# Mitigating asymmetric information in credit markets: Evidence from Microcredit \*

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#### Abstract

This paper analyzes the impact of microcredit on the transition to credit lines in the rural sector. We show that borrowers who enter the subsidized credit market through microcredit programs transition to credit lines with higher loan volumes, lower interest rates, and longer maturities relative to borrowers who enter this market directly. Our results suggest that by reducing informational frictions, the expansion of microcredit through public policy promotes the transition of new borrowers to credit markets dominated by large borrowers.

Keywords: Asymmetric information, microfinance, financial inclusion, rural credit

**JEL Codes**: G21, O12, O55

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## 1 Introduction

Microcredit facilitates the inclusion of borrowers who are typically excluded from the traditional credit market, enabling them to access the financial system and build a credit history. This history serves as a basis for financial intermediaries to assess the feasibility of providing larger loans using conventional technology. This, in turn, has the potential to mitigate adverse selection problems within this population (Agarwal et al., 2023; Cull et al., 2014). Using microdata from subsidized credit markets in Colombia, this study provides novel empirical evidence on this mechanism.

Microcredit has been shown to facilitate the financing of borrowers excluded from the traditional credit system (Banerjee et al., 2015; Dahal and Fiala, 2019). However, the direct impact of microcredit on agricultural producers may be limited because it is limited to small loans, short maturities, and high interest rates, making it difficult to use for long-term investments (Conning and Udry, 2007; Field et al., 2013). This study provides evidence of a possible indirect effect of microcredit on small farmers' access to credit by providing financial intermediaries with more accurate information about potential borrowers, thereby reducing information asymmetries.

We study the relationship between agricultural microcredit policy and access to credit for small farmers in Colombia, both of which are subsidized loans, which is a type of credit offered by financial intermediaries (banks and financial entities specialized in microcredit) using resources from a second-tier public bank (FINAGRO).<sup>1,2</sup> In 2016, agricultural microcredit began an accelerated expansion process in the country. This expansion was encouraged by regulatory changes that facilitated the use of rediscount funds for microcredit intermediation. We assess the transition from microcredit to traditional credit among producers entering the financial system for the first time in the wake of the expansion of agricultural microcredit

<sup>&</sup>lt;sup>1</sup>In Colombia, this type of credit is known as *Créditos de redescuento* 

<sup>&</sup>lt;sup>2</sup>In this document, we refer to subsidized credit that is not microcredit as traditional credit or credit lines.

lines. The results of this study indicate that despite the low probability of microcredit beneficiaries accessing traditional credit in the short term, those who successfully transition to the traditional subsidized credit system benefit from more favorable financial conditions, including larger loan amounts, longer repayment periods, and lower interest rates, compared to producers who enter the system directly through traditional subsidized credit.

Our findings are consistent with the notion that the credit history cultivated through microcredit can serve to reduce information asymmetries and improve access to finance for potentially profitable borrowers who have been marginalized in the credit market. It should be noted, however, that these cases represent a relatively small proportion of the total number of microcredit beneficiaries. This observation underscores the notion that the scope of these potential effects is limited, suggesting that other barriers may predominate.

#### 2 Contribution to literature

Information asymmetries stem from lenders' inability to perfectly observe the characteristics of potential borrowers when allocating loans, which can result in the allocation of loans to borrowers who are systematically riskier than others (Jaffee and Russell, 1976; Bebczuk, 2003). This phenomenon is referred to as adverse selection in the literature. Additionally, lenders' inability to observe borrowers' actions to guarantee repayment of debts after a loan has been granted can generate incentives for borrowers to default on their obligations. This phenomenon is referred to as "moral hazard" in the academic literature (Banerjee and Duflo, 2010; Crawford et al., 2018).

The presence of asymmetric information and moral hazard poses significant challenges to the financial system. It leads to rationing of credit and inefficient allocation of resources, affecting both quantities and prices in the credit market (Stiglitz and Weiss, 1981; Bester, 1985). It is therefore essential to develop mechanisms that mitigate these negative effects and promote a more equitable and efficient distribution of credit. For example, Agarwal et al. (2022) finds that the demand for banking services among the unbanked population is substantial; however, when they do have access to credit products, they show an increase in delinquency rates on loans to newly banked consumers, suggesting that unbanked borrowers have lower credit quality. In this sense, microcredit can be used as an engagement product to address these challenges. Microcredit tests the capacity of borrowers to engage in short and medium-term relationships to cover their debts, thereby increasing trusted debtors in the future (Banerjee and Duflo, 2010). At the same time, these credit products enable beneficiaries to acquire the necessary resources to start or expand their businesses, improve their ability to cope with emergencies, and maintain their consumption levels without experiencing a prolonged decline in their material well-being (Armendáriz and Morduch, 2010; Bruhn and Love, 2014).

Financial inclusion and the impact of microcredit have been studied extensively in the literature. Agarwal et al. (2023) highlight how a large-scale microcredit expansion program, coupled with a credit bureau accessible to all lenders, can enable unbanked borrowers to build a credit history, facilitating their transition to commercial banks. Loan-level data from Rwanda show that the program increased access to credit and reduced poverty. A significant proportion of first-time borrowers moved to commercial banks, which select less risky borrowers and offer them larger, cheaper, and longer-term loans.

This impact is especially evident in the rural sector, where farmers and workers face seasonal income fluctuations, making them vulnerable to economic booms and busts. Access to additional resources through microfinance can be critical for managing the uncertainty and unpredictability inherent in rural incomes (Collins et al., 2009). Brown et al. (2016) find that the presence of microfinance branches in rural areas can significantly improve access to financial services for marginalized populations. They examine how the proximity of microfinance bank branches affects financial inclusion, highlighting the positive impact on lowincome households. In Ghana, having a loan earmarked for the development of a productive enterprise with collateral has been shown to increase the likelihood of obtaining credit (Mishra et al., 2020). Promoting financial inclusion for low-income populations can improve household asset accumulation and financial security (Celerier and Matray, 2019).

In addition, microcredit can potentially substitute for other forms of informal credit. In India, where informal borrowing was common, the introduction of formal microcredit was followed by a decline in its use. Studies have shown positive effects on occupational choice, business size, consumption, women's decision-making power, and risk management, although these effects are not always transformative (Banerjee et al., 2015).

Moreover, microcredit and its promotion can have benefits beyond financial markets. Beck et al. (2000) show that financial development, total factor productivity and real GDP growth are positively correlated, and that better functioning financial intermediaries improve resource allocation and accelerate total factor productivity. Similarly, King and Levine (1993) highlights the positive impact of financial development on real GDP per capita, physical capital accumulation and the rate of physical capital accumulation. Other works have found more specific effects on the development of microcredit, such as Fulford (2013), who describes the effect that microcredit has on consumption, where consumers will tend to consume more initially, and even if in the long run perhaps a decrease in average consumption, in the short run it could have positive effects on productive activities and on the level of investment and saving of households. This result is supported by other studies, such as the impact evaluation in Brazil conducted by Bettoni et al. (2023), where they found that microfinance programs as a policy tool to help local small businesses grow and become more profitable, expanding employment and income generation, and they also found that this increase in credit supply has the potential to generate virtuous cycles of ever more reinvestment and growth, indicating that the benefits of relaxing borrowing constraints may be even greater in the long run. This paper also contributes to the literature on the impact of microcredit on the Colombian economy. Estrada and Hernández (2019) and Estrada et al. (2022) highlight

the role of microcredit as a tool to eradicate poverty and promote financial inclusion.

Our study highlights the importance of initial access to microcredit in improving information and credit conditions in the future. Credit scores as an outcome measure not only reflect borrowers' ability to meet their obligations, but also reduce information asymmetries and facilitate access to better financing opportunities. Although microcredit may have modest positive effects on borrowers' ability to access traditional credit in the future, in line with Karlan and Zinman (2010), borrowers who demonstrate adequate repayment behavior tend to build positive credit histories, enabling them to obtain larger loans with more favorable terms in the future.

## 3 Background

From 2012 to 2016, a number of regulatory changes were implemented in Colombia with the aim of promoting the expansion of microcredit in rural areas of the country. The following is a brief description of these regulatory changes (see Annex A for details). CNCA Res. 7 of 2012: This resolution authorized Finagro to implement a rediscount line for agricultural and rural microcredit. This resolution establishes the terms and conditions for this microcredit line, including the maximum amount set at 25 SMMLV, the established rediscount rate of DTF+2.5, the interest rate for the end user, which may be established within the limits of the law, and the established maximum term of 2 years. Resolution 2 of 2014 of the CNCA modifies Resolution 7 of 2012, authorizing the placement of own funds of financial intermediaries to finance the agricultural and rural microcredit line and allowing the granting of guarantees from the Agricultural Guarantee Fund (FAG). Subsequently, Law 1731 of 2014 created the Rural Microfinance Fund (FMR), which is managed by Finagro. The objective of the FMR is to finance, support and develop rural microfinance in the country.

In 2015, the CNCA promulgated Research 12 of 2015, which amended Research 7 of 2012 by including voluntary microinsurance premiums associated with microloans among the

eligible costs. As a result, Decree 2370 of 2015 expanded the sources of funding for the FMR by allowing contributions from public or private entities.

In 2016, Resolution 1 of 2016 of the CNCA compiled the regulation of the granting of microcredit and credit for agricultural and rural development, defining the beneficiaries, the activities that can be financed, and specifying the financial conditions, following the provisions of Resolution 7 of 2012 of the CNCA. This CNCA regulation represented a significant shift in agricultural microcredit policy, specifying some aspects of credit conditions and beneficiaries. This regulatory shift was intended to operationalize the changes outlined in previous resolutions, thereby incentivizing financial intermediaries to proactively engage in this particular credit modality. Figure 1 shows that in 2016, there was a significant acceleration in the growth of the microcredit portfolio, which had been almost non-existent in previous years.

#### 4 Data

Our main objective is to assess whether microcredit reduces information asymmetries in the subsidized credit market in Colombia. For this purpose, we use data from Finagro disbursements, which includes the universe of subsidized credit operations carried out by financial intermediaries (credit institutions and financial institutions specialized in microcredit) during the period 2015-2019.

The classification of subsidized operations is determined by the type of disbursement. Substitute portfolio and rediscount operations are classified as traditional subsidized credit operations, while those carried out using microcredit technology are classified as subsidized microcredit operations. The conditions described in Section 2 apply to traditional subsidized credit operations. The conditions established in Res. 7 of 2012 of the CNCA and its subsequent amendments govern the subsidized microcredit operations. The database contains a variable that distinguishes between disbursements subject to traditional credit conditions and those subject to microcredit conditions. This variable is used to categorize disbursements under the two different types of credit.

The database contains only disbursement observations, defined as loans that were actually disbursed to producers. It does not include information on loan applications that were denied. The data include loan characteristics such as amount, interest rate, term, investment municipality, loan destination, and financial intermediary identifier. It also provides information on the borrower, including an anonymized identifier, the value of their assets, and their gender.

Figure 1 shows the evolution of subsidized credit disbursements between 2015 and 2019, distinguishing between microcredit and traditional credit. Between the second quarter of 2016 (2016q1) and the third quarter of 2017 (2017q3), microcredit grew by 219%, from 17 billion (MM) to 54 MM. However, there was a contraction in microcredit disbursements between the end of 2017 and mid-2018, which was reversed in 2019.



Figure 1: Evolution of subsidized credit: Microcredit and traditional credit lines

Note: Evolution of disbursements for subsidized microcredit and other subsidized modalities between 2015q2 and 2019q4. Includes the modalities of LEC, ordinary credit, and other modalities of subsidized credit without including agricultural card, normalizations and restructurings. Source: FINAGRO; own calculations.

Of the beneficiaries who entered the National Agricultural Credit System (SNCA) through subsidized microcredit between the second quarter (Q2) of 2016 and Q2 of 2017, 5.2% opted for traditional subsidized credit, 20.2% accessed subsidized microcredit again, and 74.6% did not access any type of credit during the period from Q3 of 2017 to Q4 of 2019. As a result, only 5.2% of beneficiaries successfully transitioned out of the SNCA system within two years of their initial enrollment.

Our sample includes 1,390,872 loans with 46 financial intermediaries and 954,056 borrowers between 2015q2-2019q4. The predominant intermediaries in the subsidized microcredit market during the analysis period are Bancamía (43.5%), Banco Mundo Mujer (28.9%), and Banco W (13%). It is noteworthy that only four of the financial intermediaries are non-bank institutions specialized in microfinance, accounting for only 1.12% of microcredit disbursements. In contrast, as explained in section 2, the predominant financial intermediary in the area of traditional subsidized credit is the Banco Agrario de Colombia (BAC).

As shown in table 1, the average amount of microcredit operations is 1.9 million pesos, while the average amount of traditional subsidized loans is 10.9 million pesos. Similarly, the interest rate is significantly higher for microcredit (45%) compared to traditional subsidized loans (11%). The average duration of microcredit is 15.6 months, while it is 58.9 months for traditional loans. These statistics suggest that microcredit imposes stricter financial conditions and that a switch to traditional credit could be beneficial for the profitability of borrowers' productive activities.

Table 1: Descriptive statistics of the promotion credit (2015q2-2019q4)

Panel A. Subsidized Microcredit							
Variable	$\mathbf{Obs}$	Mean	St. dev.	p25	p75	p90	
Loan amount	299,684	1,977,443	1,291,521	1,050,000	2,282,654	3,420,032	
Loan Rate $(\%)$	$299,\!684$	45.59	7.42	41.60	52.72	55.22	
Maturity	$299,\!684$	15.63	4.35	12	19	21	

Panel B. Traditional Subsidized Credit							
Variable	$\mathbf{Obs}$	Mean	St. dev.	p25	p75	p90	
Loan amount	$1,\!130,\!332$	10,900,000	9,794,508	5,000,000	12,000,000	21,900,000	
Loan Rate $(\%)$	$1,\!130,\!332$	11.04	2.53	9.86	12.74	13.92	
Maturity	$1,\!130,\!332$	58.85	29.11	24	83	105	

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Note: Statistics on disbursements of microcredit and other modalities between 2015q2 and 2019q4. Includes the modalities of LEC, ordinary credit, and other subsidized modalities credit without including agricultural card, normalizations and restructurings. Credit value in pesos, rate in percentage and term in months. Source: FINAGRO; own calculations.

Table 2 shows that microcredit disbursements have remarkable characteristics. On average, male beneficiaries receive higher disbursements than female beneficiaries. In addition, microfinance institutions typically provide loans that are larger on average than those provided by banks. During the study period, credit institutions granted a greater number of loans than microfinance institutions, but microfinance institutions offered longer maturities. Finally, beneficiaries with above-average assets received loans with lower interest rates and longer maturities than those with below-average assets.

Panel A. 2016Q2-2017Q2							
Variable	Category	Loan amount	Interest rate $(\%)$	Maturity (Months)	Total disbursements	Total beneficiaries	
	Yes	1,881,830	47.20	15.17	28,573	27,070	
Post-conflict Municipalities	No	1,864,714	46.48	15.08	75,765	70,581	
Candan	Male	1,913,561	46.39	15.13	52,094	48,626	
Gender	Female	1,825,345	46.97	15.08	52,243	49,024	
Intermediant Trues	Credit institution	1,866,575	46.71	15.07	103,499	96,829	
Intermediary Type	Microfinance Institution	2,218,105	42.58	18.97	839	822	
Acceta	Above P50	2,618,219	44.12	16.16	8,982	8,388	
Assets	Below P50	1,798,867	46.92	15.01	95,356	89,263	
Truel and it is a	Legal entity	1,894,502	45.56	15.30	16,906	14,192	
Legal entity type	Natural person	1,864,548	46.90	15.07	87,432	83,459	
		Panel	B. 2017Q3-2019	Q4			
Variable	Category	Loan amount	Interest rate $(\%)$	Maturity (Months)	Total disbursements	Total beneficiaries	
	Yes	2,063,040	45.02	15.91	61,347	51,966	
Post-conflict Municipalities	No	2,023,751	45.04	15.86	130,653	109,162	
Condor	Male	2,067,164	44.93	15.92	101,044	84,986	
Gender	Female	2,001,934	45.15	15.82	90,955	76,141	
Intermediant Turne	Credit institution	2,012,734	45.41	15.82	189,465	158,744	
intermediary Type	Microfinance Institution	3,797,914	16.67	19.95	2,535	2,384	
Assots	Above P50	3,349,639	40.05	17.99	18,895	16,073	
Assets	Below P50	1,892,949	45.58	15.64	173,105	145,055	
Logal ontity type	Legal entity	1,947,004	44.40	15.56	20,689	20,448	
Legal entity type	Natural person	2,047,054	45.11	15.91	171,308	140,677	

#### Table 2: Characteristics of subsidized microcredit <sup>3</sup>

Note: Statistics of microcredit disbursements for the period 2015q2 and 2019q4. Credit value in pesos, rate in percentage and term in months. Includes number of disbursements and beneficiaries per category. Source: FINAGRO; own calculations.

#### 4.1 Empirical Strategy

In this section, we assess the extent to which microcredit contributes to reducing information asymmetries in the credit market. To this end, we analyze the access to traditional subsidized credit by producers who enter the system for the first time through subsidized microcredit. Specifically, we conduct three exercises to compare the probability of access and the conditions of traditional subsidized loans obtained by these producers with those of similar producers who enter the system directly through traditional subsidized loans.

The analysis period is divided into three distinct segments:

(i) 2015q2 to 2016q1: The period considered here includes the period prior to the imple-

<sup>&</sup>lt;sup>3</sup>The results in the standardized mean difference tests suggest that there is a significant difference in the rate, term, and disbursed amount of microloans for the variables of banking intermediaries (EC=1, not EC=0), assets (Assets>median=1, Assets<median=0) for the periods analyzed (2016q2 to 2017q2 and 2017q3 to 2019q4). Additionally, there are significant differences in the standardized means for the rate applied to microcredit disbursement in the natural person variable (PN=1, PJ=0) only for the period 2016q2 to 2017q2.

mentation of Resolution 1 of 2016. This period was used to identify producers who did not have access to credit before the expansion of microcredit. The producers identified in this analysis constitute the universe of our subsequent study.<sup>4</sup>

- (ii) 2016q2 to 2017q2: The period immediately following the implementation of the policy is of particular relevance in this context. The term "comparable producers" is used to refer to those who enter the system for the first time through the microcredit subsidy, as well as producers who enter directly with traditional subsidized loans. The use of this term facilitates the identification of relevant producers.
- (iii) 2017q3 to 2019q4: The period under consideration covers a maximum of two years after the initial enrollment of borrowers in the microcredit program, with the aim of facilitating their economic development. This period serves as the analytical basis for all the estimates presented below.

As a result, the estimates presented here focus on traditional subsidized disbursements allocated from 2017q3 to 2019q4 to the cohort of producers who did not obtain loans until 2016q1. Producers are divided into three groups for analysis. Group 1. Producers who first entered the system with a promotional microcredit disbursed between 2016q2 and 2017q2 (the main focus of the study) will be included in the analysis. Group 2. Producers who first accessed the system during the designated period with a traditional promotional loan disbursed between the second quarter of 2016 and the second quarter of 2017 (hereafter, the "first comparison group") were included in the analysis. Group 3. Producers entering the system for the first time with a traditional promotional loan disbursed between the third quarter of 2017 and the fourth quarter of 2019 (the second comparison group) are included in the study. See Annex B for the descriptive statistics of each of these analysis groups.

<sup>&</sup>lt;sup>4</sup>It should be noted that the scope of the present dataset includes only subsidized credit. Given the observation that the terms of subsidized loans are more favorable than those of standard market loans, and given the focus on small producers, it is highly likely that any producer who did not have access to subsidized loans by 2016Q1 also did not have access to standard market loans. Consequently, these producers can be considered as those without access to credit.

#### 4.1.1 Transition from promotional microcredit to traditional promotional credit

In this exercise, we examine the factors associated with the transition of borrowers from microcredit to traditional credit in the subsidized segment. To do so, we focus exclusively on a group of borrowers who first entered the system with microcredit between 2016Q2 and 2017Q2 (Group 1). We then estimate their probability of accessing a traditional loan between 2017Q3 and 2019Q4. Equation 1 describes the probability model we estimate.

$$Y_{i,t} = \alpha + \gamma \text{Borrower}_i + \theta X_{i,0} + m_t + \epsilon_{i,t} \tag{1}$$

 $Y_{i,t}$  takes the value 1 if individual *i* receives a microcredit in quarter *t* and 0 otherwise. Borrower<sub>i</sub> refers to characteristics of the borrower *i* such as the log of his wealth, gender (1 female, 0 male), type of municipality (1 if it is a post-conflict municipality, 0 otherwise), whether it is a legal entity (1 if it is a legal entity, 0 otherwise), and dummies by rurality category (cities and agglomerations, intermediate, rural, and dispersed rural). The vector  $X_{i,0}$  includes characteristics of the microcredit with which the borrower enters the system. In particular, it includes the type of institution providing the microcredit (1 for credit institutions and 0 for others), the amount, the interest rate and the maturity. The specification also includes time fixed effects  $m_t$  to control for macroeconomic factors that affect the supply and demand of credit in each quarter.

The results presented in table 3 show that women and borrowers with lower asset levels are less likely to transition from subsidized microcredit to traditional subsidized credit. A plausible interpretation of these results, as outlined in the literature presented in Section 1, is that women and borrowers with lower asset levels face heightened barriers to accessing credit due to financial intermediaries' perceptions of increased risk and reduced ability to service their debts. In addition, beneficiaries who have accessed microcredit through banking institutions are less likely to make this transition than those who have done so through non-bank institutions. In contrast, borrowers in post-conflict communities are more likely to transition to traditional subsidized credit.

Variables	Estimate
Log (Assets)	0.021***
	(0.0006)
Gender	-0.017***
	(0.001)
Intermediary Type	-0.014**
	(0.007)
Post-conflict Municipalities	$0.006^{***}$
	(0.001)
Observations	90,009
Prob > Chi2 (Wald Test)	0.0001

Table 3: Probability of transition from subsidized microcredit to traditional subsidized credit

Notes: Estimation of the probit model presented in Equation 1. Includes controls for the logarithm of the amount, interest rate and term of the initial loan obtained by beneficiaries and dummies for region, legal entity, area (rural or urban) and time. Robust standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

# 4.1.2 Probability of access to traditional credit: Entrants with microcredit vs. entrants with traditional credit.

In the following analysis, the probability of accessing traditional credit between 2017q3 and 2019q4 is compared between two groups of producers. The first group consists of those who first entered the system with microcredit between 2016q2 and 2017q2 (Group 1). The second group consists of similar producers who entered through traditional credit during the same period (Group 2).

To do this, we estimate the following model using data from 2017q3 to 2019q4:

$$Y_{i,r,t} = \alpha + \beta \text{Microcredit}_i + \gamma \text{Borrower}_i + \theta X_{i,0} + m_t + \pounds_r + \epsilon_{i,r,t}$$
(2)

 $Y_{i,r,t}$  takes the value of 1 if individual *i* in region *r* receives a traditional subsidized credit in quarter *t*, and 0 otherwise. Microcredit<sub>*i*</sub> takes the value of 1 for producers who

entered the system with microcredit between 2016q2 and 2017q2 (group 1) and 0 for those producers who entered the system with traditional subsidized credit during the same period (group 2).<sup>5</sup> As in the previous specification, characteristics of the borrower (gender, assets, type of municipality, legal entity, rural category) and of the loans with which borrowers enter the system (type of intermediary, amount, interest rate, and term) are included. The specification also includes time fixed effects  $m_t$  and  $\mathcal{L}_r$  of region.

Table 4 shows that producers who enter the system with microcredit have, on average, a 23 percentage point (pp) lower probability of receiving a traditional credit disbursement between 2017q3 and 2019q4 compared to producers who enter directly with this type of credit. These results are robust to the inclusion of various control variables.

Table 4: Probability of access to traditional subsidized credit: Entrants with subsidized microcredit vs. entrants with traditional subsidized credit

Variables	(1)	(2)	(3)
Microcredit	-0.228***	-0.229***	-0.234***
	(0.007)	(0.006)	(0.006)
Observations	$119,\!307$	$119,\!307$	$119,\!307$
Prob > Chi2 (Wald Test)	0.0001	0.0001	0.0001

Notes: Estimates of the probit model presented in Equation 2. All specifications include the logarithm of the amount, interest rate and term of the initial loan obtained by beneficiaries, region, legal entity and time dummies. Model (1) includes as controls an indicator for post-conflict municipalities and for the gender of the borrower. Model (2) also includes the type of intermediary and model (3) includes in addition to model 2 the value of assets and an indicator for legal entities. Robust standard errors. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

The lower likelihood of producers from the microcredit segment accessing a traditional loan disbursement may reflect initial differences in the characteristics of producers participating in each segment. Given the difference in interest rates between microcredit and traditional subsidized loans, it is likely that producers who enter the financial system through microcredit do so because they faced restrictions in accessing the traditional subsidized market. These restrictions could be related to the high risk perception that financial intermediaries have

<sup>&</sup>lt;sup>5</sup>Only these small and medium producers are included to make the sample as comparable as possible to borrowers who have access to microcredit. Small and medium producers are included in the category of subsidized microcredit.

of these producers, based on signals that in some cases do not accurately reflect their true ability to pay, but rather errors in the available information. For this group, entry into the financial system through promotional microcredit allows them to build a reputation as good borrowers, which eventually facilitates their transition to traditional promotional credit. For other microcredit users, however, the information available may still indicate a high level of risk, limiting their access to traditional subsidized loans.

Producers who enter directly into the traditional subsidized system have already demonstrated that they meet the criteria required by financial intermediaries. Therefore, as the results suggest, it is expected that these producers will be more likely to have access to traditional credit after their first loan than those who initially entered through microcredit.

In summary, producers who enter directly into the traditional credit system are more likely to continue to have access to this type of financing because they meet the minimum requirements from the outset. In contrast, many of those who enter through microcredit do not meet the necessary standards for transition, although a small proportion do. This suggests that while microcredit provides additional information about borrowers, it is not always sufficient to overcome the barriers to accessing traditional subsidized finance.

#### 4.1.3 Conditions for access to traditional credit

To complement the results of the previous exercise, we compared the terms of traditional loans granted between 2017Q3 and 2019Q4 for the same groups analyzed previously: producers who entered the system through microcredit (Group 1) and those who accessed directly through traditional credit (Group 2) between 2016Q2 and 2017Q2.

We estimate the following equation using observed traditional subsidized credit disbursements between 2017q3 and 2019q4:

$$Y_{i,t,b} = \alpha + \beta \text{Microcredit}_i + \gamma \text{Borrower}_i + \theta X_{i,0} + m_b + \eta_{p,t} + \epsilon_{i,b,t}$$
(3)

Where  $Y_{i,t,b}$  are characteristics of credit disbursed to borrower *i* by intermediary *b* in quarter *t*: log (amount disbursed); interest rate ( in %) and log of credit duration (months). As in the previous exercise, Microcredit<sub>*i*</sub> equals 1 for producers who entered the system with microcredit between 2016q2 and 2017q2 (group 1) and 0 for producers who entered the system with traditional credit (group 2) during the same period. As in previous exercises, Borrower<sub>*i*</sub> and  $X_{i,0}$  include characteristics of the borrowers and the loans with which they entered the system. The specification includes bank fixed effects  $m_b$  granting the credit and harvest time  $\eta_{p,t}$  to control for unobserved bank heterogeneity, and credit demand (Khwaja and Mian, 2008; Jiménez et al., 2014).

The results show that the terms of traditional loans are more favorable for producers who entered the system through microcredit than for those who entered directly with traditional credit (Table 5). On average, beneficiaries who enter the system with microcredit and manage to make the transition to traditional credit receive 15.4 percentage points (pp) higher amounts, 78 basis points (bp) lower interest rates, and 10 pp longer maturities than producers who entered the system directly with traditional credit.

This exercise suggests that producers who enter the system through microcredit are less likely to receive a disbursement of traditional credit. However, the results in Table 5 suggest that the few who do make the transition are perceived as less risky borrowers than those who enter the traditional credit segment directly. This may indicate that microcredit helps to gradually reduce information asymmetries, especially for a select group of borrowers who make the transition, allowing them to access financing on better terms.

Variables	Log(Credit)	Loan Rate $(\%)$	Log(Maturity)
Microcredit	$0.154^{***}$	-0.788*	$0.100^{*}$
	(0.020)	(0.461)	(0.057)
Observations	206,990	206,990	206,990
R-squared	0.634	0.964	0.535
Bank FE	Yes	Yes	Yes
Product-Time FE	Yes	Yes	Yes

Table 5: Credit conditions for traditional loans: Entrants with microcredit vs. entrants with traditional loans

Notes: Estimates from the linear regression model presented in Equation 3. Standard errors with bank cluster. Includes region dummies, crop-time and bank fixed effects and other individual controls. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

Finally, we perform an exercise similar to the previous one, but we use as a comparison group the producers who accessed subsidized loans for the first time between 2017q3 and 2019q4. In other words, we compare the conditions of the loans obtained by producers who migrated from the microcredit segment (group 1) with those of those who accessed the system for the first time between 2017q2 and 2019q4 (group 3).

The results are shown in Table 6. We find that producers who enter the system through microcredit receive an interest rate that is 179 basis points (bp) lower than that offered to producers who enter the system directly with traditional loans. This finding suggests that financial intermediaries may obtain relevant information about borrowers coming from the microcredit segment, which allows them to offer them better rates on traditional loans compared to the rates offered to producers they do not know and whose first loan is a traditional loan.

Variables	Log(Credit)	Loan Rate $(\%)$	Log(Maturity)
Microcredit	0.012	-1.790**	0.020
	(0.029)	(0.861)	(0.016)
Observations	450,060	450,060	450,060
R-squared	0.731	0.972	0.743
Bank FE	Yes	Yes	Yes
Product-Time FE	Yes	Yes	Yes

Table 6: Conditions of traditional loans: Entrants with microcredit vs. new borrowers

Notes: Linear regression model estimates. Standard errors with bank cluster. Includes region dummies and other individual controls. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

## 5 Policy Implications

Our results show that among producers who first enter the subsidized credit system through microcredit, only a small fraction transition to traditional subsidized credit lines. However, this small segment of borrowers receives better loan terms, including larger amounts, lower interest rates, and longer maturities, compared to producers who enter the system directly through traditional subsidized credit lines. This finding is consistent with the view that microcredit technology improves financial inclusion (Armendáriz and Morduch, 2010). Through microcredit, these producers, previously excluded from the formal credit market, can build a reputation that more accurately reflects their quality as borrowers. In some cases, this reputation is sufficient for financial intermediaries to lend to them in the traditional segment. For other producers, however, the signal is not strong enough because they remain noisy or are effectively too risky.

Our results suggest that only a minority of producers who enter the system through microcredit belong to the first group, but they appear to be significantly good borrowers. This is reflected in the more favorable terms they receive in their traditional loans compared to the average terms of borrowers in this segment. In this sense, microcredit could mitigate an information asymmetry by facilitating access to credit for a few good borrowers who were excluded from the traditional credit market. The credit history and reputation that borrowers build through their microcredit behavior could be the mechanism that explains this phenomenon (Karlan and Zinman, 2010). However, these borrowers represent only a small fraction of the total number of borrowers accessing microcredit, so the magnitude of these possible effects seems limited. Possible difficulties in financial literacy or lack of access to information about credit lines could explain the higher reliance on microcredit among borrowers who already have access to this market, and thus the lower transition to the traditional credit market (Sayinzoga et al., 2016). An alternative interpretation of our results is that microcredit improves the productivity of some producers by increasing their access to durable goods (land, machinery), which in turn improves their credit profile and facilitates their access to the traditional subsidized segment (Banerjee et al., 2015).

## 6 Conclusions

In this paper, we examine the expansion of agricultural microcredit to assess how it contributes to mitigating information asymmetries in the traditional credit market. First, we analyze the factors associated with the transition of microcredit beneficiaries from subsidized microcredit to traditional subsidized credit. The results show that borrowers with lower assets and women have a lower probability of making this transition. In contrast, producers who access microcredit through non-bank institutions have a higher probability of transitioning to traditional subsidized credit. This result may be related to differences in the microcredit technologies used by these institutions, which allow them to better select clients compared to banks.

Second, we compare the probability of access to traditional subsidized loans between beneficiaries who entered the system through microcredit and those who entered directly with traditional loans. We find that microcredit beneficiaries have a lower probability of receiving a subsidized loan disbursement up to two years after entering the system. This could reflect differences between the average borrowers who enter the system through microcredit and those who do so through traditional subsidized loans. It is possible that the former have a lower repayment capacity and are riskier for financial intermediaries. However, few producers (5.2%) make the transition to traditional subsidized loans. The payment behavior obtained through subsidized microcredit allows for significantly better terms of traditional loans obtained by these producers (i.e., higher amounts, lower interest rates, and longer maturities) compared to those of producers who enter directly through traditional loans.

We discuss possible implications of the results for the role of microcredit as a mitigator of information asymmetries. We argue that these results are consistent with the possibility that the credit history generated by microcredit helps reduce information asymmetries and facilitates access to finance for potentially profitable borrowers who were excluded from the traditional credit market. However, these cases represent only a small fraction of the total beneficiaries of microcredit, suggesting that the scope of these effects is limited and that other barriers may persist. Lack of access to information about credit lines could explain the higher reliance on microcredit among borrowers who already have access to this market, and thus the lower transition to the traditional credit market.

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## A Microcredit policy in Colombia

Table A.1: Regulatory changes to promote the expansion of microcredit in rural areas in Colombia

Resolution or Law	Effective Date	Description
Res. 7 of 2012	September 17, 2012	<ul> <li>Authorizes Finagro to implement a rediscount line of agricultural and rural microcredits, aimed at financial institutions supervised by the Superfinanciera and that have microfi- nance or microcredit technology.</li> <li>It was allowed to meet the working capital needs of individuals or legal entities that qual- ify as small producers, under the terms of Decree 312 of 1991 as amended by Decree 780 of 2011 or others that modify it, or as rural micro-entrepreneurs.</li> <li>Some conditions for the allocation of credits are: Amount of up to 25 SMMLV, Term of less than 24 months (changed to 36 months with Res. 7 of 2019), Financing coverage of 100% of the required capital.</li> </ul>
Res. 2 of 2014	May 27, 2014	<ul> <li>Modified the overall quota limit for microcredit operations, establishing a maximum quota for each financial intermediary according to the procedure to be defined. Res. 12 of 2015 modified it and decreed the maximum amount at 20% of Finagro's equity and up to 30% considered by Finagro's board of directors.</li> <li>Authorized the placement of financial intermediaries' own resources to fund the microcredit line.</li> <li>It allowed the granting of guarantees from the FAG with: Coverage of a maximum of 50% of the principal amount of the loan limit, which also applies when complementary institutional guarantees are used. A 7% annual advance commission on the amount of the guarantee in force.</li> </ul>
Law 1731 of 2014	July 31, 2014	<ul> <li>Created the Rural Microfinance Fund (FMR) to finance, support and develop rural microfinance in the country.</li> <li>It ruled that the FMR can be capitalized with resources from the recovery of the portfolio of the MADR's microcredit agreements financed through multilateral banking schemes and programs originating in the National General Budget (PGN).</li> </ul>

**Resolution or Law** Effective Date Description Res. 12 of 2015 September 17, 2015 • Modifies Resolution No. 7 of 2012. The premiums for voluntary microinsurance associated with microloans were included in the eligible costs. Decree 2370 of 2015 December 7, 2015 • The FMR's sources of financing are expanded with resources contributed by public or private entities through agreements or transfers, non-reimbursable resources from national, international or multilateral entities, financial returns from portfolio placement generated by the resources delivered and other resources obtained or assigned to it in any capacity. Additionally, with MADR Resolution 56 of 2016, it is established that the transfer of resources to the FMR from the portfolio recovery of the inter-administrative agreement No. 20050041 will be made once every 6 months. • It compiles the regulations governing the use of Res. 1 of 2016 March 15, 2016 agricultural and rural subsidized loans, defines the beneficiaries and specifies the financial conditions. • Among the activities that can be financed with agricultural and rural credit are rural activities through the microcredit line. Additionally, the financial conditions for the microcredit are specified, where the rate cannot be less than IBR + 2.5% and DTF + 2.5%e.a. Res. 7 of 2019 May 8, 2019 • Modifies Resolution No. 7 of 2012. In order to adjust microcredit conditions and according to income flows derived from rural and/or agricultural activities, it extends the term of operations from 24 to 36 months. Res. 8 of 2023 November 21, 2023 • The modification of the upper limit for loans to micro-entrepreneurs from the maximum allowed rate to IBR + 28% p.a. stands out.

Table A.2: Regulatory changes to promote the expansion of microcredit in rural areas in Colombia

## **B** Descriptive statistics of the analysis group

Panel A. Group of entrants with subsidized incrocredit								
Variable	Obs	Mean	Des. Est.	p25	p75	p90		
Statistics for period: 2016Q2-2017Q2								
Log(Credit)	85,035	14.31	0.46	13.86	14.58	14.94		
Loan amount	85,035	$1,\!848,\!596$	1,040,240	$1,\!050,\!000$	$2,\!150,\!000$	3,100,000		
Loan rate $(\%)$	85,035	47.03	6.83	42.96	55.70	56.48		
Log(Maturity)	85,035	2.67	0.26	2.48	2.89	2.99		
Maturity	$85,\!035$	15.09	3.94	12.00	18.00	20.00		

#### Table B.1: Descriptive statistics

#### Panel A. Group of entrants with subsidized microcredit

Panel B. Group of entrants with subsidized microcredit who transitioned to traditional subsidized credit

Variable	$\mathbf{Obs}$	Mean	Des. Est.	p25	p75	p90		
Statistics for period: 2017Q3-2019Q4								
Log(Credit)	4,414	15.57	0.76	15.07	16.12	16.40		
Loan amount	4,414	7,520,865	$5,\!876,\!737$	3,500,000	10,000,000	$13,\!200,\!000$		
Loan rate $(\%)$	4,414	15.40	12.12	10.42	12.52	41.56		
Log(Maturity)	4,414	3.80	0.71	3.18	4.28	4.63		
Maturity	4,414	55.01	30.20	24.00	72.00	103.00		

Panel C. Group of entrants with traditional subsidized credit between 2016Q2-2017Q2

Variable	Obs	Mean	Des. Est.	p25	p75	p90	
Statistics for period: 2016Q2-2017Q2							
Log(Credit)	244,223	15.93	0.69	15.60	16.30	16.81	
Loan amount	244,223	10,700,000	8,624,629	6,000,000	12,000,000	20,000,000	
Loan rate $(\%)$	244,223	12.82	2.11	12.96	14.01	14.19	
Log(Maturity)	244,223	4.05	0.57	4.09	4.43	4.65	
Maturity	244,223	65.61	26.07	60.00	84.00	105.00	

Panel D. Grov	p of entrants	s with traditional	l subsidized	credit betwe	een 2017Q3-2019Q4
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Variable	$\mathbf{Obs}$	Mean	Des. Est.	p25	p75	p90		
Statistics for period: 2017Q3-2019Q4								
Log(Credit)	87,452	15.72	0.87	14.95	16.30	16.81		
Loan amount	$87,\!452$	9,782,860	$9,\!409,\!404$	3,100,000	12,000,000	20,000,000		
Loan rate $(\%)$	$87,\!452$	10.40	4.56	9.58	11.55	12.21		
Log(Maturity)	$87,\!452$	3.71	0.67	3.18	4.28	4.56		
Maturity	87,452	49.66	28.62	24.00	72.00	96.00		

#### Table B.2: Descriptive statistics

Variable	Obs	Media	Des. Est.	p25	p75	p90		
Statistics for period: 2016Q2-2017Q2								
Log(Credit)	$152,\!909$	15.97	0.67	15.61	16.30	16.76		
Loan amount	$152,\!909$	10,800,000	$8,\!564,\!164$	6,000,000	12,000,000	19,000,000		
Loan rate $(\%)$	$152,\!909$	12.84	2.09	12.96	14.01	14.19		
Log(Maturity)	$152,\!909$	4.16	0.50	4.09	4.43	4.65		
Maturity	$152,\!909$	70	24.39	60	84	105		

Panel E. Group of entrants with traditional subsidized credit between 2016Q2-2017Q2 who do not obtain new subsidized credits

Panel F. Group of entrants with traditional subsidized credit between 2017Q3-2019Q4  $\,$ 

Variable	Obs	Media	Des. Est.	p25	p75	p90		
Statistics for period: 2017Q3-2019Q4								
Log(Credit)	411,612	15.45	1.01	14.56	16.12	16.65		
Loan amount	411,612	$8,\!395,\!047$	9,092,263	2,100,000	10,000,000	$17,\!000,\!000$		
Loan rate $(\%)$	411,612	20.93	16.84	10.53	38.70	51.20		
Log(Maturity)	411,612	3.63	0.78	2.94	4.28	4.58		
Maturity	411,612	49.06	31.69	19.00	72.00	98.00		

## C Characteristics of traditional subsidized loan borrow-

#### $\mathbf{ers}$

#### Table C.1: Statistics of traditional subsidized loan borrowers

Panel A. Disbursements in the period 2016Q2-2017Q2							
Variable	Category	Loan amount	Loan Rate (%)	Maturity (Months)	Total disbursements	Total beneficiaries	
Post-conflict Municipalities	Yes	11,042,222	12.55	67.11	100,708	95,652	
	No	$11,\!016,\!634$	12.90	58.76	210,244	$193,\!576$	
Gender	Male	11,248,367	12.79	60.99	203,840	188,363	
	Female	9,791,611	12.77	62.89	104,253	98,867	
Intermediary Type	Credit institution	11,019,375	12.79	61.49	310,389	288,736	
	Microfinance Institution	$14,\!082,\!783$	13.03	49.60	563	492	
Assets	Above P50	14,167,685	12.85	61.71	174,728	158,635	
	Below P50	$6,\!993,\!849$	12.70	61.15	136,224	130,593	
Legal entity type	Legal entity	12,095,461	12.23	60.96	63,496	54,186	
	Natural person	10,750,226	12.93	61.60	247,456	235,042	
	Par	el B. Disburser	nents in the peri	od 2017Q3-2019Q4			
Variable	Category	Loan amount	Loan Rate (%)	Maturity (Months)	Total disbursements	Total beneficiaries	
Post-conflict Municipalities	Yes	11,301,454	9.85	63.70	189,116	155,951	
	No	$10,\!886,\!900$	10.34	52.17	419,320	312,464	
Gender	Male	11,089,559	10.22	55.54	397,680	302,002	
	Female	$9,\!649,\!613$	10.10	56.82	201,975	161,607	
Intermediary Type	Credit institution	10,995,180	10.18	55.80	605,675	466,429	
	Microfinance Institution	$15,\!528,\!902$	10.49	46.59	2,761	1,986	
Assets	Above P50	12,983,078	10.15	55.63	423,438	309,487	
	Below P50	6,512,785	10.26	56.05	184,998	158,928	
Legal entity type	Legal entity	13,462,705	11.40	55.43	81,575	75,121	
	Natural person	10,636,901	10.00	55.81	526,842	393,276	

## 6

## D Additional probit model estimations

Variables	(1)	(2)	(3)	(4)
FAG	0.00714	0.0125	0.0128**	0.00804
	(0.00980)	(0.00912)	(0.00584)	(0.00880)
Post-conflict Municipalities	$0.00507^{***}$	$0.00509^{***}$	$0.00509^{***}$	$0.00575^{***}$
	(0.00175)	(0.00168)	(0.00168)	(0.00165)
Legal entity type	$0.0132^{***}$			$0.0154^{***}$
	(0.00208)			(0.00201)
Log(Assets)	$0.0193^{***}$			$0.0244^{***}$
	(0.000760)			(0.000858)
Assets $> p50$				$-0.0152^{***}$
	—	—	—	(0.00263)
Gender	$-0.0157^{***}$	-0.0207***	-0.0208***	$-0.0176^{***}$
	(0.00169)	(0.00155)	(0.00155)	(0.00151)
Intermediary type	-0.00545	-0.000571		-0.00657
	(0.0118)	(0.0116)	—	(0.0111)
Observations	90,008	90,008	90,008	90,008
Time FE	Yes	Yes	Yes	Yes

Table D.1: Probability of Transition to Microcredit taking into account access to FAG guarantees

Notes: Estimates from the probit model presented in Equation 1. All specifications include the logarithm of the amount, interest rate and term of the initial loan obtained by beneficiaries and region and time dummies. Robust standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.