables index, the liquidity requirements index, the intertemporal preferences index, and the number of establishments per 10,000 inhabitants.

Using the ELCA, Cadena and Quintero (2015) present a description of the evolution of Colombian households' credit between 2010 and 2013, as well as a socioeconomic characterization of such households in rural and urban areas. Meanwhile, Rodríguez-Raga and Riño-Rodríguez (2016), using the first round of the ELCA (2010), study the determinants of households' access to formal financial products, including saving, credit, and insurance. Concerning credit, these authors find that the probability of having credit increases with the age of the household head, the holding of fixed asset, and the location of the home.

The literature on debt default and overindebtedness among Colombian households is scarce. One exception is Gutiérrez et al.

³ As mentioned in Murcia (2007), most papers on credit in Colombia have addressed the matter from the supply side, mainly focusing on the study of credit constraints.

⁴ For a review of the literature on the relation between financial stability and financial inclusion see Roa (2016) and the references therein.

(2012), who use the 2010 survey on household financial burdens and education for Bogota to analyze conditions of indebtedness and the determinants of the probabilities of household default and overindebtedness. The authors find that income, employment, and the household head's age have an adverse effect on the probability of default. On the other hand, debt levels and the refinancing variable increase the likelihood of default.

3. DESCRIPTIVE DATA AND STATISTICS

An analysis of the likelihood of having credit was performed for urban as well as rural areas using the second round of the ELCA conducted in 2013. The survey constitutes an important source for a study of household access to credit because it includes data on the sources, usage, and conditions of loans obtained by such households (Cadena and Quintero, 2015).

In particular, we used data on the heads of 4,911 households in urban areas and 4,351 households in rural areas. Most of the household heads are men, 63% in urban areas and 80% in rural ones. The age of household heads varies between 17 and 88 years in urban areas and between 19 and 97 in rural ones. The urban survey is representative for strata 1 to 4 in Colombia and five of its geographic regions: Bogotá, Central, Oriental, Atlántica, and Pacífica. The rural survey is representative of small farmers in four microregions: Atlántica Media, Altiplano Cundi-Boyacense, Eje Cafetero, and Centro-Oriente.

Concerning the relevant variables, 59% of urban households reported having at least one loan. As mentioned previously, formal and informal credit markets exist alongside one another in Colombia. A household can, therefore, access both credit sources and have more than one loan with each of them.⁵ Thus, 72.5% of urban household credit corresponds to loans granted by formal institutions, 23.9% to the informal sector, and 3.6% to unidentified sources. In addition, 49% of rural households reported having at least one loan, while 65% of these households' loans were obtained from formal

⁵ For instance, 53% of households in urban areas that reported having credit had only one loan, while around 10% had four or more. In rural areas, 58% of households that reported having credit had only one loan and close to 6% had four or more.

Table 1**DISTRIBUTION OF HOUSEHOLD CREDIT SOURCES**
Percent

	<i>Urban area</i>	<i>Rural area</i>
<i>Have credit (percentage of households)</i>		
Yes	59	49
No	41	51
<i>Who they borrow from (percentage of loans)</i>		
Formal sector	72.5	65.0
Banks or financial entities	46.8	52.0
Employee funds or cooperatives	7.5	3.8
Department stores or supermarkets	15.9	6.4
Family compensation funds	0.7	0.0
Unions or associations	0.2	1.9
Employer	0.5	0.4
Government education loan (Icetex)	0.9	0.4
Informal sector	23.9	32.0
Family members	4.1	5.8
Friends	5.5	8.9
Moneylenders	9.3	3.3
Storekeepers	3.9	12.2
Catalog shopping	0.9	0.8
Pawnshops or trading houses	0.2	0.9
Other sources	3.6	3.0

Note: A household can have different types of credit at the same time. To calculate the values presented in this table all the loans reported by households were taken into account. These values, therefore, show formal and informal loans as a percentage of total loans.

Source: Authors own calculations based on the ELCA.

institutions, 32% from informal ones and 3% from unspecified sources (Table 1). Although banks are the main credit source for households, it is important to highlight that only 13% of households requesting credit from such institutions obtain it. On the supply side, the most important reasons for rejection reported by households are poor credit rating, insufficient income, and inadequate guarantees. On the other hand, some main demand-side reasons for why households do not request loans from the financial system are the need for “too many requirements and a lot of paperwork,” behavioral biases such as fears of not being able to pay a loan and lose the guarantee, as well as the belief that even if they requested a loan it would not be approved. For these reasons, households seek alternative sources of financing.

With respect to usage, among urban households the main purpose of credit is to purchase furniture, home appliances, and other assets (20%); buy clothes or food (17%); pay debts (16%); set up or invest in a business (13%); make home improvements (9%); and purchase a home (7%). In the case of rural households, it is important to emphasize that 36% of loans are used for investing in agriculture, livestock, and farm buildings, while 17% are for purchasing clothes or food, 13% for furniture, appliances, and other assets, and 9% for paying debts.⁶

4. EMPIRICAL STRATEGY AND RESULTS

In this section, we attempt to identify factors affecting the likelihood of a household having credit. We also perform estimations that take into account formal and informal sources of credit. This analysis is important given that in developing countries like Colombia the coexistence of formal and informal credit markets is widespread. Households might face constraints for accessing formal credit due to their inherent characteristics and institutional factors. These households, therefore, need to turn to other credit sources to meet their borrowing requirements. According to Mohieldin and Wright (2000), the coexistence of formal and informal credit markets can be explained by two opposing views. On the one hand, regulations

⁶ These percentages were calculated taking into account the usage of all household loans. For further details, see Iregui et al. (2016).

limiting interest rates lead to the creation of an alternative market (informal) where interest rates are not controlled. On the other, different costs associated with contract detection, monitoring, and compliance, cause credit market fragmentation. The literature has also found that there are significant differences in credit usage depending on its origin. For instance, loans from the formal sector are mainly used for investment and business activities, whereas informal credit is used to satisfy household consumption.⁷

Households that are in arrears and their determinants have not been widely studied in Colombia. Household overindebtedness could become a problem for economic authorities given its impact on financial stability stemming from a deterioration in the portfolio. It is therefore interesting, given the data included in the surveys employed, to analyze the possible determinants of the likelihood that middle- and low-income households are in arrears with at least one of their loans, be they formal or informal.

4.1 Determinants of the Probability of a Household Having Credit

To analyze the factors that might determine whether a household has at least one loan, be it with the formal or informal sector, logit models were estimated.⁸ The estimation equations for urban and rural households are written as follows:

$$1 \quad Credit_i = \alpha_0 + \alpha_1 X_{1,i} + \alpha_2 X_{2,i} + \alpha_3 X_{3,i} + \varepsilon_i,$$

$$2 \quad Formal_credit_i = \delta_0 + \delta_1 X_{1,i} + \delta_2 X_{2,i} + \delta_3 X_{3,i} + \delta_4 X_{4,i} + \mu_i,$$

$$3 \quad Informal_credit_i = \beta_0 + \beta_1 X_{1,i} + \beta_2 X_{2,i} + \beta_3 X_{3,i} + \beta_4 X_{4,i} + \nu_i,$$

where *Credit*, *Formal_credit*, and *Informal_credit* are binary variables that take the value One if household *i* has at least one loan, one formal or one informal loan, and 0 if it does not. $X_{1,i}$ contains the

⁷ See for instance Zeller (1994) for the case of Madagascar, Mohieldin and Wright (2000) for Egypt, and Jia et al. (2015) for rural areas of China.

⁸ The estimation included the corresponding expansion factors.

characteristics of household i (income, whether the household saves or not, whether it benefits from a government transfer program, size, region where it is located, or home ownership), $X_{2,i}$ includes the characteristics of household head i (age, age squared, sex, education, marital status, and employment), $X_{3,i}$ contains some shocks that have been able to destabilize the household, and $X_{4,i}$ corresponds to the main credit usage of household i (for example paying debts, purchasing clothes or food, setting up or investing in a business, education, acquiring a home, and purchasing an automobile, among others). Annex contains the definitions of these variables.

With respect to formal lenders, the survey allows for identifying whether these are banks or financial entities, employee funds or cooperatives, department stores, supermarkets, unions or associations, or government bodies granting education loans. Informal credit sources include friends, money lenders, family members (from other households), storekeepers, catalog purchases, and pawnshops or trading houses.

Table 2 shows the marginal effects of the estimations carried out using logit models.⁹ The results show that the likelihood of a household having at least one loan decreases as the age of the household head increases, although in a nonlinear manner.¹⁰ In particular, a 10% increase in the age of the household head reduces the probability of having a loan by close to 12% in urban areas and 18% in rural ones. This suggests that the older the head, the lower the likelihood of being in debt; this could be due to the fact that with increasing age these households are covering their needs (e.g., acquiring a home, children's education) with higher income, or become averse to indebtedness. When separate estimations are performed for formal and informal credit, in contrast to the case of informal credit, the results show that the probability of having formal credit increases with the age of the household head. This might be due to the requirements demanded by financial institutions (for example, credit history, guarantees, and stable employment).

⁹ The estimations were also performed for the sample of household heads in employment in order to establish whether the probability of having credit depended on the type of employment of the individual. In addition, estimations were carried out for each formal and informal source of credit. The results are not presented here to save space, but are available upon request.

¹⁰ The marginal effect of age refers to the impact of age and age squared.

Table 2

PROBABILITY OF HAVING AT LEAST ONE LOAN: LOGIT ESTIMATION
Marginal effects¹

Dependent variable one if the household has at least one loan; zero if not

	<i>Urban area</i>		<i>Rural area</i>	
	<i>Total credit</i>	<i>Formal credit</i>	<i>Informal credit</i>	<i>Informal credit</i>
Log of age	-0.1161 (0.0582) ^b	0.0658 (0.0328) ^b	-0.1199 (0.0429) ^a	-0.1789 (0.0376) ^a
Sex (male = 1)	-0.0118 (0.0322)	0.0132 (0.0258)	-0.0044 (0.0303)	0.0204 (0.0281)
Married (yes = 1)	0.1304 (0.0422) ^a	0.0376 (0.0371)	-0.0579 (0.0498)	0.0978 (0.0289) ^a
Separated (yes = 1)	0.0478 (0.0437)	0.0405 (0.0309)	-0.0315 (0.0493)	0.0294 (0.0378)
Middle school/high school (yes = 1)	0.0318 (0.0258)	0.0243 (0.0174)	-0.0389 (0.0237)	0.0128 (0.0228)
Technical/ technological education (yes = 1)	0.0061 (0.0519)	0.0407 (0.0284)	-0.0446 (0.0365)	0.1049 (0.0792)
Tertiary education (yes = 1)	-0.0032 (0.0460)	0.1300 (0.0212) ^a	-0.1733 (0.0329) ^a	0.2098 (0.0935) ^b
				0.0803 (0.0367) ^b
				-0.0219 (0.0282)
				0.0558 (0.0331) ^c
				-0.0787 (0.0403) ^c
				-0.0046 (0.0200)
				0.0841 (0.0580)
				-0.0009 (0.0721)
				-0.0704 (0.0418) ^c
				-0.0105 (0.0307)
				-0.0210 (0.0336)
				0.0919 (0.0450) ^b
				-0.0361 (0.0224)
				-0.0508 (0.0548)
				-0.0808 (0.0626)

Income quintile 2	0.1079 (0.0290) ^a	0.0496 (0.0191) ^a	-0.0657 (0.0269) ^b	0.0515 (0.0259) ^b	0.0019 (0.0284)	0.0483 (0.0324)
Income quintile 3	0.1015 (0.0317) ^a	0.1017 (0.0168) ^a	-0.1173 (0.0251) ^a	0.0746 (0.0267) ^a	0.0152 (0.0266)	0.0431 (0.0314)
Income quintile 4	0.2280 (0.0301) ^a	0.1253 (0.0205) ^a	-0.1495 (0.0306) ^a	0.1298 (0.0270) ^a	0.0356 (0.0263)	0.0056 (0.0307)
Income quintile 5	0.3072 (0.0318) ^a	0.1709 (0.0192) ^a	-0.2325 (0.0272) ^a	0.2622 (0.0251) ^a	0.0782 (0.0271) ^a	-0.0305 (0.0291)
Saves (yes = 1)	0.0113 (0.0305)	0.0456 (0.0188) ^b	-0.0733 (0.0276) ^a	0.0326 (0.0234)	0.0330 (0.0216)	-0.0172 (0.0236)
Government transfers (yes = 1)	0.0640 (0.0292) ^b	-0.0040 (0.0195)	-0.0088 (0.0244)	-0.0083 (0.0197)	-0.0152 (0.0177)	0.0190 (0.0202)
Household size	-0.0260 (0.0060) ^a	-0.0091 (0.0042) ^b	0.0061 (0.0054)	0.0093 (0.0050) ^c	0.0062 (0.0043)	-0.0078 (0.0053)
Homeowner (yes = 1)	0.0895 (0.0257) ^a	0.0217 (0.0189)	-0.0368 (0.0251)	0.0351 (0.0189) ^a	0.0023 (0.0176)	-0.0314 (0.0210)
Labor market participatipn (yes = 1)	0.0633 (0.0334) ^c	-0.0273 (0.0221)	0.0359 (0.0276)	0.0485 (0.0278) ^c	-0.0042 (0.0300)	0.0254 (0.0327)
Other shocks (yes = 1)	0.0681 (0.0237) ^a	-0.0038 (0.0169)	0.0493 (0.0238) ^b	0.0081 (0.0194)	0.0032 (0.0172)	-0.0107 (0.0204)
Accident shock (yes = 1)	-0.0001 (0.0251)	-0.0247 (0.0175)	0.0279 (0.0219)	0.0012 (0.0192)	0.0186 (0.0186)	0.0226 (0.0204)

	Urban area			Rural area		
	Total credit	Formal credit	Informal credit	Total credit	Formal credit	Informal credit
Separation shock (yes = 1)	0.0163 (0.0369)	-0.0157 (0.0268)	0.0678 (0.0458)			
Employment shock (yes = 1)	0.0505 (0.0258) ^b	-0.0034 (0.0183)	-0.0011 (0.0244)			
Family member intake shock (yes = 1)	0.0062 (0.0379)	-0.0019 (0.0233)	0.0157 (0.0283)	0.0911 (0.0285) ^a	-0.0306 (0.0254)	0.0178 (0.0301)
Move away shock (yes = 1)	-0.0095 (0.0326)	-0.0122 (0.0303)	0.0116 (0.0347)			
Disaster shock (yes = 1)	0.0859 (0.0267) ^a	0.0019 (0.0220)	0.0126 (0.0280)	0.0136 (0.0211)	-0.0301 (0.0192)	0.0272 (0.0217)
Plague shock (yes = 1)				0.1295 (0.0194) ^a	0.0073 (0.0182)	-0.0035 (0.0203)
Loss of animals shock (yes = 1)				0.0620 (0.0226) ^a	-0.0351 (0.0211) ^c	0.0502 (0.0231) ^b
Usage pay debts (yes = 1)		0.0514 (0.0169) ^a	0.1805 (0.0258) ^a		0.1867 (0.0218) ^a	0.1622 (0.0296) ^a
Usage clothes/food (yes = 1)		0.0416 (0.0173) ^b	0.1551 (0.0275) ^a		-0.1190 (0.0245) ^a	0.6058 (0.0243) ^a

Usage business (yes = 1)	0.1378 (0.0164) ^a	0.0120 (0.0284)	0.2673 (0.0246) ^a	-0.0622 (0.0327) ^c
Usage education (yes = 1)	-0.0262 (0.0356)	0.2354 (0.0553) ^a	0.0951 (0.0345) ^a	0.1346 (0.0470) ^a
Usage purchasing a home (yes = 1)	0.1583 (0.0151) ^a	-0.0907 (0.0372) ^b	0.1678 (0.0372) ^a	0.0942 (0.0503) ^c
Usage other assets (yes = 1)	0.1495 (0.0162) ^a	-0.0310 (0.0234)	0.1438 (0.0207) ^a	0.0730 (0.0275) ^a
Usage home improvements (yes = 1)	0.1293 (0.0159) ^a	0.1355 (0.0396) ^a	0.2482 (0.0227) ^a	0.0095 (0.0309)
Usage automobile (yes = 1)	0.0980 (0.0304) ^a	-0.0287 (0.0462)		
Usage farming investment (yes = 1)			0.4782 (0.0188) ^a	-0.1181 (0.0241) ^a
Region fixed effects	Yes	Yes	Yes	Yes
Number of observations	4,720	2,756	2,756	2,127

Notes: ¹ Marginal effects were calculated at the means for the continuous variable and at one for dichotomous variables. ^a $p < 0.01$, ^b $p < 0.05$,

^c $p < 0.1$

Source: Authors own calculations.

The likelihood of having at least one loan is higher in both urban and rural areas for married individuals as compared to the reference group (single/widowers). It is to be expected that these individuals need more credit to meet the requirements of their families.¹¹ Meanwhile, household heads in rural areas that are separated are less likely to borrow from formal sources and more likely to do so from informal ones.

As for education, in rural areas, having a tertiary education increases the probability of having credit by 21% compared to households where the head has only a basic or lower level of education. In urban areas, having a tertiary education is associated with a higher probability of a household having formal credit (13%) and a lower probability of having informal credit (17%). Other studies have also found a positive relation between formal credit and education. For instance, Magri (2007) finds that household heads with higher levels of education might have less difficulty gathering and assessing the information necessary to apply for a loan. Moreover, Chen and Chivakul (2008), and Swain (2007) point out that higher human capital increases a household's capacity to generate future income, facilitating access to credit.

Concerning household income, according to the literature the relation between current income and debt is ambiguous (Magri, 2007). For instance, Chen and Chivakul (2008), Del Rio and Young (2006), and Swain (2007) find that as current income increases, the likelihood of debt declines. Pastrapa and Apostolopoulos (2015), and Sorokina (2013) show that income does not affect the probability of having credit, while Crook (2001) finds that middle- and low-income households demand more credit when their income increases. Along the same lines, our results indicate that as income rises the probability of having at least one loan also increases, both for the sample of households in urban areas and that for households in rural areas. This result could be explained by the fact that the marginal utility of consumption is very high for low- and middle-incomes, meaning an increase in income might be reflected in increased spending, and therefore in a greater demand for credit (Magri, 2007; Del Rio and Young, 2006). When formal and informal credit are analyzed separately, we find that income increases the probability of having

¹¹ Del Rio and Young (2006) found a similar result for the United Kingdom.

formal credit in both urban and rural areas, and reduces the probability of having informal credit.

In urban areas, we also find households that save have a higher probability (4%) of having formal credit, given that savings can be used as a guarantee. These same households also have a lower probability of having informal credit (7%). Meanwhile, households in urban areas receiving government transfers (Families in Action program) are 6% more likely to have credit than those not receiving such transfers. Beneficiaries of this type of program probably have more information on access to credit because one of the requirements for participating in them is having a bank account. As for household size, we find that the probability of having credit decreases in urban areas. This could be a result of the fact that more individuals contribute to the family economy in such households, thereby reducing their credit requirements.

A dichotomous variable was included as a proxy for wealth that indicates whether a household is a homeowner or not. The latter asset can also be used as a guarantee, meaning a positive relation should be expected between this variable and the probability of having credit.¹² Our results suggest households that own a home are around 9% more likely to have credit than those that do not, in urban areas (6% in rural areas).

A positive relation is also expected between the work status of the household head and having at least one loan, given that individuals in employment might be less uncertain about their future income. The results show that a household head who participates in the labor market is around 6% more likely to have at least one loan than a head that does not, in urban areas (5% in rural areas).

As for shocks that could destabilize a household, the results show that in urban areas the household head becoming unemployed, natural disasters, and other shocks (for example, the death of a household head, spouse, or another family member; robbery, fire, or destruction of household assets) increase the probability of having credit. Meanwhile, in rural areas, plagues, loss of livestock, and the arrival or intake of another family member increase this probability.

The choice of credit source (formal or informal) could depend on the use given to the loan. A dichotomous variable was constructed

¹² See for instance Chen and Chivakul (2008), and Mohieldin and Wright (2000).

for each usage that takes the value One if the household has at least one loan for such use and 0 if it does not. The results show that households use formal as well as informal credit to pay debts. In particular, in the sample of households in urban areas, if the credit is used to pay debts, the likelihood of having a formal loan is 5% higher than if the credit was for other purposes, while that of an informal loan is 18% higher. In rural areas, this probability is around 17% higher for both types of credit.

Households in urban areas also use both types of credit sources to purchase clothes or food. Thus, for such households the probability of having formal credit is 4% higher than if the resources were allocated to other uses, while that of having informal credit is 16% higher. In rural areas, informal loans are mostly used for meeting household consumption requirements. The probability of obtaining informal credit for clothes or food is 61% higher than for other purposes, while the probability of obtaining formal credit is 12% lower.¹³ It is important to highlight the role of storekeepers as a credit source for financing the consumption requirements of clothes or food.

As would be expected, households turn more to formal loans, especially with banks or financial institutions, when setting up a business. The results suggest that the probability of having a formal loan is 14% higher in urban areas and 27% higher in rural ones, compared to other uses. With respect to credit used for purchasing a home, in both urban and rural areas, the likelihood of having formal credit is 16% higher than for other uses. Households also make home improvements using credit. In particular, the probability of financing these renovations with formal credit is 16% higher in urban areas and 23% higher in rural ones. As for purchasing furniture, home appliances, and other assets, the likelihood of having at least one formal loan is 15% higher in urban areas, whereas both credit sources are used in rural areas. In the case of formal credit, this probability is 14% higher than that for other purposes, while that of having informal credit is 7% higher. The results also indicate that if the household credit is for purchasing an automobile, it is 10% more likely to be financed with formal credit in urban areas.¹⁴

¹³ Jia et al. (2015) find that, in rural areas of China, informal loans are mainly used to satisfy the consumption requirements of farmers.

¹⁴ Using credit to purchase an automobile is only considered in the urban sample given that only 1% of households had credit for this item in the rural sample.

Formal credit is frequently used in rural areas for financing business and investment activities. For instance, 88% of loans used for investing in agriculture, livestock, and farm buildings was granted by banks or financial institutions. The estimates indicate that the probability of those households having formal credit for such items is 48% higher, while for informal loans the probability is 12% lower.

4.2 Probability of a Household Being in Arrears

In this section, we examine whether socioeconomic variables, credit usage, and different shocks that affected households could have some impact on the probability of debt default. The estimation equation is written as follows:

$$4 \quad \text{Arrears}_i = \gamma_0 + \gamma_1 X_{1,i} + \gamma_2 X_{2,i} + \gamma_3 X_{3,i} + \gamma_4 X_{4,i} + \eta_i,$$

where *Arrears* is a binary variable that takes the value One if household *i* is not up to date with payments of at least one of its loans and 0 if it is up to date with all loans. $X_{1,i}$, $X_{2,i}$, $X_{3,i}$ and $X_{4,i}$ are defined as in Equations 2 and 3. Equation 4 is also estimated separately for formal and informal credit.

As can be seen in Table 3, in general terms the results demonstrate that the sociodemographic characteristics of the household head do not significantly explain the probability of being in arrears. The variables that mostly explain these results are income and credit usage. In particular, the likelihood of being in arrears decreases with the age of the household head for formal credit in urban areas and for informal credit in rural areas.¹⁵ If the household head is married, in rural areas the likelihood of being in arrears is lower than for individuals who are single/widowers, which might be because the household head receives economic support from their spouse. In the same areas, the likelihood of being in arrears is lower (6%) for household heads that have middle or high school education than for those with basic or lower level of education. For informal loans, this likelihood is 5% lower.

¹⁵ Estimates were also carried out disaggregating age into the following ranges: 17-27, 28-37, 38-47, 48-57 and over 58. The estimations are not shown here, but are available upon request.

As for income, the probability of being in arrears decreases for the highest quintiles in both areas. For instance, in urban areas, the likelihood of being in arrears with a formal loan is 7% lower in quintile 5 than in quintile 1 (reference quintile), and in rural areas, this likelihood is 4% lower. Meanwhile, this probability rises for formal loans in both areas as household size increases. However, this is not the case for homeowners, whose probability of being in arrears decreases in both rural and urban areas.

With respect to shocks that destabilized the household, in urban areas the household head becoming unemployed as well as other events (for example the death of the household head, spouse, or other family member; a spouse or other household member becoming unemployed; robbery, fire, or destruction of household assets, among others) increase the likelihood of being in arrears given that such shocks have a direct impact on household income. On the other hand, the arrival or intake of a family member, and the occurrence of a natural disaster (flooding, avalanches, collapses, river overflows or landslides, storms, tremors, or earthquakes) increase the probability of being in arrears by 5% and 9% respectively.

Finally, when considering credit usage, we find that the likelihood of being in arrears in both areas is generally higher if the loans are used to pay debts (10% in urban areas and 14% in rural ones), to purchase clothes or food (15% in urban areas and 24% in rural ones), to set up businesses (17% in urban areas and 9% in rural), for other assets (14% in urban and 6% in rural) and to purchase a home (close to 36% in both areas), as compared to other uses. Nevertheless, for purchasing a home, the probability of being in arrears is 5% lower in urban areas if the loan was obtained from informal sources. On the contrary, the likelihood of being in arrears is higher if credit is used for education and home improvements than if the resources are used for other purposes. In rural areas, this probability is higher if the credit is used for agricultural investments and is obtained from formal sources.

Table 3

PROBABILITY OF A HOUSEHOLD BEING IN ARREARS: LOGIT ESTIMATION

Marginal effects¹

Dependent variable: One if the household is in arrears with at least one loan; zero if it is up to date on all loans

	<i>Rural area</i>					
	<i>Total arrears</i>	<i>Formal arrears</i>	<i>Informal arrears</i>	<i>Total arrears</i>	<i>Formal arrears</i>	<i>Informal arrears</i>
Log of age	0.0258 (0.0669)	-0.0611 (0.0302) ^b	-0.0052 (0.0214)	-0.0665 (0.0445)	0.0479 (0.0328)	-0.0847 (0.0329) ^a
Sex (male=1)	0.0184 (0.0359)	-0.0038 (0.0204)	0.0150 (0.0150)	0.0088 (0.0320)	0.0152 (0.0190)	0.0089 (0.0272)
Married (yes=1)	0.0245 (0.0465)	-0.0426 (0.0263)	0.0057 (0.0188)	-0.0722 (0.0404) ^c	-0.0184 (0.0262)	-0.0580 (0.0336) ^c
Separated (yes=1)	0.0389 (0.0447)	0.0064 (0.0233)	0.0172 (0.0225)	0.0003 (0.0466)	-0.0085 (0.0280)	0.0163 (0.0377)
Middle school/high school (yes=1)	-0.0322 (0.0287)	0.0215 (0.0174)	-0.0071 (0.0121)	-0.0616 (0.0231) ^a	-0.0089 (0.0163)	-0.0491 (0.0188) ^a
Technical / technological education (yes=1)	0.0091 (0.0425)	0.0453 (0.0303)	0.0185 (0.0208)	-0.0168 (0.0567)	0.0394 (0.0572)	0.0000 (0.0508)
Tertiary education (yes=1)	0.0800 (0.0595)	0.0400 (0.0288)	-0.0415 (0.0138) ^a	0.0574 (0.0867)	0.1079 (0.0789)	-0.0568 (0.0628)

	Urban area			Rural area		
	Total arrears	Formal arrears	Informal arrears	Total arrears	Formal arrears	Informal arrears
Income quintile 2	-0.0830 (0.0280) ^a	-0.0215 (0.0179)	-0.0322 (0.0106) ^a	0.0281 (0.0341)	0.0084 (0.0227)	0.0283 (0.0285)
Income quintile 3	-0.0376 (0.0330)	0.0029 (0.0208)	-0.0152 (0.0130)	-0.0061 (0.0322)	-0.0180 (0.0192)	0.0272 (0.0285)
Income quintile 4	-0.1198 (0.0308) ^a	-0.0071 (0.0193)	-0.0518 (0.0125) ^a	0.0326 (0.0366)	0.0222 (0.0257)	0.0030 (0.0279)
Income quintile 5	-0.1332 (0.0327) ^a	-0.0663 (0.0185) ^a	-0.0781 (0.0121) ^a	-0.0153 (0.0322)	-0.0402 (0.0179) ^b	0.0137 (0.0278)
Government transfers (yes = 1)	0.0162 (0.0310)	-0.0058 (0.0168)	0.0035 (0.0124)	-0.0085 (0.0217)	-0.0088 (0.0145)	0.0015 (0.0178)
Household size	0.0128 (0.0074) ^c	0.0143 (0.0033) ^a	0.0025 (0.0024)	0.0079 (0.0054)	0.0082 (0.0032) ^b	-0.0004 (0.0042)
Homeowner (yes = 1)	-0.0498 (0.0265) ^c	-0.0377 (0.0149) ^b	-0.0066 (0.0112)	-0.0453 (0.0221) ^b	-0.0180 (0.0164)	-0.0421 (0.0175) ^b
Labor market participation (yes = 1)	-0.0140 (0.0396)	-0.0439 (0.0239) ^c	0.0155 (0.0118)	0.0446 (0.0284)	0.0199 (0.0173)	0.0284 (0.0236)
Other shock (yes = 1)	0.0904 (0.0314) ^a	0.0505 (0.0149) ^a	0.0543 (0.0160) ^a	0.0226 (0.0213)	0.0230 (0.0155)	-0.0049 (0.0167)

Accident shock (yes = 1)	-0.0103 (0.0270)	0.0008 (0.0137)	0.0215 (0.0115) ^c	-0.0005 (0.0210)	-0.0219 (0.0129) ^c	0.0157 (0.0176)
Separation shock (yes = 1)	0.0439 (0.0474)	0.0216 (0.0300)	0.0120 (0.0209)			
Employment shock (yes = 1)	0.0537 (0.0366)	0.0565 (0.0209) ^a	0.0234 (0.0140) ^c			
Family member intake shock (yes = 1)	-0.0602 (0.0280) ^b	-0.0099 (0.0174)	-0.0181 (0.0131)	0.0520 (0.0301) ^c	-0.0006 (0.0192)	0.0430 (0.0243) ^c
Move away shock (yes = 1)	0.0311 (0.0355)	0.0405 (0.0252)	-0.0119 (0.0149)			
Disasters shock (yes = 1)	0.0223 (0.0441)	0.0114 (0.0202)	0.0345 (0.0190) ^c	0.0892 (0.0253) ^a	0.0328 (0.0180) ^c	0.0717 (0.0198) ^a
Plague shock (yes = 1)				0.0153 (0.0223)	0.0145 (0.0156)	0.0051 (0.0182)
Animal loss shock (yes = 1)				0.0129 (0.0260)	-0.0035 (0.0183)	0.0105 (0.0197)
Usage pay debts (yes = 1)	0.1023 (0.0331) ^a	0.0790 (0.0192) ^a	0.0723 (0.0141) ^a	0.1353 (0.0353) ^a	0.1170 (0.0318) ^a	0.0587 (0.0298) ^b
Usage clothes/food (yes = 1)	0.1480 (0.0380) ^a	0.0440 (0.0166) ^a	0.0976 (0.0196) ^a	0.2418 (0.0303) ^a	0.0064 (0.0205)	0.2500 (0.0273) ^a
Usage business (yes = 1)	0.2017 (0.0329) ^a	0.1673 (0.0271) ^a	0.0225 (0.0156)	0.0085 (0.0384)	0.0919 (0.0372) ^b	-0.0316 (0.0319)

	Urban area			Rural area		
	Total arrears	Formal arrears	Informal arrears	Total arrears	Formal arrears	Informal arrears
Usage education (yes = 1)	0.0450 (0.0508)	0.0613 (0.0289) ^b	0.0676 (0.0304) ^b	0.0227 (0.0507)	0.0535 (0.0436)	-0.0320 (0.0385)
Usage purchasing a home (yes = 1)	0.3697 (0.0635) ^a	0.0415 (0.0293)	-0.0540 (0.0095) ^a	0.3613 (0.0628) ^a	0.1007 (0.0637)	0.0202 (0.0598)
Usage other assets (yes = 1)	0.1420 (0.0448) ^a	0.0559 (0.0169) ^a	0.0023 (0.0117)	0.0561 (0.0268) ^b	0.0679 (0.0239) ^a	0.0332 (0.0225)
Usage home improvements (yes = 1)	0.1508 (0.0602) ^b	0.0707 (0.0296) ^b	0.0648 (0.0281) ^b	-0.0166 (0.0408)	0.0147 (0.0370)	-0.0027 (0.0342)
Usage automobile (yes = 1)	-0.0879 (0.0416) ^b	0.0501 (0.0378)	0.0049 (0.0327)			
Usage farming investments (yes = 1)				0.0406 (0.0247)	0.1030 (0.0214) ^a	-0.0317 (0.0193)
Regional fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,756	2,756	2,756	2,127	2,127	2,127

Notes: ¹ Marginal effects were calculated at the means for the continuous variable and at one for dichotomous variables. ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$
Sources: Authors own calculations.

5. FINAL REMARKS

This paper studies two important topics concerning households' financial behavior. First, the determinants of formal and informal indebtedness, and second, the likelihood of them being in arrears. The coexistence of formal and informal credit markets is a widespread phenomenon in Colombia. Hence, understanding the factors that affect the probability of a household having credit, depending on the origin of the resources, is of significant interest for a developing country such as Colombia.

The evidence presented in this paper highlights the importance of increasing the participation of formal credit among the sources of financing used by households to reduce the risks and costs associated with some informal credit sources. This process should be accompanied by appropriate regulation, as well as greater financial education to prevent overindebtedness among households, considering the risks this might have on the stability of the financial system. The high share of credit used for clothes or food could reflect problems of low incomes for meeting households' basic needs, meaning public policies oriented toward creating and formalizing employment might be necessary.

The results demonstrate how the probability of having formal credit increases with the age of the household head, education and income, which is the opposite to what occurs with informal credit. The results show that young people, low-income individuals, and those with low levels of education are less likely to have access to credit, especially formal credit. These individuals face credit constraints which marginalize them and prevent them from developing their business potential, generating poverty traps. Hence, public policies aimed at creating and formalizing employment are needed. Some strategies could include investing in education and technical training. In Colombia, a randomized trial of the Youth in Action program, which provides classes and training to thousands of unemployed youngsters (Attanasio et al., 2011) showed that, ten years after the intervention, participants had a greater probability of working in the formal sector and having higher earnings. This type of initiative could, therefore, help loosen credit constraints and reduce inequality.

The factors most explaining arrears are income and credit usage. In this direction, public policies could be envisaged that are

geared toward improving the management of household finances and responsible use of money, such as preparing a spending plan that identifies sources of income, and defines expenses and debts so a household can be aware of its budget and stick to it. Messages (reminders) reminding individuals of commitments, spending limits, and payment dates also help them to be more responsible with their finances (Karlan et al., 2014).

Finally, it would be important to consider behavioral factors that might affect arrears on debt. In particular, the literature has shown how common behavioral biases such as problems of self-control, present-bias, limited attention problems (people *forget* to set aside money for expenditure needs) impede individuals from being up to date with their payment obligations (Karlan et al., 2014).

ANNEX

Description of Variables Used in the Estimations

DESCRIPTION OF VARIABLES	
<i>Variables</i>	<i>Description</i>
<i>Endogenous Variables</i>	
Loans	One if the household has at least one loan; zero if it does not have any
Formal credit	One if the household has at least one loan with banks or financial entities, employee funds or cooperatives, department stores, supermarkets or Codensa, family compensation funds, unions or associations, employer or Icetex; zero if it does not.
Informal credit	One if the household has at least one loan with family members (from other households), friends, money lenders, storekeepers, catalog shopping, pawn shop or trading house, and other informal sources; zero if it does not.
Arrears	One if the household is in arrears with at least one of its loans; zero if it is up to date with all its loan payments.

Explicative Variables

Age	The age of the household head in years at the time of the survey.
Sex	One if the household head is male; zero if not.
Married	One if the household head is married or cohabiting; zero if not.
Separated	One if the household head is separated; zero if not.
Widower	One if the household head is a widower; zero if not.
Single	One if the household head is single; zero if not.
No education	One if the household head has not completed primary/basic education; zero if they have.
Primary	One if the highest level of education completed by the household head is basic/primary; zero if not.
High school/ middle school	One if the highest level of education completed by the household head is high school/middle; zero if not.
Technical/ technological education	One if the highest level of education completed by the household head is technical, with or without a degree, or technological, with or without a degree; zero if not.
Tertiary education	One if the highest level of education completed by the household head is university, with or without a degree, postgraduate degree, with or without a degree; zero if not.
Household income	Total household income consists of labor and non-labor income. An alternative definition was used for the rural sector that also includes additional payments other than salary received by the household (food, housing, education, subsidies, food and transport vouchers, or family allowance) and net profits or fees generated by their activities.
Household size	The number of individuals in the household
Homeowner	One if the household is a homeowner (fully paid for or being paid for); zero if not.
Labor participation	One if the household head participates in the labor market; zero if they do not.
Usage debts	One if credit is used for paying debts; zero if not.
Usage clothes/ food	One if credit is used for purchasing clothes or food; zero if not.
Usage business	One if credit is used for investing in a business; zero if not.

<i>Variables</i>	<i>Description</i>
Usage education	One if credit is used for their own or their children's education; zero if not.
Usage purchasing a home	One if credit is for purchasing a home; zero if not.
Usage other assets	One if credit is used for purchasing other assets, furniture or home appliances; zero if not.
Usage home improvements	One if credit is for home improvements; zero if not.
Usage automobile	One if credit is for purchasing an automobile; zero if not.
Usage farming investments	One if credit is for investing in agriculture, livestock or farm buildings; zero if not.
Shock accident	One if a household member suffered an accident or illness that prevented them performing day-to-day tasks; zero if not.
Shock separation	One if the spouses were separated; zero if not.
Shock leaving	One if the household had to leave its habitual place of residence; zero if not.
Shock employment	One if the household head became unemployed; zero if not.
Shock family member intake	One if a family member arrived or was taken in by the household; zero if not.
Shock plagues	One if the household suffered plagues or crop failures; zero if not.
Shock loss of animals	One if the household suffered loss or death of animals; zero if not.
Shock disasters	One if the household suffered flooding, avalanches, land collapse, river overflows or landslides, storms, tremors, or earthquakes; zero if not.
Shock others	One if the household experienced death of the household head, spouse or another family member; a spouse or another household member becoming unemployed; bankruptcy or closure of family businesses; loss or reduction of remittances; loss of farms, lots or plots of land; robbery, fire or destruction of household assets, or were victims of violent crimes. Rural areas also included whether the household had to move away from its habitual place of residence, if the household head became unemployed, and if the spouses separated; zero if not.
Government transfers	One if the household is a beneficiary of the families in action program; zero if not.

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