Dependency association of determinants of uptake of "drop by drop" loans in micro, small and medium enterprises

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Abstract. The objective of this study is to determine if there is a dependency association between the characteristics of micro, small, and medium-sized companies (MSMEs) in terms of size, seniority, level of education of their managers and gender, and the taking advantage of "drop by drop" credit (informal loans) This research employs quantitative methodology to examine the use of this type of credit by MSMEs in the city of Bogotá (Colombia). The main findings include that there is a dependency association between the variables of company size, company age, managerial level of education, and using "drop by drop" credit.

Keywords: Formal credit, informal credit, MSMEs, financing.
JEL: G3; M2; K2.

1. Introduction

The generation of income and its distribution across the population are important factors in a country's macroeconomic performance (Espinel & Giraldo, 2009). Companies are a key part of the economic circuit, and so their role as societal entities affect their relations with that circuit (Massad, 2007). The strengthening of micro, small, and medium-sized enterprises (MSMEs) contributes to the development of the economy (Cabello, 2014) and their access to credit can make the difference between survival and disappearance (Jiménez-Sánchez, Rojas-Restrepo, & Ospina-Galvis, 2013; Athuane-Gima, 1995).

For companies in general, access to credit is a key variable in their operation. As Fernández (2014) notes, all assets pertaining to an organization are financed by liabilities and/or its equity. A company has two sources of financing: the resources of its owners, partners, or shareholders, through an increase in equity; or by incurring debt with third parties through recognition of liabilities (Irarrázabal, 2014).

Financing decisions can be associated with different variables. These include factors inherent to a company such as size (Botello, 2015); management style (Barton & Gordon, 1987); and impact analysis of agency costs on debt acquisition (Pesce, Esandi, Briozzo, & Vigier, 2015) whether due to cost or to the tax benefit of debt (Barrera, Parada, & Serrano, 2020); among others, such as a company's financing strength or the cost of using other sources of financing (Greenwald & Stiglitz, 1993).

In Colombia, by law, different variables are used to classify a company's size: micro-enterprise, small enterprise, medium-sized enterprise, or large enterprise. The first three classifications are often included in a single group: MSMEs. Table 1 presents the variables used for classification. (It should be noted that large enterprises are understood as those that exceed the values stipulated in the variables defined by law.)

Table 1
Company size (MSMEs), current legislation as of 2018

Company size	Number of employees	Total assets	Gross annual sales[1]
Micro	Fewer than 11	Fewer than 501 SMMS[1]	Not regulated by law
Small	Between 11 and 50	Between 501 and 5,000 SMMS[2]	Not regulated by law

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1   According to Barrera (2019) this variable was not included until 2018.
2   SMMS: statutory monthly minimum salary.

Medium	Between 51 and 200	Between 100,000 and 610,000 TVUs[3]	Not regulated by law

Sources: adapted from Law 590 of 2000, Law 905 of 2004, Law 1151 of 2007, and Law 1450 of 2011.

In Colombia, MSMEs account for more than 99% of all companies in operation (Confecámaras, 2020), they create 80% of all jobs in the country, and contribute 35% of GDP (Ministerio del Trabajo, 2019). These figures are not outliers: similar trends can be found the world over (Pinto, 2007). Although credit plays an important role in the economy, not all companies—especially not smaller ones—can access the regular market supply (Mballa, 2017), and so they must meet their financing needs through other sources (Montoya, 2001). These sources are characterized by their high cost (Asobancaria, 2019), high financial risk, high social risk, and high security risk (García & Gómez, 2016). One example is so-called "drop-by-drop" credit (Holguín, 2018).

Given these considerations, it is worth exploring the factors that prompt MSMEs to access informal drop-by-drop loans. Although informal credit fills a vacuum left by the inaccessibility of formal financing, depending on the conditions they can also negatively affect the country's business framework. In this study, we consider the following question: which of these characteristics of MSMEs—size, age, and management—determine their access to informal drop-by-drop loans?

To address this research question, we draw on the population of MSMEs that operate out of the Corporación de Abastos de Bogotá S. A. (Corabastos) market complex in the Bogotá locality of Kennedy, based on their classification by company size as of December 31, 2018. Corabastos (2019) hosts some 6,500 wholesalers and retailers, who together sell more than 12,400 tons of food per day totaling some COP 24,000 million.[4] An average of 200,000 people visit the site each day, and its overall coverage extends to some 10 million people.

The main aim of this research is to determine whether there is a dependent relationship between certain MSME characteristics (size, age, and managers' education level, and gender) and drop-by-drop borrowing. Employing a quantitative, correlational, cross-sectional, and non-experimental methodology, we collect, process, and analyze primary data collected by way of a survey based on simple random sampling.

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3   TVU: tax value unit
4   More than USD 7,300,000 at the December 31, 2019 exchange rate.

2. Formal lending by banks and other institutions in the Colombian financial system

There are several reasons for the existence of formal banking. Bhattacharya & Thakor (1993), in their discussion of what they term the main problems of banking theory, pose the following question: Why do financial intermediaries exist? Though there may be several possible answers, in the most basic terms financial intermediaries such as banks exist to meet the basic needs of the market in terms of savings, investment, and credit. As Barrios (2004) points out, one of the main roles for which banks are necessary is that of facilitating the transfer of capital between savers and borrowers. Banking, to be sure, aids the provision of financial resources to companies that have limited access to the capital market (Schwartz, 1974; Emery, 1984). Credit lines oriented towards the business sector provide borrowers with benefits over alternative financing instruments (De Cos & Hernando, 1999).

In Colombia, the main function of credit establishments is to receive deposits and issue loans from the economy's surplus agents to its deficit agents (Díaz, 2005) in the form of credit. The Colombian financial system is primarily made up of three kinds of organizations: credit institutions, financial service providers, and other financial institutions (Escobar, 2013).

Activities related to the management, use, and investment of deposits can only be carried out by those with prior authorization from the Colombian state, within national territory, pursuant to Article 335 of the 1991 Political Constitution of Colombia.

As at January 2019, Colombia's financial system had a net credit portfolio and financial leasing operations worth more than COP 459.2 trillion[5] (Superintendencia Financiera de Colombia, 2019).

3. Main barriers to accessing formal credit for MSMEs

Access to formal credit for Colombian MSMEs, and especially SMEs, is limited largely by their inability to meet the formal demands and requirements established by formal service providers (Montoya, 2001; Consejo Nacional de Política Económica y Social, 2007). In Colombia, as in other countries in the region, prevailing socioeconomic conditions make it difficult for many to be considered as potential customers of the financial system (Mballa, 2017).

For MSMEs, barriers to accessing formal credit include a lack of assets to offer as security (Cull, Demirgüç-Kunt, & Morduch, 2007), the high

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5   More than USD 145,272,588,000 at the exchange rate on December 31, 2019.

cost of specialized credit, such as microcredit, and MSMEs' ability to pay (Figueroa, 2016) Valencia (2010, p. 130) points to "the lack of resources of loan applicants [...], willingness to pay, loss of confidence in the financial institutions, market fluctuations"[6] while Rosende (1986) notes other factors such as the country's level of economic stability and the ability of financial institutions to attract deposits (Rosende, 1986).

4. Access to informal credit: drop-by-drop loans

Informal credit is a response to the gap in the market in terms of the supply of formal credit (Ramírez-Urquidy, Mungaray, & Guzmán, 2009; Obando-Bastidas, Herrera-Sarmiento, & Rodríguez-Ladino, 2016). For some MSMEs, an inability to meet the requirements of the formal financial system acts as a barrier to access (Montoya, 2001; Consejo Nacional de Política Económica y Social, 2007). Trivelli (1994, cited by García & Gómez, 2016, p. 139) defines informal credit as "an intermediation activity carried out by non-specialist lenders that are neither supervised nor endorsed by the state." A key consideration regarding informal credit concerns its legality or illegality. Credit may be illegal based on factors such as the interest rate charged (Asobancaria, 2019) and collection mechanisms implemented by the lender (Hernández & Oviedo, 2016; Obando-Bastidas et al., 2016). When it comes to collection mechanisms, García & Gómez (2016) argue that delays in agreed payments in the informal system can even drive borrowers to change their addresses for security reasons such as threats of extortion or murder. Indeed, the risks to informal borrowers do go beyond the economic sphere.

With regard to interest rate levels, Article 305 of Law 599, 2000 (amended by Law 890, 2004) states that:

> He who receives or charges, directly or indirectly, in exchange for a cash loan or for the sale of goods or services in installments, for a profit or advantage that exceeds by half the interest that banks charge for the corresponding period, as attested to by the Banking Superintendency, regardless of the means used to record, conceal, or disguise the operation, will receive a jail term of thirty-two (32) to ninety (90) months and a fine of sixty-six point six-six (66.66) to three-hundred (300) statutory minimum legal salaries.

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6   All translations from the Spanish are by *Apuntes*.

The literature on drop-by-drop lending is limited. This type of credit refers to informal, low-denomination loans that can be repaid in small installments of relatively short frequency (García, Castillo, & Vargas, 2017). Drop-by-drop loans are associated with criminal acts and, often, organized crime (Moreno & Otálora, 2018) because of the high interest rates charged—which exceed the maximum rates stipulated by Article 205 of Law 599 (2000), including monthly rates of 15% (Ruiz & Betín, 2017; Asobancaria, 2019)and daily ones of 20% (Holguín, 2018)—as well as coercion in the event of default (Hernández & Oviedo, 2016). According to the Banco de la República de Colombia (2021), the average annual lending rate for 2018 ranged between 11.09% and 12.44%.

The issuance and recovery process involves disbursing the loan, which tends to be a relatively low sum of money; setting an interest rate that is generally above the legally permitted maximum; agreeing on the total amount, which is to be repaid in a short period of time through frequent, often daily, installments; and, in many cases, providing some form of collateral (Indacochea, 1989; Raccanello, 2013; Holguín, 2018).

Research shows that drop-by-drop borrowing is linked to variables of vulnerability (Leskinen & Raijas, 2006; Nicolini, 2006). MSMEs resort to this type of borrowing for reasons that are associated with company size and manager's level of education.

Lusardi (1999) stresses the importance of education, and especially in the area of finance, for a firm's decision-making. On the other hand, scholars such as Fessler, Schürz, Wagner, and Weber (2007) find no direct relationship between these variables. But Obando-Bastidas, Herrera-Sarmiento, and Rodríguez-Ladino (2016) demonstrate that there is an association between access to drop-by-drop credit and the education level of micro-enterprise owners who take out such loans. Similarly, for their sample, Barrera and Parra (2020) detect a relationship between drop-by-drop loans, company size, and the manager's education level.

5. Methodology

To answer our research question regarding which characteristics of MSMEs—size, age, and management—determine their access to informal drop-by-drop loans, we employed a qualitative, correlational, cross-sectional, and non-experimental methodology. For information collection, we designed a 19-question survey. Of these, we formulated five relevant to our hypotheses (see Table 2). The other questions focused on demographic information and served to ensure that each participant actually pertained to the target population.

The instrument contained only closed questions and did not request personal information or anything else that might compromise the security or personal welfare of the respondents. Participation in the survey was entirely anonymous and voluntary. We administered the survey directly at the location of the target population, with the permission of the site operators.

The participants were managers of MSMEs that operate out of the Corporación de Abastos de Bogotá S. A. (Corabastos) based on the size classification applicable as of December 31, 2018, fulfilling the standards of space and time proposed by Hernández, Fernández, & Baptista (2014). Corabastos is the biggest market complex in Bogotá and Colombia. Some 6,500 traders work there, amassing COP 24,000 million in daily sales to the 10 million or so people the complex covers (Corabastos, 2019).

We completed our sample of businesses within Corabastos taking into account an unknown overall population size (although the total number of wholesalers and retailers at the complex is known, we do not know how many are owners or just managers of the MSMEs.), as well as the parameters of heterogeneity (50%), confidence interval (95%), and margin of error (5%). Therefore, to calculate the sample, we started from the basis of non-knowledge of the total population. Having estimated the confidence level and determined the margin of error, we utilized the following formula (Badii, Castillo, & Guillén, 2017):

$$n = \frac{z^2pq}{d^2}$$

Where:
z = normal distribution factor based on confidence level;
p = probability of the event occurring;
q =probability that the event will not happen;
d = margin of error.

Such that:

$$n = \frac{1,96^2 * 0,5 * 0,5}{0,05^2} \quad n = \frac{3,8416 * 0,5 * 0,5}{0,0025} \quad n = \frac{0,9604}{0,0025} = 384,16 \approx 385$$

We apply simple random probabilistic sampling, in proportion to the number of MSMEs recorded per section within the market complex. This means that the number of surveys administered in each section is proportional to the number of units in each one, in relation to the total number of surveys to be administered. To make sure that all units had a chance of being selected, we administered the survey to every third unit, starting from

number one, and moved on to the next unit each time we encountered a business that stated they were not a MSME or declined to take part in the survey. If we reached the end of a section without having administered the required number of surveys, we started again from unit number two, and so on.

Based on the information collected, we calculate Pearson's chi-squared test (x^2) between the variables presented in Table 2.

Table 2
Variables: survey questions employed for calculation of Pearson's chi-squared test

Variable	Question		Variable	Question
Takes out (or not) drop-by-drop credit	Have you ever taken out (a) drop-by-drop loan(s) for your business? Yes/No (mark one option only)	Vs.	Company size	In 2018, was your business classified as a: (mark one option only) micro-enterprise, small enterprise, medium-sized enterprise, large enterprise?
Takes out (or not) drop-by-drop credit	Have you ever taken out (a) drop-by-drop loan(s) for your business? Yes/No (mark one option only)	Vs.	Company age	The company has been in operation for (mark one option only): less than one year; between one and three years; Between three and five years; between five and ten years; more than ten years
Takes out (or not) drop-by-drop credit	Have you ever taken out (a) drop-by-drop loan(s) for your business? Yes/No (mark one option only)	Vs.	Manager's level of education	Select your maximum level of education (mark one option only): primary, high-school baccalaureate, technical, technological, professional, postgraduate, none of the above.
Takes out (or not) drop-by-drop credit	Have you ever taken out (a) drop-by-drop loan(s) for your business? Yes/No (mark one option only)	Vs.	Manager's gender	What is your gender? (mark one option only): male, female, other

Source: compiled by authors based on data from the survey.

The results of Pearson's chi-squared test (x^2) and the resulting p value (level of significance, asymptotic significance, or margin of error accepted) will be employed to validate or invalidate the hypotheses, within the parameters of the maximum accepted margin of error (5%). The null hypotheses (H_0) of all those associations between variables that obtain a p value below or equal to 0.05 are rejected, which means that the alternative hypothesis (H_1) is accepted. The null hypothesis (H_0) is accepted when the resulting p value is greater than 0/05, which leads to rejection

of the alternative hypothesis (H_1). For the present study, we propose the hypothesis presented in Table 3.

Table 3
Proposed hypothesis by relationships between variables

Variables		Null hypothesis – H^0	Alternative hypothesis – H^1
Takes out (or not) drop-by-drop credit	Company size	There is no dependence between drop-by-drop borrowing (or not) and company size	There is dependence between drop-by-drop borrowing (or not) and company size
Takes out (or not) drop-by-drop credit	Company age	There is no dependence between drop-by-drop borrowing (or not) and company age	There is dependence between drop-by-drop borrowing (or not) and company age
Takes out (or not) drop-by-drop credit	Manager's level of education	There is no dependence between drop-by-drop borrowing (or not) and manager's education	There is dependence between drop-by-drop borrowing (or not) and manager's education
Takes out (or not) drop-by-drop credit	Manager's gender	There is no dependence between drop-by-drop borrowing (or not) and manager's gender	There is dependence between drop-by-drop borrowing (or not) and manager's gender

Source: Compiled by authors.

For the organization and analysis of the data collected, we employed the Statistical Package for the Social Sciences (SPSS), version 23.

6. Results

As stipulated in the methodology section above, we administered 385 surveys to owners or managers of MSMEs based at Corabastos. All participants were adults. The results were as follows:

Of the entire sample, 79.5% of the respondents were men and 20.5% were women; none specified "other" as their gender. As to level of education, 42.7% of respondents said they had been educated to the baccalaureate level, followed by technological qualifications (15%), primary-school level (14.8%), and professional qualifications (13.7%). Meanwhile, 1.3% of participants said they had not completed any education or could not read or write. With regard to enterprise longevity, 54.6% of the MSMEs had been operating for five years or more, while just 2.1% were less than one year old. In terms of size, as of December 31, 2018, 71% were legally classifiable as micro-enterprises, followed by small enterprises (18.6%) and medium-sized enterprises (10.4%). Finally, 21.6% of the MSMEs had taken out at least one drop-by-drop loan, while 78.4% had not.

6.1 Calculation of Pearson's chi-squared (x^2)

We calculated Pearson's chi-squared between company size and drop-by-drop borrowing; company age and drop-by-drop borrowing; manager's education and drop-by-drop borrowing; and manager's gender and drop-by-drop borrowing.

In the case of company size and drop-by-drop borrowing, based on the data input in SPSS and the calculation of the contingency table between the "company size" and the "drop-by-drop borrowing" variables, we obtained the following results.

Table 4.
Contingency table: "company size" and "drop-by-drop borrowing" variables

			Company size			Total
			Micro	Small	Medium-sized	
Took out drop-by-drop loan for their business?	Yes	Count	67	15	1	83
		% versus company size	24.5%	20.8%	2.5%	21.6%
	No	Count	206	57	39	302
		% versus company size	75.5%	79.2%	97.5%	78.4%
Total		Count	273	72	40	385
		% versus company size	100.0%	100.0%	100.0%	100.0%

Chi-squared test			
	Value	Df	Asymptotic significance (2-tails)
Pearson's chi-squared	10.051[a]	2	0.007
Probability index	14.071	2	0.001
Linear-by-linear association	8.527	1	0.003
No. valid cases	385		

[a] 0 cells (0.0%) have an expected recount of less than 5. The minimum expected recount is 8.62.

Source: Compiled by authors

As can be seen in Table 4, in the Pearson's chi squared calculation, the *p* value (significance level, asymptotic significance, or margin of error accepted) is less than 0.01.

For company age and drop-by-drop borrowing, we carried out the procedure as described. The results are presented in Table 5.

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Table 5
Contingency table: "company age" and "drop-by-drop borrowing" variables

| | | | Age of business | | | | | |
			Less than one year	Between 1 and 3 years	Between 3 and 5 years	Between 5 and 10 years	More than 10 years	Total
Took out drop-by-drop loan for their business?	Yes	Count	1	21	19	22	20	83
		% versus Company age	12.5%	35.0%	17.8%	17.2%	24.4%	21.6%
	No	Count	7	39	88	106	62	302
		% versus Company age	87.5%	65.0%	82.2%	82.8%	75.6%	78.4%
Total		Count	8	60	107	128	82	385
		% versus Company age	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-squared test			
	Value	Df	Asymptotic significance (2-tails)
Pearson's chi-squared	9.548 [a]	4	0.049
Probability index	8.992	4	0.061
Linear-by-linear association	0.791	1	0.374
No. valid cases	385		

[a] 1 cell (10.0%) has an expected recount of less than 5. The minimum expected recount is 1.72.

Source: Compiled by authors.

As can be seen in Table 5, in the Pearson's chi squared calculation, the *p* value (significance level, asymptotic significance, or margin of error accepted) is less than 0.05.

Table 6 presents the contingency data for manager's education and drop-by-drop borrowing.,

Table 6

Contingency table: "manager's education" and "drop-by-drop borrowing" variables

			Level of education[7]							Total
			Primary	Baccalaureate	Technical	Technological	Professional	Postgrad	None	
Took out drop-by-drop loan for their business?	Yes	Count	23	35	8	6	6	2	3	83
		% versus level of education	40.4%	21.2%	21.6%	10.3%	11.3%	20.0%	60.0%	21.6%
	No	Count	34	130	29	52	47	8	2	302
		% versus level of education	59.6%	78.8%	78.4%	89.7%	88.7%	80.0%	40.0%	78.4%
Total		Count	57	165	37	58	53	10	5	385
		% versus level of education	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-squared test

	Value	Df	Asymptotic significance (2-tails)
Pearson's chi-squared	23.897[a]	6	0.001
Probability index	22.572	6	0.001
Linear-by-linear association	6.889	1	0.009
No. valid cases	385		

[a] 3 cells (21.4%) have an expected recount of less than 5. The minimum expected recount is 1.08.

Source: Compiled by authors.

7 In the Colombian education system, a distinction is made between basic high-school (ninth grade) and the baccalaureate (*bachillerato*; eleventh grade), which is an entry requirement for progression to higher education, and between the "technical" (which can be started on completion of basic secondary schooling), "technological," and "professional" grades (both of which can be started on acquisition of the baccalaureate).

As can be seen in Table 6, in the Pearson's chi-squared calculation, the *p* value (significance level, asymptotic significance, or margin of error accepted) is less than 0.01.

Finally, for the case of manager's gender and drop-by-drop borrowing, the contingency table is presented below.

Table 7
Contingency table: "manager's gender" and "drop-by-drop borrowing" variables

| | | | Level of education | | Total |
			Male	Female	
Took out drop-by-drop credit for their business?	Yes	Count	64	19	83
		% versus level of education	20.9%	24.1%	21.6%
	No	Count	242	60	302
		% versus level of education	79.1%	75.9%	78.4%
Total		Count	306	79	385
		% versus level of education	100.0%	100.0%	100.0%

Chi-squared test					
	Value	Df	Asymptotic significance (2-tails)	Exact sig (2-tails)	Exact sig (1-tail)
Pearson's chi-squared	0.365[a]	1	0.546		
Continuity correlation	0.203	1	0.652		
Probability index	0.358	1	0.55		
Fisher's exact test				0.542	0.321
Linear-by-linear association	0.364	1	0.546		
No. valid cases	385				

[a] 0 cells (0.0%) have an expected recount of less than 5. Calculated only for a table of 2x2.

Source: Compiled by authors.

For this case, the table shows that in calculating Pearson's chi squared, the *p* value (significance level, asymptotic significance, or margin of error accepted) is more than ten times greater than 0.05.

7. Discussion and conclusions

Given the quantitative approach and the sample calculation and selection, our results can be generalized to the population defined. At the descriptive level, we identified that 80% of the Corabastos MSME managers or owners are men, which attests to a significant gender gap.

With regard to education, the high-school baccalaureate predominates, and, along with primary-level schooling, accounts for 57.5% of all participants. This means that more than half of the target population has not accessed formal higher education programs that would improve their performance as MSME owners or managers.

We also found that 21.6% of the managers—a little over a fifth—have taken out drop-by-drop loans for their productive units.

Based on the hypotheses regarding the associations between the variables as well as the methodology employed, and having calculated the chi-square and the resulting p value, three null hypotheses and one alternative are invalidated, as shown in Table 8.

Table 8
Hypotheses accepted according to association between variables

Variables		Hypothesis accepted
Drop-by-drop borrowing (or not)	Company size	H_1: There is dependence between drop-by-drop borrowing (or not) and company size
Drop-by-drop borrowing (or not)	Company age	H_1: There is dependence between drop-by-drop borrowing (or not) and company age
Drop-by-drop borrowing (or not)	Manager's level of education	H_1: There is dependence between drop-by-drop borrowing (or not) and manager's education
Drop-by-drop borrowing (or not)	Manager's gender	H_0: There is no dependence between drop-by-drop borrowing (or not) and manager's gender

Source: Compiled by authors.

These results validate the findings of Obando-Bastidas et al. (2016) when it comes to the relationship between drop-by-drop borrowing and the level of education of the company manager. They are also in line with Barrera and Parra (2020), who observe that education is a determining factor in this type of borrowing. On the other hand, our results are at odds with Fessler et al. (2007), who find no relationship between access to this type of credit and level of education.

As for new findings, we detected associations between drop-by-drop borrowing and the variables of company size and age. This supports the results of Barrera and Parra (2020) to the effect that company size is a determining factor in managers taking out this type of loan. Likewise, we found that there is no association between drop-by-drop borrowing (or not) and the variable of manager's gender.

Overall, we conclude that there is a relationship of dependence between the following variables: "company size" and "drop-by-drop borrowing";

"company age" and "drop-by-drop borrowing"; and "manager's education" and "drop-by-drop borrowing."

Our findings point to the need for the formulation of public policies aimed at the creation and management of companies by women, in order to close the gender gap. Likewise, we identified the need to mitigate the phenomenon of illegal informal lending, which limits the growth of companies by placing a high financial burden upon them. There is a need for programs to promote MSME's access to formal, low-cost, and easy-access credit. While the formal supply includes microcredits, these tend to be high cost with collateral requirements that constitute access barriers. These measures can contribute to strengthening the country's business infrastructure, taking into account the importance of MSMEs in creating jobs and their contribution to national GDP.

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