

# The effect of microcredit on Colombia's GDP, 2005-2018

David Andrés Londoño-Bedoya,<sup>a</sup> Claudia Marcela Garzón-Quintero<sup>a</sup> and María Antonieta Collazos-Ortiz<sup>a</sup>

<sup>a</sup> Pontificia Universidad Javeriana

Email addresses: [davidlondono@javeriana.edu.co](mailto:davidlondono@javeriana.edu.co); [garzon-claudia@javeriana.edu.co](mailto:garzon-claudia@javeriana.edu.co) and [mcollazos@javeriana.edu.co](mailto:mcollazos@javeriana.edu.co), respectively.

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## Abstract

This article seeks to establish whether microcredit has impacted Colombia's Gross Domestic Product (GDP) and, if so, to what extent. To determine this, the current article provides a summary of microcredit, its main schools, its critics, and how this line of credit operates at the normative and qualitative level in Colombia. There is also a review of the literature on the financial sector's impact on GDP. All of the above was tested against panel data analysis at the subnational level in Colombia. Findings showed that microcredit has a negative impact on Colombia's GDP.

**Keywords:** microfinance; microcredit; financial system; GDP; economic growth; panel data.

## 1. INTRODUCTION

The relationship between the financial system and economic growth has received a great deal of attention in economic literature. In the early 20th century, Schumpeter (1912) asserted that financial services do stimulate a country's economic growth and boost technological innovations and production, to which King and Levine (1993) added that, if financial services were suppressed, interest costs would be higher and capital formation would slow down.

Microcredit is an element of microfinance, and is understood as a financial innovation designed to expand and improve the efficiency of the financial system. In fact, microcredit reduces the extent of an economy's financialization.

Originally, microcredit originated as a counterproposal to traditional banking, in which the entrepreneurs at the base of the pyramid<sup>1</sup> lacked access to credit because they had a low socioeconomic and educational level, and therefore did not meet the requirements for obtaining a loan. This new, more flexible model is based on the principles of trust and good faith, allowing microentrepreneurs, who do not have ample payment capacity or credit history to access formal credit.

In the case of Colombia, Serrano (2009, p. 28) explains that:

[...] Microcredit is formally defined in the Colombian banking legislation and has a special category, allowing banks to charge recipients a commission of up to 7% of the amount of the (anticipated) credit for advice and monitoring, which makes it the nominally most expensive kind of credit. We are still at the stage where the cost of credit is compared to the so-called drop by drop loans. In contrast to other forms of credit, this commission does not factor in the usury limit that exists in Colombia according to credit modality (some people are currently calling for the elimination of this ceiling).

Microcredit differs from bank credit in that microcredit loans can charge a commission in advance, while traditional bank credit does not. Additionally, in Colombia the offer of microcredit loans does not exclude traditional financial institutions.

Microcredit has great growth potential in Colombia. According to Asobancaria (2017) microcredit grew by 114% between 2011 and 2017, the balance of the microcredit portfolio doubled from 5.5 to 11.8 billion pesos, and, according to Clavijo (2016), the number of debtors rose from 12,139 in 2007 to 48,280 in 2014. In spite of this favorable behavior, it is important to establish if microcredit has impacted economic growth, so as to determine if the resources distributed have become part of the formal economy and to what extent they have benefited it. Depending on what the reality of the situation is, a case could be made for continuing the existing public policy or creating new alternatives to promote entrepreneurs at the base of the pyramid.

The hypothesis put forward is that there is a positive relationship between microcredit and Gross Domestic Product (GDP). To this end, a panel data analysis was carried out at the subnational level in Colombia, covering the first quarter of 2005 until the fourth quarter of 2018.

This article consists of five sections, in addition to this introduction: the second section reviews the literature on financial systems, microfinance, and economic growth. The third section defines microcredit, its legal framework, and illustrates its specific characteristics as it exists in Colombia. The fourth section presents the data and explains the methodology chosen to test the hypothesis. The fifth section then presents findings, while the sixth section offers some conclusions and recommendations.

## 2. THE FINANCIAL SYSTEM AND MICROFINANCE AS AN ENGINE OF ECONOMIC GROWTH

The financial system serves to facilitate exchange, allow savings to be amassed, decrease liquidity risk, and generate data on resource allocation and investment (Levine, 1997). According to Antón (2014), the financial system must ensure the following in order to be efficient:

- a) Promotion of economic activity and transference of purchasing power from agents with surplus liquid assets to agents with lacking liquid assets (González, 1986). This allows them to finance investments or acquire goods that improve their quality of life.
- b) Borrowers must make payments so that the system is available to others who can receive the same benefits.
- c) Borrowers must make profitable investments with the resources provided, so that they can repay the loan and have a positive impact on the economy.

Similarly, the relationship between the financial system and economic growth has been discussed by various authors such as Robinson (1952), who states that a country first grows economically and then increases the demand for financial services, rather than the other way around. Schumpeter (1912) claimed that financial services stimulate economic growth and boost technological innovations and production, to which King and Levine (1993) added that, if financial services were suppressed, interest costs would be higher and capital formation would slow down. For Fung (2009), however, the relationship between financial services and economic growth decreases as economic growth increases.

Levine *et al.* (2000) found that in developing countries with extensive financial services, GDP grew on average 3.2% per year; in countries where the financial system is incipient, on the other hand, GDP increased on average 1.4% per year.

Regarding the relationship between microcredit and economic growth, Alamgir (1996) concluded that the Grameen Bank contributed 1.1% to Bangladesh's GDP in 1996; Pitt and Khandker (1998), on the other hand, claimed that consumption in Bangladesh increased by 0.09% per household and 0.10% per person between 1991 and 1992. Khandker (2005) stated that microcredit loans granted in Bangladesh between 1998 and 1999 decreased poverty by 5%. Subsequently, Khandker and Samad (2013) studied the effects of microcredit in Bangladesh for 20 years and concluded that borrowers increased their income level, consumption, and their children's years of schooling. While in Bangladesh microcredit generated positive outcomes for the overall economy, Hollis and Sweetman (1998) studied six microfinance institutions in England, Ireland, Italy, and Germany and found that there was no positive correlation between microfinance and economic growth.

In the case of Colombia, there are no formal studies that determine the nature of the relationship between microcredit and GDP. In response to this, the present article seeks to establish whether this line of credit has a positive impact, as in Bangladesh, or if, on the contrary, its impact is negative.

### 3. MICROCREDIT: BUSINESS MODEL AND DEFINITION

At the inaugural Microcredit Summit in 1997, microcredit was defined as: "[...] programs for granting small loans to the poorest sections of society, so that they can start small businesses that generate income to improve their standard of living and that of their families" (Lacalle, 2001, p. 125). According to Rodríguez and López (2010), such loans are elements of microfinance, which comprises a group of financial tools whose market niche is the popular sector. In addition to microcredit, microfinance includes savings, remittances, payments, and insurance (Villamizar and Ducón, 2018).

In this model, borrowers (microcredit recipients), through small capitalizations to their enterprises (received in the form of loans), obtain profits that allow them to make repayments. At the same time, recipients can use these loans allow recipients to improve their quality of life: as Patiño (2008) explains, microcredit can have a positive impact to the extent that it increases income levels, allows new assets to be acquired, generates employment, reduces people's vulnerability, and improves health and education services.

According to the Consultative Group to Assist the Poor (CGAP) (Cohen, 2003) microfinance widely impacts not only the borrower, but also the environment in which the loan is made. Microcredit impacts the borrower on the following levels:

- Individual: by empowering them and improving their ability to make financial decisions that positively impact their quality of life.
- Domestic: by increasing their family's income and improving their assets, such as housing and land.
- Business: by increasing their company's production and generating employment.

In addition to reducing inequality, microcredit improves the living conditions of recipients and those around them, according to Garavito (2016), by eliminating informal credit.<sup>2</sup> In response to the lack of access to traditional credit, people resort to informal loans which, despite their high interest rates, are an attractive option because of their easy availability (Coulter and Shepherd, 2000). Microcredit, therefore, offers a way out of informality and opens the door to formal banking for individuals excluded from the system.

Microcredit poses a challenge to banks seeking to compete with informal financing, as to be sustainable in the long-term and to meet their value proposition and objectives, microcredit must innovate and use fewer resources so as to be a more efficient option. For this reason, the microcredit business model, at least initially, eliminated activities and services that did not add value to its customers, such as collateral and insurance; it reduced the number of collaborators and offices needed to operate; and its products were marketed via word of mouth.

Thus, microcredit's customer segments are low-income individuals or legal entities, especially women,<sup>3</sup> who are engaged in some type of incipient and expandable business activity and who do not have large economic incomes or substantial collateral. In turn, these loans, in some cases, are not awarded to a single person but to solidarity groups. According to Ghatak (2000), such groups are less likely to default, as these groups tend to be

formed by those characterized by timely payment of their obligations, which generates trust and security. Peer pressure may also play a role, as if one member defaults, the other members must respond in order to be eligible for future loans.

In turn, the microcredit model promotes relational banking, <sup>4</sup> in which there are close relationships between the lenders and their customers, meaning that the customer's needs and environment, are known first-hand. This is achieved via frequent visits to monitor the operation, thereby reducing the probability of default. However, this type of practice, while reducing credit risk or non-payment, increases personnel costs compared to traditional banking. These costs are compensated by the high interest rates currently assigned to these operations.

### **Microcredit: origins**

This type of loan originated in 1974 in Bangladesh, when economics professor Muhammad Yunus and a group of his students visited a village in the country. There he interviewed a woman who made furniture from bamboo, who had to use informal loans with a 10% weekly interest rate to finance her business, which left her just USD \$0.01 USD in profit (Grameen Bank, 2019).

Professor Yunus deduced that if the women were charged a lower interest rate, it could improve their quality of life and allow them to rise above subsistence levels. Therefore, as an experiment, he decided to lend \$27 USD to a group of 42 basket-weaving villagers, who were able to repay the credit with low interest. He later discovered that this small loan helped the borrowers to escape from poverty (Grameen Bank, 2019).

Yunus saw that the model was working and was now convinced that low-income people had been prevented from maximizing their assets' potential, due to the lack of opportunities that state institutions and policies offered (Yunus, 2006). He therefore decided, with the support of the Central Bank, to found the Grameen Bank in 1983, which translates from Bengali as "Rural Bank." This commercial bank focuses on microcredit, whose business model is the opposite of traditional banking (Rentería, 2005). The bank's objective is: "to eliminate exploitation of people, create self-employment, and take the poor out of the circle of poverty by enabling them to amass savings" (Villarreal 2008, p. 49).

The institution, with confidence in its customers and discipline, has managed to remain successful over time, working from the premise that "credit without strict discipline is nothing more than charity" (Yunus, 1998, p. 409). As a result of its significant impact, the first Microcredit Summit was held in 1997 in Washington, D.C., attended by the presidents of 137 countries, where the goal was to help 100 million poor families by 2005 (Garavito, 2016). Ten years later, the model was replicated and the objective was met, with more than 106 million families receiving their first loan through 3,552 institutions dedicated to microcredit, which had 154.8 million clients, of which 83.4% were women (Harris, 2009).

Following on from the microcredit model and its positive impact, Yunus won the Nobel Peace Prize in 2006, "for his efforts to create economic and social development from below [...] Lasting peace cannot be achieved unless large population groups find ways out of poverty. Microcredit is one such means" (Grameen Bank, 2019).

Over time, the Grameen Bank has reinvented itself and created new products for its customers, such as microinsurance and pensions. By December 2018 it had 9.08 million customers, 97% of which were women, with a loan repayment rate of 97%, had 2,568 branches covering 93% of the total villages in Bangladesh, and 58 countries around the world have since applied the model, including some first world countries such as the United States, Canada, France, the Netherlands, and Norway (Grameen Bank, 2019).

### **General criticisms of microcredit**

Despite microcredit's performance in Bangladesh, this model has its critics. According to Baternan (2013), it does not have a positive impact on society because it finances the wrong companies and people who have no knowledge of management, thereby generating informality, poverty, and risks of non-payment. Furthermore, according to Garcia and Diaz (2011), these loans are not entirely attractive for some providers, who tend to grant loans to more-experienced companies with less risk of default. An example of this is banks with high evaluation and monitoring costs that prevent them from obtaining sufficient profitability from these loans (Presbitero and Rabellotti, 2014). In such cases, it is more profitable to grant one large loan than several small ones (Gutiérrez, 2006).

According to the Ohio School (1973), credit should not be segmented into specific sectors or socioeconomic groups, as it has a facilitating role rather than serving as a driving force for economic development, and should therefore be focused on existing needs and rather than creating new demands (Hulme and Mosley, 1996).

Many consider microcredit to be a tool that could generate opportunities to improve the quality of life of microentrepreneurs at the base of the pyramid. Nevertheless, microcredit should not replace state policies, but rather complement them. Indeed, the lack of access to traditional credit is not the main problem faced by low-income people, so this access should not be considered a right, even if can serve to reduce poverty (Patiño, 2008; Adams and Von Pischke, 1992; Hulme and Musley, 1996).

### **Microcredit in Colombia**

Unlike Bangladesh, in Latin America the precursors of microcredit were non-profit entities located in urban areas whose customer segment was newly formed small businesses without access to credit (Berger 2006). Although access to microcredit had been previously based not only on the profitability it generated for banks but also on social utility (García and Díaz, 2011), in Latin America microcredit has been motivated primarily by commercial

considerations than ones related to welfare (Larrain, 2009). In Coleman's opinion (2006), although microcredit programs are aimed at the low-income population, it is the medium- and high-income sections who benefit from these programs.

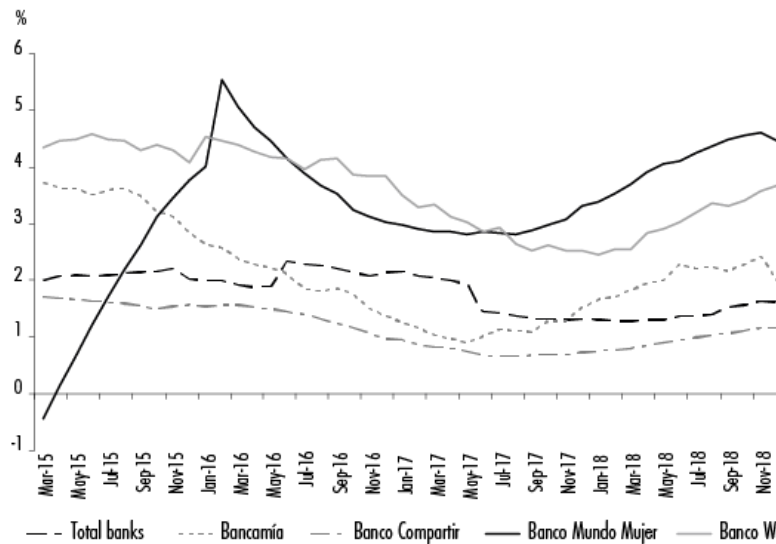
Colombia is not exempt from the Latin American reality, and in its financial system there are three groups of competing Microfinance Institutions (MFIs) that provide microcredit, although with some specific market niches:

- a) Formal Financial Institutions (credit institutions: commercial banks or financial cooperatives),
- b) Savings and credit cooperatives and multi-activity cooperatives with savings and credit sections,
- c) Non-Governmental Organizations (NGOs)

Based on figures from the Financial Inclusion Report (2018),<sup>5</sup> as of December 2018, 15 billion pesos were disbursed in the form of microcredit. 12.5 billion of this (85.6%) was granted by credit institutions, with the remaining 14.4% issued by microfinance NGOs and cooperatives supervised by the Solidarity Superintendence; 3.1 million adults and businesses had an active microcredit loan, almost 10% of the 34 million adults in the country, thus illustrating microcredit's importance in Colombia.

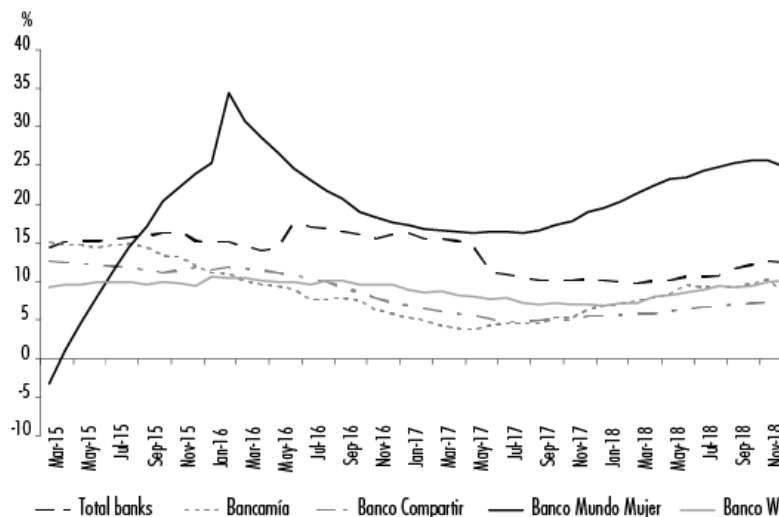
Confirming Larrain's (2009) proposition, in Colombia some credit institutions focused solely on microfinance such as Bancamía, Banco Compartir, Banco Mundo Mujer, and Banco W have a return on assets (ROA) above the average for the traditional banking sector (see figure 1), and, although the return on equity (ROE) does not show the same behavior (see figure 2), Banco W greatly exceeds the sector for this indicator, and the other banks focused on microcredit are on course to follow this trajectory.

Figure 1. ROA of the banking sector vs. credit institutions focused on microcredit



Source: Compiled by the authors using data from the Financial Superintendence of Colombia.

Figure 2. ROE of the banking sector vs. credit institutions focused on microcredit



This shows that microcredit, despite being risky, is profitable due to the high interest rates charged to borrowers, a reality that undermines microcredit's altruistic or welfare purposes in Colombia.

Villamizar and Ducón (2018) understand that the Ohio school, rather than the Grameen Bank model, most closely resembles the Colombian microcredit model, given that microentrepreneurs have an established investment plan and have been in business for some time. This proposition can be corroborated by the fact that, to access microcredit in Colombia, a company must demonstrate to the lender that it has been operating for a minimum of 10 to 12 months, depending on the entity from which the loan is requested; its annual income must be at least COP\$24 million on average; and that the amount requested will be used for the acquisition of fixed assets,<sup>6</sup> working capital,<sup>7</sup> or for construction to improve the premises where the company operates.

However, while an applicant must demonstrate experience in business and a minimum income to access a microcredit loan in Colombia, the Colombian model has some resemblance with the Grameen Bank model. For example, according to Asomicrofinanzas (2018), of the 2,876,909 people who received microcredit from its partners in 2018,<sup>8</sup> 50.7% were women and 35% of the portfolio was disbursed in rural areas. In the case of Bancamía (2018), an entity specialized in microcredit, between 2008 and 2018, on average 68% of its clients were women of 55 years of age dedicated to small businesses, 77% were in vulnerable conditions, 21% lived in rural environments, 78% had at most a primary school education, and 23% employed at least one person. Similarly, Bancamía (2018, p. 206) points out that its "[...] customers classified as extremely poor need, on average, two loans to rise above the poverty line," while its microentrepreneurs who were classified as poor needed only one. This shows that microcredit can reduce poverty and must develop medium/long-term relationships with customers to improve their quality of life.

To achieve these relationships, microcredit institutions in Colombia invest intensively in human talent and fieldwork. Commercial advisors constantly supervise customers from the moment they apply for a loan until the loan is repaid, thus generating confidence via an understanding of the borrower's environment, productive activities, and needs. Therefore, in addition to reducing credit risk, they seek to provide clear, timely, and objective input on issues related to money management, thereby enabling the customer to make sound decisions.

This article is based on data from credit institutions, which are defined in Chapter I, Article 2 of Decree 663 of 1993 as: "[...] financial institutions whose main function consists of collecting in legal currency resources from the public in the form of deposits, either demand or fixed-term, in order to channel them in loans, discounts, advances, or other active credit operations."

Credit institutions can be banking institutions, commercial financing companies, financial cooperatives, financial corporations, or savings and housing corporations. However, only the first three of these offer microcredit.

At the time of writing, Colombia had 25 bank establishments, 11 of which had a microcredit portfolio; 15 financing companies, 3 offering microcredit, and; 5 financial cooperatives, 4 with microcredit. The low percentage of credit institutions that offer microcredit indicates a disincentive on the part of the sector to issue this type of portfolio, which may be due to the activity's high risk, combined with the operational cost of maintaining it. Further corroboration is the fact that, in Colombia, microcredit lags behind other products such as consumer, commercial, and housing portfolios, and, although the percentage of the population with microcredit loans increased from 0.2% in 2005 to 2.77% in 2018 (see table 1), it continues to be a neglected segment that does not convince providers, despite the profitability it generates (see figures 1 and 2).

**Table 1. Microcredit's share of the total portfolio**

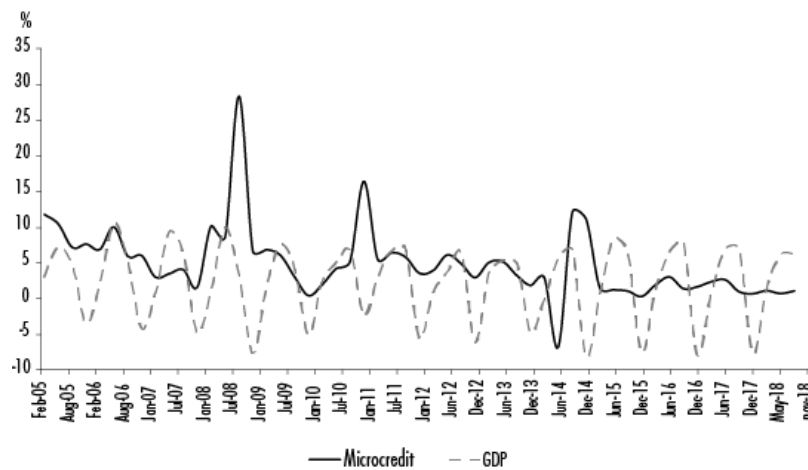
Date	Nov-18	Oct-18	Nov-17
Credit Portfolio*	441 508	436 220	417 190
Consumption	28.44%	28.36%	27.73%
Commercial	54.96%	55.02%	56.43%
Home	13.83%	13.83%	13.01%
Microcredit	2.77%	2.78%	2.82%

Note: \* figures in billions of pesos.

Source: Compiled by the authors based on data from Asobancaria (2017).

Although microcredit initially reported high growth rates in Colombia (see Figure 3), in recent years it has stabilized and has, at times, had an inverse relationship with GDP growth rate, which could be due to the fact that, as economic growth decreases, employment also decreases, with the outcome that subsistence enterprises increase and, therefore, the demand for microcredit. This relationship will be addressed later in this article's methodology.

**Figure 3. Growth rates: microcredit vs. GDP**



Source: Compiled by the authors using data from the Financial Superintendence of Colombia and DANE.

### Microcredit regulations in Colombia

According to Yunus (1998), the state's role should be focused on defense and foreign policy, with a passive role in the financial system, allowing entities such as the Grameen Bank to tackle social issues. In contrast to this, however, the Colombian government has actively regulated in an attempt to stimulate microcredit and, in turn, protect the offering entities from the risk of non-payment by customers.

This portfolio is regulated by Article 39 of Law 590, 2000 called "MIPYME Law" -modified by Law 905, 2004-, whose purpose was to democratize credit and correct market failures, in addition to regulating the promotion and development of micro-, small, and medium enterprises, as well as stimulating entities to issue microcredit loans.

The above-mentioned law defined this modality as a "[...] system of financing for microenterprises,<sup>9</sup> within which the maximum amount per loan operation is twenty-five (25) legal monthly minimum salaries in force, without, at any time, the balance for a single debtor being able to exceed said amount [...]" (Law 590, 2000). Subsequently, Decree 919 of 2008 of the Ministry of Finance and Public Credit extended the maximum amount of microcredit to 120 current legal monthly minimum wages (SMMLV).

Likewise, Law 590 authorized financial intermediaries to charge commissions and fees for specialized advice, visits, and repayment collection for those operations that did not exceed 25 SMMLV. This made microcredit more expensive and indicated that the total balance of the debtor's debt could not exceed 120 SMMLV at the time of credit approval, in order to protect lenders from not recovering resources.

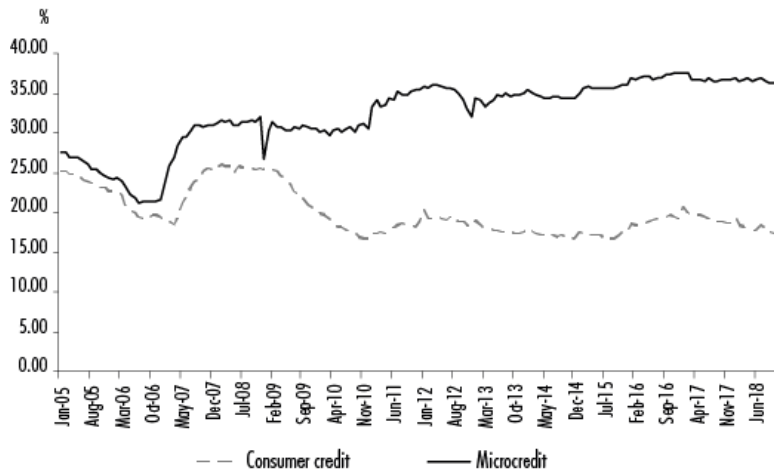
To stimulate the demand for microcredit, the National Government, through Decree 3078 of 2006 from the Ministry of Finance, created the Bank of Opportunities program, administered by Bancoldex.<sup>10</sup> The Bank of Opportunities' objective is to reduce poverty and promote financial inclusion of vulnerable sections of the population and microentrepreneurs by subsidizing the costs of intermediary entities; co-finance the projects in which financial inclusion activities are invested in their initial phase; and train and advise intermediaries in microfinance. The program supports entities such as microcredit NGOs, banks, financing companies, cooperatives, and insurance companies (Bank of Opportunities, 2019).

Additionally, a guarantee to underwrite debt is required to access credit in Colombia. This may be a mortgage, a co-signer, machinery and equipment pledges, to name a few. Low-income customers, however, frequently cannot provide these guarantees. Therefore, the National Guarantee Fund -an entity created by the National Government- grants a quota to credit institutions that issue microcredit, and, due to the risk involved, require guarantees. This guarantee takes the form of an additional fee that is added to the interest rate charged by the lender.

In 2007, Resolution 428 from the Financial Superintendence of Colombia (Superintendencia Financiera de Colombia, SFC) initiated a differentiated interest rate regime according to credit modality. In this regime, microcredit has a higher interest rate than consumer credit (see figure 4), due to the associated operating costs and greater risk involved. Furthermore, Resolution 01 of the National Council of Microenterprises, enacted in 2007, established maximum fees and commissions, in which loans under 4 SMMLV would be charged a maximum rate of 7.5% and those between 4 and 25 SMMLV a rate of 4.5%, in addition to value added tax (VAT), for both values.

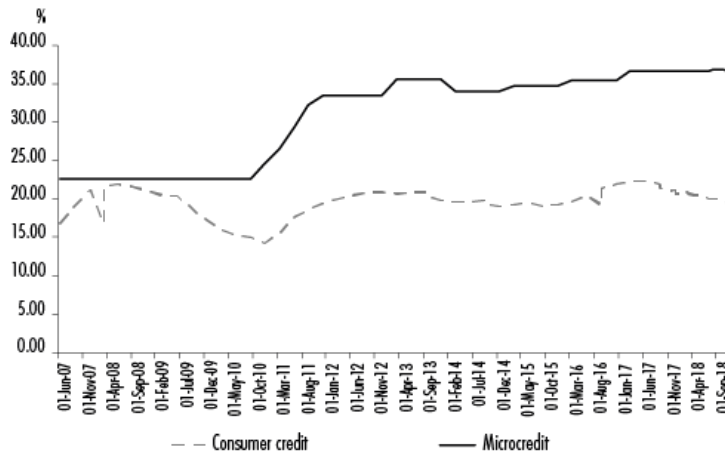
The risk and data asymmetry of these loans are compensated by high interest rates, which effectively exclude low-income people from the market and associated business opportunities (Garavito, 2016; Borgan et al., 2015; Gutiérrez, 2006). The high interest rates are evidenced by the fact that the microcredit usury rate averaged 49.2% between 2007 and 2018, well above the average for consumer and ordinary credit of 29.8%, thus widening the gap between these two types of loans (see Figure 5), and potentially resulting in borrowers preferring consumer or informal credit over microcredit. As there are limitations to accessing credit, businesses can be affected by stagnating growth, production, and innovation possibilities (Presbitero and Rabellotti, 2016).

Figure 4. Interest rates offered by credit instructions, microcredit vs. consumption



Source: Compiled by the authors using data from the Financial Superintendence of Colombia.

Figure 5. Consumer and ordinary credit usury rate vs. microcredit



Source: Compiled by the authors using data from the Financial Superintendence of Colombia

According to Karlan and Zinman (2008), however, the demand for microcredit is inelastic, given that an increase or decrease in the interest rate and commissions does not affect the amount of microcredit requested. Offering entities take advantage of this fact to increase the interest rate as far as they are legally allowed.

In general, it is evident that the regulation of microcredit in Colombia has favored bankers more than microentrepreneurs, where the latter have significant debt restrictions and are charged high interest rates. And although these conditions have not diminished the demand for microcredit, they can have a negative impact on borrowers.

#### 4. DATA AND METHODOLOGY

Our analysis of microcredit as a business model, its origin, and how it operates in Colombia, proceeds from the assumption that it has a positive impact on GDP. This hypothesis will be tested via an econometric model of panel data, as follows.

##### Data

In our analysis, individuals ( $i$ ) refers to the 32 Departments of Colombia, to which the Capital District of Bogotá was added, for a total of 33 individuals. Time ( $t$ ) is in quarters and runs from the first quarter of 2005 to the fourth quarter of 2018, for a total of 56 quarters over a period of 14 years. There are a total of 1,848 observations.

##### Model and variables

A panel data model was estimated in order to:

- a) Observe the dynamics of the phenomenon.
- b) Correct problems of inverse causality, by more precisely distinguishing between the before (cause) and after (effect).
- c) Increase the number of observations and achieve more degrees of freedom.
- d) Correct for omitted-variable bias.
- e) Take into account the heterogeneity of the individuals analyzed.

Second, the model chosen was the current measurement of GDP through expenditure and the equation to be estimated is as follows:

$$GDP = f(C + G + I + XN)$$

Where GDP represents Gross Domestic Product and is based on Consumption (C), Government Expenditure (G), Investment (I), and Net Exports (XN).

Two control variables are introduced to the model, Population (Pop) and the Unsatisfied Basic Needs Index (UBN), in order to reduce the effects of omitted-variable bias.

The econometric model for estimation, then, is the following:

$$GDP_{it} = \alpha_i + \beta_1 C_{it} + \beta_2 I_{it} + \beta_3 G_{it} + \beta_4 XN_{it} + \beta_5 Pop_{it} + \beta_6 NBI_{it} + \mu_{it}$$

Where:

- a)  $GDP_{it}$  (Gross Domestic Product): "equal to the sum of the final uses of goods and services measured at the buyer's price, minus the imports of goods and services" (DANE, 2017). For the purposes of this model, GDP was used as the dependent variable. The data was obtained from the National Administrative Department of Statistics (Departamento Administrativo Nacional de Estadística, DANE), at current prices, measured quarterly from 2005 to 2018 for all of Colombia.

As we did not have quarterly data for each Department, we proceeded to take the percentage that each Department contributes to the GDP annually, as reported by DANE, and multiplied it by the total GDP for each of the quarters.

- b)  $C_{it}$  (Consumption): independent variable. Analysis worked from the assumption that the microcredit, consumer credit, commercial credit, and home credit portfolios have a major impact on the national household consumption account. According to Saiz (2010), borrowers obtain microcredit to spend on their family's welfare and the consumption of perishable goods. Consumer credit is freely available and is generally used to purchase goods and services that have an impact on consumption.

To simplify the model, commercial and home credit were included in this category, although these portfolios could also impact investment. In light of these considerations, consumption can be represented as follows for this model:

$$C_{it} = f(Mic_{it} + CCons_{it} + CCom_{it} + CViv_{it})$$

Where:

$Mic_{it}$  (Microcredit): independent variable. These are the disbursements made by microenterprise credit institutions. Following on from Demirguc-Kunt and Levine (1996), it is assumed that as financing increases, in this case through microcredit disbursements, economic growth will also increase, as companies will have resources that enable their development, and that there will be a positive impact on the economy in general.

$CCons_{it}$  (Consumer Credit): independent variable. This represents free destination loans, distinct from loans for commercial purposes, paid by credit institutions to natural or legal persons.

$CCom_{it}$  (Commercial Credit): independent variable. This represents: "all credit other than home, consumer, and microcredit" (SFC, 2013), paid by credit institutions to natural or legal persons.

$CViv_{it}$  (Home Credit): independent variable. This represents credit to acquire housing, paid by credit institutions to individuals or legal entities.



It is worth mentioning that the data pertaining to these portfolios (microcredit, consumer, commercial, and home), were obtained from the SFC, at current prices, measured quarterly from 2005 to 2018.

However, as can be seen in Figures 9 and 10, the model presented problems of multicollinearity when these variables were included. As a result, it was decided to remove the  $CC_{mit}$  (Commercial Credit) and  $CViv_{it}$  (Home credit) variables.

In light of these considerations, consumption's function was reconsidered, and it was assumed that one part is explained by microcredit and the other by consumer credit, as follows:

$$Crest_{it} = f(C_{it} - Mic_{it} - CC_{it})$$

Where remaining consumption  $Crest_{it}$  is a function of Total Consumption  $C_{it}$ , minus Microcredit  $Mic_{it}$  and Consumer Credit  $CC_{it}$ .

- c)  $I$  (Investment) or Gross Capital Formation: independent variable. Investment or Gross Capital Formation indicates the fixed assets that an economy has.
- d)  $G$  (Government Expenditure): independent variable. This represents the fiscal expenditure that the government contributes to the economy.
- e)  $XN$  (Net Exports): independent variable. The difference between exports and imports.
- f)  $Pop$  (Population): independent variable: The number of people according to the population census in each Department.
- g) Unsatisfied Basic Needs Index (UBN): independent variable. This measure determines the degree to which the basic needs of the population are covered in: i) housing, ii) overcrowding, iii) public services, iv) economic dependence, and v) school attendance.

The data pertaining to the variables of Investment, Expenditure, Net Exports, Population, and UBN were obtained from DANE, at current prices from 2005 to 2018.

### Descriptive statistics of variables

The statistics describing the variables emphasize that remaining consumption reaches negative minimums. This is because consumer credit and microcredit were higher than total consumption in some departments (see table 2).

**Table 2. Descriptive statistics of variables**

Variable	Obs	Mean	Std. Dev.	Min	Max
GBP	1848	1.96E+13	1.02E+14	1.86E+10	9.97E+14
Microcredit	1848	1.92E+11	2.50E+11	4.03E+07	1.27E+12
Remaining consumption	1848	3.48E+13	1.54E+14	-8.22E+12	9.86E+14
Investment	1848	2.76E+13	1.16E+14	3.41E+09	9.91E+14
Expenditure	1848	4.07E+13	1.53E+14	2.28E+09	9.95E+14
Net exports	1848	-6.15E+13	1.80E+14	-9.96E+14	-1.26E+08
Pop	1848	1403998	1664993	35230	8181047
UBN	1848	26.37089	16.06777	3.355908	81.94108

Source: Compiled by the authors, Stata program output.

## 5. RESULTS

The estimates were made using Stata software, which first found that the data panel was balanced (see table 3).

**Table 3. Specified panel**

panel variable:	id (strongly balanced)
time variable:	date, 2005q1 to 2018q4
delta:	1 quarter

Source: Compiled by the authors, Stata program output.

Subsequently, Pearson's correlation coefficient was calculated by entering the possible independent variables, so as to determine if there was collinearity between variables (see table 4).

**Table 4. Correlation between independent variables**

	<i>GDP</i>	<i>Microcredit</i>	<i>Remaining consumption</i>	<i>Consumer credit</i>	<i>Investment</i>	<i>Expenditure</i>	<i>Net exports</i>	<i>Pop</i>	<i>UBN</i>
<i>GDP</i>	1.0000								
<i>Microcredit</i>	-0.0465	1.0000							
<i>Remaining consumption</i>	0.4344	-0.1414	1.0000						
<i>Consumer credit</i>	0.0291	0.6377	-0.0754	1.0000					
<i>Investment</i>	0.1767	-0.1392	0.3669	-0.0487	1.0000				
<i>Expenditure</i>	0.2678	-0.1278	0.2334	-0.0369	0.4633	1.0000			
<i>Net exports</i>	-0.2364	0.0023	-0.3834	-0.1405	-0.3955	-0.3942	1.0000		
<i>Pop</i>	-0.0367	0.6487	-0.1571	0.798	-0.0352	0.0107	-0.2554	1.0000	
<i>UBN</i>	0.015	-0.4402	0.0779	-0.3358	0.0738	0.0325	0.0598	-0.4319	1.0000

Source: Compiled by the authors, Stata program output.

Ideally, variables should not present a result greater than or equal to 0.7, as this would indicate that there is no collinearity. For this model, consumer, home, and commercial loans showed a correlation greater than 0.7, indicating that the variables are measuring the same thing, which was corroborated with the variance inflation factor VIF (see table 5).

**Table 5. Inflation factor of variables**

<i>Variable</i>	<i>VIF</i>	<i>1/VIF</i>
<i>Consumer credit</i>	66.58	0.015019
<i>Commercial credit</i>	40.58	0.024645
<i>Home credit</i>	23.26	0.042996
<i>Pop</i>	6.25	0.159937
<i>Microcredit</i>	3.21	0.311367
<i>expnetas</i>	1.64	0.61008
<i>Investment</i>	1.48	0.676471
<i>Expenditure</i>	1.47	0.67884
<i>UBN</i>	1.46	0.686692
<i>Mean VIF</i>	16.21	

Source: Compiled by the authors, Stata program output.

Therefore, it was decided to eliminate the commercial and home credit variables and, with the remaining independent variables (microcredit, consumer credit, investment, spending, net exports, population, and UBN), again correlation and multicollinearity tests were conducted, in which no variable yielded more than 0.7 (see Table 6).

**Table 6. Correlation between independent variables after removing variables**

	<i>GDP</i>	<i>Microcredit</i>	<i>Remaining consumption</i>	<i>Investment</i>	<i>Expenditure</i>	<i>Net exports</i>	<i>Pop</i>	<i>UBN</i>
<i>GDP</i>	1.0000							
<i>Microcredit</i>	-0.0465	1.0000						
<i>Remaining consumption</i>	0.4344	-0.1414	1.0000					
<i>Investment</i>	0.1767	-0.1392	0.3669	1.0000				
<i>Expenditure</i>	0.2678	-0.1278	0.2334	0.4633	1.0000			
<i>Net exports</i>	-0.2364	0.0023	-0.3834	-0.3955	-0.3942	1.0000		
<i>Pop</i>	-0.0367	0.6487	-0.1571	-0.0352	0.0107	-0.2554	1.0000	
<i>UBN</i>	0.015	-0.4402	0.0779	0.0738	0.0325	0.0598	-0.4319	1.0000

Source: Compiled by the authors, Stata program output.

To check these results, however, the multicollinearity test (VIF) was performed (see Table 7).

**Table 7. Inflation factor of variables after removing variables**

<i>Variable</i>	<i>VIF</i>	<i>1/VIF</i>
<i>Pop</i>	3.32	0.301162
<i>Microcredit</i>	2.8	0.357581
<i>expnetas</i>	1.81	0.553892
<i>Investment</i>	1.54	0.648925
<i>Expenditure</i>	1.47	0.682436
<i>Remaining consumption</i>	1.4	0.713329
<i>UBN</i>	1.28	0.78217
<i>Mean VIF</i>	1.94	

Source: Compiled by the authors, Stata program output.

Results of values less than four confirmed the inexistence of collinearity. Subsequently, the Hausman test was carried out to determine whether the panel should be treated with fixed or random effects (see table 8).

**Table 8. Hausman test results**

	-- Coefficients --			
	(b) <i>fe</i>	(B) <i>re</i>	(b-B) <i>Difference</i>	<i>sqrt(diag(V_b-V_B))</i> <i>S.E.</i>
Microcredit	-0.466941	-3.874403	3.407462	3.963165
Consumer credit	0.9824273	1.211243	-0.2288161	0.4087586
Remaining consumption	0.0297471	0.0932575	-0.0635104	0.0095528
Investment	-0.1032534	-0.0862867	-0.0169667	0.0016212
Expenditure	0.0768373	0.0951919	-0.0183545	0.0044921
Net exports	-0.0020719	-0.0153012	0.0132293	0.0045545

b = consistent under Ho and Ha; obtained from xtreg  
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg  
 Test: Ho: difference in coefficients not systematic  
 $\chi^2(6) = (b - B)' [(V_b - V_B)^{-1}] (b - B) = 41.46$   
 Prob >  $\chi^2 = 0.0000$   
 (V\_b-V\_B is not positive definite)

Source: Compiled by the authors, Stata program output.

As Prob >  $\chi^2$  was less than 0.05, we proceeded to use the fixed-effects data panel, which indicates that individuals influence the independent variables.

The robustness test was then used for the fixed estimators, in which the 1,848 observations were divided into 56 groups or quarters (see table 9).

**Table 9. Robust fixed effect results**

Fixed-effects (within) regression		Number of obs = 1848				
Group variable: id		Number of groups = 33				
R-sq: within = 0.0256		Obs per group: min = 56				
between = 0.0858		avg = 56.0				
overall = 0.0452		max = 56				
corr(u_i, Xb) = 0.0959		Prob > F = 0.0000				
		(Std. Err. adjusted for 33 clusters in id)				
GDP	Robust					
	Coef.	Std. Err.	t	P >  t	[95% Conf. Interval]	
Microcredit	-3.361147	6.45791	-0.52	0.606	-16.51548 9.793185	
Consumer credit	0.9895717	0.2983504	3.32	0.002	0.3818519 1.597292	
Remaining consumption	0.0297563	0.0278876	1.07	0.294	-0.0270488 0.0865615	
Investment	-0.1010223	0.092105	-1.1	0.281	-0.288634 0.0865895	
Expenditure	0.0771671	0.0741647	1.04	0.306	-0.0739015 0.2282357	
Net exports	-0.001768	0.0164604	-0.11	0.915	-0.0352967 0.0317608	
UBN	-3.78E+11	4.10E+11	-0.92	0.364	-1.21E+12 4.58E+11	
_cons	2.67E+13	1.08E+13	2.46	0.019	4.63E+12 4.88E+13	
sigma_u	6.58E+13					
sigma_e	7.65E+13					
rho	0.42514146 (fraction of variance due to u_i)					

Source: Compiled by the authors, Stata program output.

To determine whether the model has autocorrelation, the Wooldridge test was used, in which the null hypothesis is that there is no autocorrelation with at least 99% reliability and a Prob > F = 0.2502. Therefore, the null hypothesis is accepted (see Table 10).

**Table 10. Wooldridge Test Results**

Wooldridge test for autocorrelation in panel data	
H0: no first order autocorrelation	
F(1, 32) = 1.371	
Prob > F = 0.2502	

Source: Compiled by the authors, Stata program output.

Wald's test was employed to determine whether the model presents heteroscedasticity. Here, the null hypothesis was rejected because Prob > chi2 = 0.0000, indicating that the model presents heteroscedasticity (see table 11).

**Table 11. Results of Wald's heteroscedasticity test**

in fixed effect regression model	
H0: sigma(i)^2 = sigma^2 for all i	
chi2 (33) = 6.5e+12	
Prob>chi2 = 0.0000	

Source: Compiled by the authors, Stata program output.

Therefore, the heteroscedasticity had to be corrected using robust standard errors (see table 12):

**Table 12. Model without heteroscedasticity**

Linear regression, heteroskedastic panels corrected standard errors						
Group variable: id		Number of obs = 1848				
Time variable: date		Number of groups = 33				
Panels: heteroskedastic (balanced)		Obs per group: min = 56				
Autocorrelation: no autocorrelation		avg = 56				
		max = 56				
Estimated covariances = 33		R-squared = 0.2261				
Estimated autocorrelations = 0		Wald chi2(7) = 2182.77				
Estimated coefficients = 8		Prob > chi2 = 0.0000				
	<i>Hetercorrected</i>					
GDP	<i>Coef.</i>	<i>Std. Err.</i>	<i>z</i>	<i>P &gt; z</i>	<i>[95% Conf. Interval]</i>	
Microcredit	-8.565789	3.090994	-2.77	0.006	-14.62403	-2.507552
Consumer credit	1.351017	0.1735381	7.79	0.000	1.010889	1.691146
Remaining consumption	0.2703003	0.0527634	5.12	0.000	0.1668859	0.3737147
Investment	-0.0635355	0.0382352	-1.66	0.097	-0.1384752	0.0114042
Expenditure	0.131534	0.0367579	3.58	0.000	0.0594898	0.2035783
Net exports	-1.08E-02	2.67E-02	-0.41	0.685	-6.31E-02	4.15E-02
UBN	-8.27E+09	2.98E+10	-0.28	0.781	-6.66E+10	5.01E+10
_cons	5.06E+12	1.62E+12	3.13	0.002	1.89E+12	8.22E+12

Source: Compiled by the authors, Stata program output.

Based on the tests carried out, the most appropriate model is as follows:

$$GDP_{it} = 5.06 - 8.56 Mic_{it} + 1.35 CC_{it} + 0.27 Crest_{it} - 0.06 I_{it} + 0.13 G_{it} - 0.01XN_{it} - 8.27NBI_{it} + \mu_{it}$$

Here, microcredit, in contrast to consumer credit, has a negative effect on GDP, thus negating this article's initial hypothesis of the article.

However, the panel data models estimating fixed effects consider the short-term impact. As the microcredit variable sign is not as expected, following Kennedy (2002), we resort to correcting for the effect of dynamic confusion and introduce the lagging microcredit variable in the model, obtaining the

results shown in table 13.

**Table 13. Model without heteroscedasticity**

Linear regression, heteroskedastic panels corrected standard errors						
Group variable: id		Number of obs = 1815				
Time variable: date		Number of groups = 33				
Panels: heteroskedastic (balanced)		Obs per group: min = 55				
Autocorrelation: no autocorrelation		avg = 55				
		max = 55				
Estimated covariances = 33		R-squared = 0.2260				
Estimated autocorrelations = 0		Wald chi2(8) = 1689.78				
Estimated coefficients = 9		Prob > chi2 = 0.0000				
pib	Het-corrected					
	Coef.	Std. Err.	z	P > z	[95% Conf. Interval]	
Microcredit	-102.0546	42.13817	-2.42	0.015	-184.6438	-19.46527
Consumer credit	1.295025	0.1784628	7.26	0.000	0.9452446	1.644806
Remaining consumption	0.2616199	0.0519819	5.03	0.000	0.1597374	0.3635025
Investment	-0.0658695	0.0390878	-1.69	0.092	-0.1424803	0.0107412
Expenditure	0.1329148	0.0367519	3.62	0.000	0.0608825	0.2049471
Net exports	-0.0124961	0.0268565	-0.47	0.642	-0.0651338	0.0401417
UBN	-1.09E+10	2.82E+10	-0.39	0.700	-6.61E+10	4.44E+10
Microcredit						
L1.	97.24214	42.869	2.27	0.023	13.22044	181.2638
_cons	4.76E+12	1.55E+12	3.07	0.002	1.72E+12	7.8E+12

Source: Compiled by the authors, Stata program output.

By including the lagging microcredit variable (L1. microcredit), the microcredit variable retains a negative sign and is 99% significant, while the lagging microcredit variable is positive and significant at 98%, confirming that microcredit has a greater negative impact over the long term rather than the short term.

When seeking to account for this finding, it could be argued that the high costs associated with microcredit mean that recipients are later forced to make increased sacrifices to pay financial obligations, which are ultimately not taken into consideration when calculating GDP.

## 6. CONCLUSIONS AND RECOMMENDATIONS

- In Colombia, microcredit has a negative impact on GDP, both in the short and long term, due to the onerous interest rate which necessitates greater sacrifice of future consumption to repay the initial loan.
- The clear social function of Grameen Bank's microcredit model is absent in Colombia. On the contrary, Colombia's microcredit policy is a commercial one, rather than a welfare one; the high interest rates and the demanding requirements to access a loan of this type demonstrate that the MFIs in Colombia do not work from the principle of trust. Rather the perception of a high risk of lending resources to the population at the base of the pyramid prevails and, therefore, this segment must pay a high price for accessing credit.
- In Colombia, microcredit policies benefit and protect lenders in greater proportion than borrowers (higher interest rates for microcredit versus consumption).
- However, it is not possible to categorically state that existing microcredit policies in Colombia have not been successful just because they do not have a positive relationship with GDP.
- At the time of writing, 60% of microfinance institutions did not have an active microcredit line. Therefore, the benefits of the policies, despite being preferential to these establishments, have not yet been captured by the market.
- Future research could determine if microcredit has impacted the income of the households that receive these loans, if their quality of life improves in the long term, and if the informality of credit has decreased for Colombian microentrepreneurs. Additionally, future research could investigate why certain MFIs do not offer a microcredit line within their product portfolio.

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<sup>1</sup> This refers to people living below the poverty line, who are generally excluded and have limited opportunities to improve their quality of life.



- <sup>2</sup> Informal financing refers to obtaining small quantities of liquid assets outside of formal channels, through family, friends, traders and, in general, non-traditional lenders who may charge high interest rates (Saiz, 2010). This modality tends to behave as a monopoly that allows the interest rate to be increased (Hoff and Stiglitz, 1990).
- <sup>3</sup> Microcredit loans are predominantly awarded to women because they, generally, repay their obligations on time and allocate the profits of their small businesses to the welfare of their families, for example, the education of their children, in contrast to men who use these loans to increase their consumption of perishable goods (Saiz, 2010).
- <sup>4</sup> "[...] long-term implicit contract between a bank and its debtor ... establishing close ties between the lender and the borrower" (BBVA, Foundation, 2007, p. 3).
- <sup>5</sup> Prepared by the Bank of Opportunities, the Financial Superintendence of Colombia, the Superintendence of the Solidarity Economy and microcredit NGOs.
- <sup>6</sup> Including new/used machinery, equipment, or real estate.
- <sup>7</sup> Raw materials, inventories, supplies, operating expenses.
- <sup>8</sup> As of December 2018, *Asomicrofinanzas* had 9 member banks, 8 cooperatives, 17 MFIs and one compensation fund (*Asomicrofinanzas*, 2018).
- <sup>9</sup> Defined in Law 590 of 2000 as units whose plant personnel does not exceed ten (10) workers; and with total assets less than five hundred and one (501) SMMLV
- <sup>10</sup> Bancoldex is the development bank for business growth in Colombia, leveraging companies of all sizes, all sectors and all regions of the country regardless of how long they have been operational, with knowledge services and financial instruments. Source: [https:// www.bancoldex.com/que-es-bancoldex-237](https://www.bancoldex.com/que-es-bancoldex-237)