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ACCESO AL FINANCIAMIENTO DE PYMES EN ARGENTINA
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RESUMEN
Este artículo explora el impacto de la disponibilidad de servicios bancarios sobre el desempeño de la microempresa en Colombia, usando los datos de la Encuesta de Microestablecimientos del DANE de 2003 a 2007 en combinación con la información pública disponible acerca de la oferta de servicios bancarios a nivel de municipio. Encuentra una correlación positiva y estadísticamente significativa entre diferentes medidas de la oferta de servicios bancarios y las ventas (o nivel de producción en el caso de los establecimientos manufactureros), la productividad laboral y el nivel de activos fijos de la microempresas. No encuentra una correlación estadísticamente significativa con el empleo, lo que sugiere que el mayor acceso a financiamiento ha resultado en el tránsito de las microempresas hacia tecnologías más intensivas en capital. Los resultados son robustos a especificaciones empíricas alternativas. Encuentra también que las políticas para expandir el acceso al microcrédito a las microempresas informales más pequeñas han sido exitosas en promover su crecimiento. Finalmente, no se encuentra un efecto positivo de la disponibilidad de crédito a nivel local sobre la formalización empresarial. Por el contrario, la flexibilidad en los requisitos para acceder a financiamiento parecen desincentivar la formalidad.

Palabras clave: instituciones y servicios financieros, instituciones microfinancieras, bancos, desempeño empresarial, Colombia

BANKING SERVICES SUPPLY AND MICRO FIRM PERFORMANCE: EVIDENCE FROM COLOMBIA
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ABSTRACT

This paper uses a dataset of a survey of Colombian micro firms from 2003 to 2007 in combination with data from publicly available sources about banking services supply at the municipality level, to assess the impact of the availability of banking services on micro firms performance. We find a positive and statistically significant correlation between banking services supply targeted to micro firms and firm size measured by sales, firm labor productivity and firm capital to labor ratios, and a nil correlation with employment, suggesting improved access to credit has resulted in micro firms' transit to more capital-intensive technologies. This result is robust to alternative empirical specifications. Also, policies to extend microcredit access to the smaller informal micro firms appear to have been successful in promoting their growth. Finally, microcredit availability at the local level does not appear to have a positive impact on formalization. On the contrary, more flexible requirements to access financing, seem to be a counter incentive for formalization.

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Banking services supply and micro firm performance: evidence from Colombia

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Abstract

This paper uses a dataset of a survey of Colombian micro firms from 2003 to 2007 in combination with data from publicly available sources about banking services supply at the municipality level, to assess the impact of the availability of banking services on micro firms performance. It finds that there is a positive and statistically significant correlation between banking services supply targeted to micro firms and firm size measured by sales, firm labor productivity and firm capital to labor ratios, and a nil correlation with employment, suggesting improved access to credit has resulted in micro firms' transit to more capital-intensive technologies. This result is robust to alternative empirical specifications. Also, policies to extend microcredit access to the smaller informal micro firms appear to have been successful in promoting their growth. Finally, microcredit availability at the local level does not appear to have a positive impact on formalization. On the contrary, more flexible requirements to access financing, seem to be a counter incentive for formalization.

Key words: Financial Institutions and Services, Microfinance Institutions, Banks, Firm Performance, Colombia
JEL Codes: G20, G21, L25, O54

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1. Introduction

Latin American and Caribbean countries underperformance relative to other developing countries in terms of productivity growth has reflected on moderate average economic growth of the region over the last 15 years. Colombia is no exception. GDP per capita growth was on average of 1.9% per year between 1990 and 2009, and the picture is even less appealing considering the evolution of GDP per worker that had a peak in 1995, then fell continuously until 2001, and despite recovery between 2002 and 2007, fell below its 1989 value in 2009. Underlying these results is stagnant productivity. Medina et al (2003) measure plant-level TFP between 1978 and 1999 and find aggregate manufacturing productivity largely stagnates and even declines in some of the larger industries during this period. Similarly, estimates of productivity by Eslava et al. (2006) before and after the market reforms introduced in the 1990s in Colombia show relatively modest overall productivity growth.

A recent study put forth by the Inter American Development Bank (IADB, 2010) shows that productivity is strongly associated with firm size, with the smaller firms lagging behind in terms of productivity, and questions whether programs targeted to the smaller firms contribute to increase firms' productivity or, on the contrary, make firms too large relative to what they should be with a detrimental effect on aggregate productivity.

This research adds to the somewhat scarce literature exploring the impact of alternative policy programs on firm performance by size, using Colombian data to understand micro firms' responses to policies aimed at facilitating their access to financing. This is relevant not only because micro firms represent a large share of total employment in developing countries (in Colombia the number is around 50%), but also because policies facilitating access to financing have been prioritized in Colombia since 2003, with particular emphasis on facilitating access to financing to the smaller firms.

According to Beck et al (2004), because smaller firms are inherently riskier investments from the point of view of the credit markets and are usually subject to proportionally greater scrutiny for each dollar borrowed -so they are also more expensive to deal with in the event of a default- they tend to use less bank finance. They are also, however, those who benefit the most from better protection of property rights and financial intermediary development.

While policies that facilitate access to financing are in general well evaluated in terms of their rationale, because they fall in the category of interventions to mitigate

market failures in the form of information asymmetries, and contract enforcement problems that shun firms from the credit markets[2], it is not clear that all policies aimed at this objective are equally effective.

Colombia has transited from subsidized credit targeted at particular groups of firms, to programs that facilitate access to financing of the smaller firms through, for instance, the granting of automatic government-backed partial guarantees to credit requests below a certain threshold level. Of particular interest for the purpose of this paper, the Colombian government has put in place incentives for financial and non-financial intermediaries to expand their activity into regions where banking services supply has been absent or scarce in the past, and has adapted regulations in order to facilitate expansion of both types of institutions into the microcredit market segment.

This paper is organized as follows. Sections 2 and 3 introduce the data used in the empirical exercises: Section 2 uses the Annual Micro Firms' Survey (AMS) from the National Department of Statistics' (DANE, for its acronym in Spanish) to characterize the Colombian micro firms' sector, and Section 3 describes the supply of banking services across the country's geography though both financial and non-financial institutions, using publicly available information collected and organized in a database for the purposes of this research. Section 4 presents the econometric exercises exploring micro firms' performance in response to banking services availability in the municipalities where they operate and Section 5 concludes.

2. Colombian micro firms: characterization using microeconomic data

DANE's AMS is available from 2000 to 2007. It is representative of a selection of sectors at the ISIC 3-digit level for 14 cities until 2005, and in 2006 it expands to be representative of the entire Colombian micro firms' sector. It cannot be used to follow the evolution of micro firms' aggregate series over time (i.e. number of firms, total

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[2] The functioning of credit markets depends crucially on that the promise to pay back a loan can be enforced even when payment does not occur voluntarily. For the creditor to have incentives to enter into debt contracts the legal system needs to be efficient and any guarantee or collateral pledge for a loan should be settled quickly and at a low cost in the event of default. Problems associated with procedures for the liquidation of assets used as collateral, limitations in the type of assets that can be used as collateral, inefficiencies of property registries and the judiciary system, and uncertainty about property rights of these assets hinder access to credit.

employment, production), but it can be used to characterize micro firms according to a series of variables[3].

By the standard definition used in Colombia, a micro firm is a firm with 10 workers or less and/or fixed assets (other than the household) valued at less than 500 legal minimum monthly wages.

Table 1 presents some summary statistics for years 2000 and 2007 that show the average micro firm was 30% larger in 2007 in terms of sales (or output, in the case of micro firms in the manufacturing sector) than it was in 2000, and somewhat smaller in terms of workers, possibly reflecting a tendency of micro firms to hire less temporary employees. As a share of total costs labor costs decrease on average, while labor productivity increases at 5.4% per year over the period. The average capital to labor ratio also grows from 2000 to 2007, although at a lower rate per year of 3.1%. All of these variables are distributed with substantial dispersion across micro firms, but this is particularly true for fixed assets, for which the standard deviation to mean value is of 4.8. These numbers suggest a story of the micro firms' sector performance over time that is better in terms of economic growth and productivity than in terms of employment.

Table 2 reports descriptive statistics by sector of activity for 2007. 61% of micro firms were in retail; 32% were in the services sectors; and 7% were in manufacturing. Informality measured both by the availability of a commercial register for the micro firm (the first step a firm would have to attain in Colombia in order to become formal in terms of tax payments, etcetera) and by the availability of formal accounting in the business, is similar across sectors. The share of micro firms that are formal according to the first measure is slightly above 50%, and according to the second measure the share of formal micro firms is even smaller, of around 32% on average, with manufacturing micro firms being on average the less formal by both measures.

By sales, the largest micro firms are in the retail sector, although manufacturing micro firms and micro firms in the services sectors are larger, on average, both by number of workers, and by the value of their fixed assets. Finally, the share of temporary employment and of female employment is largest in the services sectors.

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[3] Regretfully DANE's AMS does not collect information about the micro firms interaction with the banking sector.

Table 1: Descriptive statistics 2000 and 2007

Variable	Descriptive statistics	2000	2007
Fixed assets	Mean	6,714	6,880
	St. Dev	30,414	33,289
	Max	3,314,793	2,592,629
	Min	0	0
Sales or production	Mean	20,473	26,651
	St. Dev	56,388	57,986
	Max	3,989,427	1,267,236
	Min	7	0
Employment	Mean	2.10	1.86
	St. Dev	1.54	1.31
	Max	15	10
	Min	0	1
% Temporary employment	Mean	19.5	11.1
	St. Dev	41.5	42.7
	Max	100	100
	Min	0	0
% Female employment	Mean	51.7	52.4
	St. Dev	22.1	8.1
	Max	100	100
	Min	0	0
Labor costs as % of total costs	Mean	16.9	10.6
	St. Dev	21.1	17.9
	Max	100	100
	Min	0	0
Capital per worker	Mean	3,057	3,796
	St. Dev	9,263	16,127
	Max	828,698	831,880
	Min	0	0
Labor productivity	Mean	8,884	12,873
	St. Dev	17,675	21,148
	Max	997,357	633,618
	Min	0	0

Source: DANE, Annual Micro Entrepreneurial Survey (AMS) and authors' calculations. Note: Monetary values in 2009 pesos converted to USD at the December 2009 exchange rate.

Table 2: Micro firms by sector of activity, 2007

	Manufacturing	Retail	Services	Total
Number of firms share (%)	7.2	61.3	31.5	1,221,184
Sales or production share (%)	6.7	66.9	26.4	32,545,447
Fixed assets share (%)	10.3	50.2	39.5	8,404,905
Employment share (%)	9.2	54.7	36.2	2,274,310
% with commercial register	52.9	54.1	54.8	54.2
% with formal accounting	28.8	31.4	35.7	32.6
Average size by sales in USD	24,711	29,082	22,363	26,651
Average size by employment	2.36	1.66	2.14	1.86
Average size by fixed assets in USD	9,812	5,637	8,635	6,880
% temporary employment	10.6	9.6	14.1	11.1
% female employment	39.8	49.8	60.5	52.4
Labor costs as % of total costs	12.0	5.6	15.8	10.6
Labor productivity	8,597	14,938	9,837	12,873
K/L	4,160	3,532	4,232	3,796

Source: DANE, Annual Micro Entrepreneurial Survey (AMS) and authors' calculations. Note: Monetary values in 2009 pesos converted to USD at the December 2009 exchange rate.

As can be seen in Table 3 micro firms that do not own a commercial register are around 45% of all micro firms[4], and concentrate 20% of sales (or output) of the micro firms' sector, 27% of fixed assets, and 35% of employment. They are smaller on average by all measures than micro firms that have a commercial register -their average sales are about 25% of the average sales of formal micro firms, their average employment is 50% as large, and their assets are less than 50% as large-, and half as productive. Only 11% of them have formal accounting procedures (compare to 49% for micro firms that own a commercial register).

Results go in a similar direction for micro firms that do not have formal accounting procedures, even when they have advanced to the level where they own a commercial register. These micro firms represent a larger share of 67% of all micro firms, and amount for 41% of sales, 53% of assets, and 58% of employment of the micro firms' sector. As before, they are not only smaller by all measures, but also operate with lower capital to labor ratios, and have labor productivity levels that are half than those of the firms with formal accounting. These numbers are shown in Table 4.

Table 3: Micro firms by commercial register, 2007

	Without commercial register	With commercial register
Number of firms share (%)	44.3	55.7
Sales or production share (%)	19.9	80.1
Fixed assets share (%)	26.7	73.3
Employment share (%)	35.1	64.9
% with formal accounting	11.3	49.3
Average size by sales in USD	12,046	38,561
Average size by employment	1	2
Average size by fixed assets in USD	4,164	9,126
% temporary employment	4	17
% female employment	55.5	50.0
Labor costs as % of total costs	4.7	12.9
Labor productivity	7,935	16,886
K/L	3,134	4,327

Source: DANE, Annual Micro Entrepreneurial Survey (AMS) and authors' calculations. Note: Monetary values in 2009 pesos converted to USD at the December 2009 exchange rate.

Table 5 splits micro firms according to their size by employment, in three categories: 1 to 3 workers, 4 to 6 workers and 6 workers or more. Possibly, what is more striking of these numbers is the share of micro firms that fall in the first group: micro firms operating with 1 to 3 workers account for 92% of all micro firms, 69% of sales (or output), 75% of fixed assets and 75% of employment, and they are smaller by all

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[4] This number is slightly different to that reported on Table 1 because statistics are computed for the respondents of each question, that may o may not be the same across questions.

measures and less productive than the larger micro firms. In the other extreme of the distribution, micro firms with 6 workers or more are only 1.5% of all micro firms and are on average about 8 times larger in terms of sales, assets and employment. The micro firms in this group are more formal measured both by commercial register ownership and by formal accounting, and on average operate with higher productivity levels.

Table 4: Micro firms by formal accounting, 2007

	Without formal accounting	With formal accounting
Number of firms share (%)	67.4	32.6
Sales or production share (%)	41.2	58.8
Fixed assets share (%)	53.4	46.6
Employment share (%)	57.8	42.2
% with commercial register	40.8	82.1
Average size by sales in USD	16,279	48,142
Average size by employment	1.60	2.42
Average size by fixed assets in USD	5,446	9,851
% temporary employment	4.8	24.0
% female employment	53.1	50.9
Labor costs as % of total costs	6.2	15.7
Labor productivity	9,814	19,210
K/L	3,657	4,085

Source: DANE, Annual Micro Entrepreneurial Survey (AMS) and authors' calculations. Note: Monetary values in 2009 pesos converted to USD at the December 2009 exchange rate.

Table 5: Micro firms by employment categories, 2007

	1-3 employees	4-6 employees	More than 6 employees
Number of firms share (%)	91.6	6.8	1.5
Sales or production share (%)	69.4	21.7	8.9
Fixed assets share (%)	75.0	15.3	9.7
Employment share (%)	76.1	17.1	6.7
% with commercial register	51.5	82.9	90.9
% with formal accounting	29.4	63.1	82.8
Average size by sales in USD	20,182	84,951	153,446
Average size by employment	1.55	4.69	8.10
Average size by fixed assets in USD	5,630	15,450	43,275
% temporary employment	8.8	32.6	49.6
% female employment	53.0	47.1	43.7
Labor costs as % of total costs	7.3	29.8	34.4
Labor productivity	12,390	17,899	19,322
K/L	3,807	3,272	5,454

Source: DANE, Annual Micro Entrepreneurial Survey (AMS) and authors' calculations. Note: Monetary values in 2009 pesos converted to USD at the December 2009 exchange rate.

Finally, Table 6 shows most micro firms (97%) do not have a business-type organization, but operate under the name of their owners. This group, once again, concentrates the smallest, less formal, less productive units.

Table 6: Micro firms by employment categories, 2007

	Business association	Cooperative	De facto business association	Natural person
Number of firms share (%)	2.6	0.1	0.5	96.8
Sales or production share (%)	10.8	0.5	1.1	87.6
Fixed assets share (%)	7.6	0.2	0.9	91.3
Employment share (%)	5.7	0.2	0.7	93.3
% with commercial register	92.1	57.6	66.3	53.1
% with formal accounting	87.3	83.4	43.7	30.9
Average size by sales in USD	109,946	114,001	63,068	24,111
Average size by employment	4.07	3.87	2.80	1.80
Average size by fixed assets in USD	19,890	13,999	12,734	6,490
% temporary employment	44.7	54.6	8.5	10.1
% female employment	45.8	63.6	38.6	52.6
Labor costs as % of total costs	24.9	33.0	10.3	8.8
Labor productivity	29,365	30,275	18,181	12,379
K/L	4,870	4,816	4,143	3,764

Source: DANE, Annual Micro Entrepreneurial Survey (AMS) and authors' calculations. Note: Monetary values in 2009 pesos converted to USD at the December 2009 exchange rate.

3. Overview of the banking services supply in Colombia

The working hypothesis of this paper is that differences in banking services supply across regions contribute to explain cross-country variations in economic activity, affecting in particular the performance of firms that face financial constraints (i.e. credit markets are local in nature and performance of the smaller firms is affected by the local offer of banking services). This idea is supported in the literature. Pedrosa and Do (2009) find credit institutions respond with more restrictive credit conditions to distant firms. Becker (2007) finds variations in local savings conditions translate into variations in local credit conditions and economic activity, with a stronger effect in industries that are more dependent on external funds. Cetorelli and Strahan (2006) find the number of firms is more sensible to local competition in the banking sector where firms are more dependent on external financing. Finally, Guiso et al (2004) find evidence that local financial development affects firms' growth rates, particularly in the case of smaller firms, as well as the entry rate of new firms.

In Colombia there are two types of institutions that are relevant to understand cross-regional differences in the supply of banking services: financial intermediaries operating under the regulation of Superintendencia Financiera[5] -banks, commercial finance companies, and financial cooperatives among others-, and NGOs qualified only to offer loans to the smaller firms, but not to collect savings. There is also a segment of

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[5] Superintendencia Financiera is the government agency in charge of the control and supervision of all financial institutions.

the non-financial cooperative sector that provides financing to cooperative members, that attends a very small share of the market, and for which there are no activity records publicly available.

Tables 7 to 9 provide an overview of the activity of financial institutions in Colombia, by municipality size categories and by banking services sector concentration categories, for years 2003 and 2009. The information in these tables comes from publicly available reports from Superintendencia Financiera containing detailed information by financial institution, by municipality for each year, that were used to build the database to be used in estimation.

Table 7 shows deposits per capita were much larger in the larger municipalities in both years, as is to be expected since larger municipalities tend to outperform the smaller in terms of economic activity. More importantly, however, it shows that average deposits per capita were substantially higher in 2009 for all municipality size categories, and that the increase was largest for the municipalities in the smallest population category. Also savings through financial institutions were possible in 796 municipalities in 2003 and in 831 in 2009, implying financial institutions extended their range of influence during the period to reach 35 new municipalities, 30 of them falling in the smallest population category.

The lower portion of Table 7 shows deposits per capita by municipality categories according to their banking services sector concentration level. Municipalities were assigned to each category using a Herfindhal-Hirschman Index (HHI) computed over total loans. As can be seen most municipal markets are served by only one financial institution, and expansion to new municipalities results mostly from expansion of the presence of one financial institution.

Table 7: Deposits per capita by municipality categories (in USD)

Population category	2003				2009			
	Obs	Mean	Median	S.D/Mean	Obs	Mean	Median	S.D/Mean
<50.000	678	187	115	1.14	708	257	174	1.14
(50.000, 100.000]	58	337	223	1.28	57	396	272	1.28
(100.000, 500.000]	45	605	590	0.76	49	824	738	0.76
> 500.000	15	1,651	1,347	0.92	17	2,191	1,413	0.92

HHI category	2003				2009			
	Obs	Mean	Median	S.D/Mean	Obs	Mean	Median	S.D/Mean
<=1800	53	1,646	1,361	0.77	53	2,370	1,872	0.91
(1800,2500]	14	1,328	897	0.84	21	1,470	1,129	0.96
(2500,5000]	77	866	775	0.69	89	1,028	822	0.8
(5000,7500]	100	632	518	0.80	84	815	667	0.74
(7500,10000]	11	975	534	1.12	12	1,179	665	0.97
10000	541	240	176	1.18	572	363	278	1.1

Source: Superintendencia Financiera and authors' calculations. Monetary values in 2009 pesos converted to USD using the December 2009 exchange rate.

Table 8 confirms loans per capita follow a pattern of cross-regional variation similar to that of deposits. What is more interesting, however, is that average loans per capita during the period show a much higher increase than deposits per capita, for municipalities in all size categories, but particularly in the case of the smaller municipalities (compare an annual growth rate of 5.4% for average deposits per capita over the period to an annual growth rate of 17.9% for average loans per capita). The larger mean deposits per capita are found in municipalities that fall in the largest size category and also in those in which the supply of banking services by financial intermediaries is less concentrated.

Table 8: Loans per capita by municipality categories (in USD)

Population category	2003				2009			
	Obs	Mean	Median	S.D/Mean	Obs	Mean	Median	S.D/Mean
<50.000	678	94	59	1.21	708	253	194	0.9
(50.000, 100.000]	58	176	121	1.11	57	335	308	0.83
(100.000, 500.000]	45	340	313	0.74	49	749	702	0.71
> 500.000	15	1,739	1,866	0.51	17	2,712	3,344	0.65
HHI category	**2003**				**2009**			
	Obs	Mean	Median	S.D/Mean	Obs	Mean	Median	S.D/Mean
<=1800	53	1,155	853	1.07	53	2,411	1,862	0.92
(1800,2500]	14	592	590	0.49	21	1,299	1,329	0.48
(2500,5000]	77	403	296	0.69	89	900	775	0.58
(5000,7500]	10	317	252	0.80	84	765	651	0.69
(7500,10000]	11	462	340	1.21	12	756	494	0.77
10000	541	129	91	1.16	572	383	302	0.84
Total	796	260	133	1.74	831	635	424	1.33

Source: Superintendencia Financiera and authors' calculations. Monetary values in 2009 pesos converted to USD using the December 2009 exchange rate.

Table 9 shows that expansion of credit availability has been accompanied by a moderate expansion of bank offices across municipalities.

Table 9: Bank offices per 100,000 people, by municipality categories (in USD)

Population category	2004				2009			
	Obs	Mean	Median	S.D/Mean	Obs	Mean	Median	S.D/Mean
<50.000	683	10.86	9.11	0.69	708	11.07	9.19	0.68
(50.000, 100.000]	57	6.39	5.37	0.68	57	6.14	5.42	0.67
(100.000, 500.000]	45	7.12	7.05	0.64	49	8.24	7.52	0.55
> 500.000	7	13.20	12.97	0.36	9	12.37	14.76	0.49
HHI category	**2004**				**2009**			
	Obs	Mean	Median	S.D/Mean	Obs	Mean	10.99	S.D/Mean
<=1800	49	11.60	10.40	0.65	53	11.33	10.63	0.37
(1800,2500]	15	9.86	9.72	0.46	21	10.50	8.79	0.44
(2500,5000]	75	9.63	8.33	0.59	89	10.08	8.79	0.59
(5000,7500]	93	9.77	7.93	0.60	84	9.98	8.60	0.56
(7500,10000]	10	13.96	12.09	0.78	12	10.34	9.86	0.57
10000	558	10.36	8.68	0.74	572	10.70	8.66	0.75

Source: Superintendencia Financiera and authors' calculations. Monetary values in 2009 pesos converted to USD using the December 2009 exchange rate.

Microcredit is still a small part of Colombian credit markets' activity (it was about 4% of total credit in 2009). It has grown, nonetheless, at impressive rates since 2003 with the government's encouragement, both in terms of loan value and loan numbers. Figure 1 looks at the evolution of loans granted to micro firms between 2003 and 2009 in Colombia, by type of intermediary. The program Banca de Oportunidades, by which Bancoldex makes available special rediscount credit lines not only to financial institutions but also to cooperatives and NGOs, to incentivize the supply of microcredit across country regions, was introduced in 2006. It was created with the objective of facilitating access to credit and other financial services to low-income families, micro-firms, SMEs and startup projects. Banca de Oportunidades plays the role of facilitator, promoting the required reforms to the regulatory framework, supporting diffusion and incentives' strategies, and reaching agreements with the different private sector associations about specific goals in terms of penetration of (and access to) financial services. But it is the network of institutions that is in charge of extending the supply of financial services to unattended areas and population segments at its own risk. Notice that despite the importance of NGOs in this market segment, banks are still the main providers of microcredit.

Figure 1: Microcredit by type of intermediary
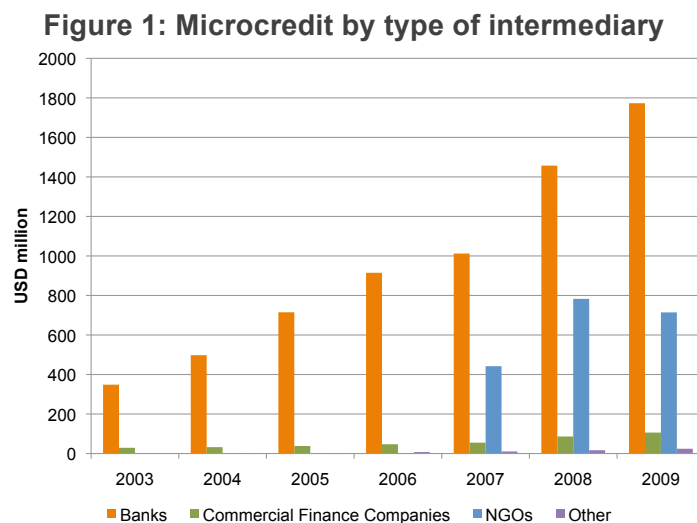
Source: Superintendencia Financiera, Banca de Oportunidades and authors' calculations. Monetary values in 2009 pesos converted to USD using the December 2009 exchange rate.

Moreover, Table 10 shows that financial intermediaries activity in the microcredit market segment is concentrated in a small number of banks, with Banco Agrario being responsible for 50% of microcredit granted in 2009. Banco Caja Social (BCSC) and

Bancamia (an NGO recently converted into a bank) follow with market shares of 17% and 13% respectively. Only Bancamia is a specialized microcredit bank.

Banco Agrario is the financial institution operating in this market segment that has the largest geographic coverage – it is present in 677 municipalities. It is a public bank and its activity is in principle targeted to agricultural units. In the recent years it has been used to channel not only resources for microcredit but also resources of other government programs.

Table 10: Microcredit by financial intermediary

Institution	Number of municipalities covered		Microcredit as a share of total credit (%)		Market share (%)	
	2003	2009	2003	2009	2003	2009
BANCAMIA		62		99.0		12.7
FINAMERICA	4	17	72.4	68.3	6.5	2.9
BANCO PROCREDIT		5		39.3		0.9
BANCO AGRARIO	677	712	18.9	32.1	49.4	50.1
FIN. COMPARTIR	6	8	12.0	30.1	1.1	1.2
GIROS Y FINANZAS		10		4.0		0.1
MACROFINANCIERA		2		3.2		0.0
COOP FIN DE ANTIOQ.		15		2.2		0.0
COOPCENTRAL	11	6	0.9	16.3	0.1	0.3
BCSC	44	62	5.8	12.7	11.4	17.0
CONFINANCIERA		3		12.6		1.3
BANCO DE BOGOTA	115	173	0.3	1.2	2.1	5.6
AV VILLAS	5	47	0.0	0.8	0.0	0.8
BANCOLOMBIA	121	169	1.4	0.7	14.7	4.9
BANCO POPULAR	64	80	0.1	0.6	0.4	1.1
COOTRAFA		10		0.3		0.0
FINANDINA	3	7	0.2	0.3	0.0	0.5
G.M.A.C COLOMBIA		1		0.3		0.1
FINANCIERA JURISCOOP		1		0.1		0.0
BBVA	74	62	0.9	0.0	0.5	0.1
DAVIVIENDA		74		0.0		0.0
HSBC		8		0.0		0.0

Source: Superintendencia Financiera and authors' calculations.

4. Empirical exercise

The databases used to provide a characterization of the micro firms' sector and of the banking services supply across the Colombian geography in the previous sections are used to explore the impact of local banking services supply on micro firms' performance in an econometric setting. The database used in estimation is a firm level database that covers five years of activity of the Colombian micro firms sector, from 2003 to 2007[6]. It contains detailed information on firm characteristics as well as location identifiers that allow associating each firm to (measures of) the municipal level banking

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[6] We are excluding Banco Agrario's activity from the estimation, since this bank's activity targets mostly agricultural units. We are also adjusting the sample to include the same country regions across years in estimation (14 metropolitan areas). This is relevant because the geographical scope of DANEs Microfirms Survey was extended since 2006, making incomparable the sample across years.

services supply. The database is not panel shaped, so all estimations rely on pooled regressions.

a. Estimation

The basic equation used in estimation is:

$$Outcome_{imt} = \alpha + \beta Microcredit_{mt} + \lambda'X + \gamma'Mun + \varkappa'Time + \varepsilon$$

where *Outcome*$_{imt}$ is a measure of performance of firm i in municipality m at time t; *Microcredit*$_{mt}$ denotes microcredit per capita in municipality m at time t; *X* is a set of firm level controls that includes age category dummies, employment size category dummies, and ISIC 1 digit sector of activity dummies; *Mun* is a set of municipality dummies included to control in estimation for unobserved municipal level characteristics that do not change over time (or are relatively stable); and *Time* is a set of time dummies to control for the macroeconomic cycle. These controls are included in every regression to mitigate biases from potential endogeneity of the banking services supply.

The fact that micro firm performance measures at the firm level are explained by banking services at the municipality level -rather than by firm level measures of banking debt, which are not available from the AMS or from any other public source- also contributes to mitigating endogeneity concerns, since it is not likely that the economic activity of a municipality, that would draw banking services towards it, would be driven by a micro firm. It does, however, represent also the drawback that we assume all micro firms in a municipality are equally exposed to banking services penetration, which might not be true for firms located in the rural area of a municipality if, as is presumably true, banking services supply reaches urban areas first. Standard errors in all estimations are robust and clustered at the municipality level, to acknowledge the shape of the data.

Firm level outcomes used in estimation include total employment; the share of employment not hired through a permanent contract; fixed assets; sales or output (the latter in the case of manufacturing micro firms); labor productivity; the capital to labor ratio. Variables that are not given as percentage enter estimation in logs.

The effect of banking services supply on the probability of micro firms to own a commercial register and to have formal accounting process is also explored. In these cases the outcomes are indicator variables, so estimation is done using probit models.

Results include a set of robustness exercises in which variations of the basic regressions described are estimated.

b. Results

Table 11 presents the results of the baseline regressions. According to these estimations there is a positive significant relationship of banking services for micro firms supply with firm size, measured both by sales and fixed assets, with firms' capital to labor ratios (i.e. firms transit to more capital intensive technologies in response to improved access to financing) and with labor productivity. These results come together with a finding of a nil effect of banking services supply on employment or employment quality that helps to explain them. The evidence suggests facilitation of financing to the micro firms' sector has not contributed to lower unemployment, but rather has promoted growth with a bias toward more capital-intensive technologies.

Table 11: OLS Baseline Regressions

Dependent Variable	Employment (in logs) (1)	Temporary employment as % of total employment (2)	Fixed Assets (in logs) (3)	Sales or output (en logs) (4)	Labor productivity (in logs) (5)	Capital per worker (in logs) (6)
Microcredit per capita (in logs)	-0.00561	0.0173	0.0993**	0.102*	0.108*	0.101**
	[0.0105]	[0.0112]	[0.0329]	[0.0475]	[0.0461]	[0.0308]
Constant	0.465**	-0.0651	13.50**	14.32**	13.85**	13.35**
	[0.104]	[0.112]	[0.306]	[0.441]	[0.414]	[0.275]
Number of observations	85,165	85,165	74,761	85,165	85,165	74,761
Adjusted R^2	0.557	0.165	0.131	0.297	0.207	0.047

Note: All regressions include time dummies, municipality dummies, firms' sector of activity dummies, firms' age category dummies, and firms' employment-size category dummies. Standard errors in parentheses are robust standard errors clustered at the municipality level. ** denotes significance at 1%, * denotes significance at 5%, + denotes significance at 10%.

Regressions in Table 12 include municipal manufacturing output per capita, as an additional control for cross-regional variations in economic activity that may affect both micro firms' performance and banking services supply. This control variable obtains a negative effect in the employment, sales or output and fixed assets regressions implying that when manufacturing activity in the municipality is more important, micro firms tend to be smaller. The coefficient on this variable is also negative in the labor productivity regression. Results on the relationship between banking services supply and micro firm performance are robust to those obtained in the baseline regressions. In what follows we use modified versions of this second set of regressions to test the robustness of our results.

Table 12: OLS Baseline Regressions 2

Dependent variable	Employment (in logs) (1)	Temporary employment as % of total employment (2)	Fixed Assets (in logs) (3)	Sales or output (en logs) (4)	Labor productivity (in logs) (5)	Capital per worker (in logs) (6)
Microcredit per capita (in logs)	-0.00481	0.0160	0.106**	0.106*	0.111*	0.107**
	[0.0100]	[0.0102]	[0.0319]	[0.0460]	[0.0453]	[0.0300]
Manufacturing output per capita (in logs)	-0.0438	0.0701	-0.340*	-0.208	-0.164	-0.290+
	[0.0443]	[0.0444]	[0.156]	[0.236]	[0.226]	[0.169]
Constant	0.778*	-0.567	15.91**	15.81**	15.03**	15.41**
	[0.376]	[0.370]	[1.237]	[1.802]	[1.691]	[1.317]
Number of observations	85,165	85,165	74,761	85,165	85,165	74,761
Adjusted R^2	0.557	0.165	0.132	0.298	0.207	0.047

Note: All regressions include time dummies, municipality dummies, firms' sector of activity dummies, firms' age category dummies, and firms' employment-size category dummies. Standard errors in parentheses are robust standard errors clustered at the municipality level. ** denotes significance at 1%, * denotes significance at 5%, + denotes significance at 10%.

Table 13 presents the results of a slightly different model taking into account the potential different impact of banking services availability to micro firms that own a commercial register (i.e. that have completed a step towards formalization). Results confirm that ownership of a commercial register is associated with larger micro firm size by all measures (employment, fixed assets and sales or output), higher labor productivity and higher capital to labor ratios. It is apparently also associated with higher ratios of temporary employment to total employment. With regards to the effect of banking services availability on micro firm performance, coefficients obtained are similar in sign and significance levels to those from the baseline case.

Table 13: Robustness 1

Dependent Variable	Employment (in logs) (1)	Temporary employment as % of total employment (2)	Fixed Assets (in logs) (3)	Sales or output (en logs) (4)	Labor productivity (in logs) (5)	Capital per worker (in logs) (6)
Microcredit per capita (in logs)	-0.000415	0.0175	0.121**	0.160**	0.161**	0.118**
	[0.00840]	[0.0105]	[0.0327]	[0.0518]	[0.0503]	[0.0298]
Dummy Commercial Register=1	0.306**	0.154+	1.230**	2.368**	2.063**	0.907*
	[0.0627]	[0.0800]	[0.393]	[0.374]	[0.326]	[0.381]
Microcredit per capita (in logs) x Dummy Commercial Register=1	-0.00813	-0.00116	-0.0473	-0.131**	-0.123**	-0.0377
	[0.00632]	[0.00755]	[0.0431]	[0.0383]	[0.0333]	[0.0416]
Manufacturing output per capita (in logs)	-0.0321	0.0779*	-0.301*	-0.123	-0.0909	-0.267+
	[0.0443]	[0.0356]	[0.130]	[0.242]	[0.231]	[0.148]
Constant	0.580	-0.685*	15.26**	14.32**	13.74**	14.97**
	[0.351]	[0.289]	[0.981]	[1.756]	[1.665]	[1.114]
Number of observations	83,231	83,231	73,274	83,231	83,231	73,274
Adjusted R^2	0.590	0.206	0.168	0.396	0.290	0.067

Note: All regressions include time dummies, municipality dummies, firms' sector of activity dummies, firms' age category dummies, and firms' employment-size category dummies. Standard errors in parentheses are robust standard errors clustered at the municipality level. ** denotes significance at 1%, * denotes significance at 5%, + denotes significance at 10%.

The effect of banking services availability for micro firms that own a commercial register is the same as for all micro firms with regards to size measured by fixed assets and with regards to capital intensity technology choices. Formal micro firms are less benefitted than others from banking services availability, however, in terms of both labor productivity gains, and growth measured by sales. These results are consistent with the fact that microcredit regulations are in fact intended to allow funds to flow towards the smaller informal micro firms, and could be interpreted as a measure of success of this decision.

Table 14 presents the results we obtain when interactions of alternative municipality-level characteristics and time dummies are included as additional controls. Municipality characteristics used in these regressions are population size category dummies defined over the value of this variable in 2003, the first year of the sample (shown in Panel 1); loans per capita size category dummies defined over the value of this variable in 2003, the first year of the sample (shown in Panel 2); and (3) manufacturing output size category dummies defined over the value of this variable in 2003, the first year of the sample (shown in Panel 3). As shown, results from the previous sets of regressions sustain. The more noticeable difference is that including interactions of time dummies and manufacturing output size category dummies results in slightly smaller coefficients in all regressions and lower significance level in the fixed assets and capital per worker regressions (but still at 10% or less).

Table 14: Robustness 2

Panel 1 - Categories by population size x Time dummies

Dependent Variable	Employment (in logs) (1)	Temporary employment as % of total employment (2)	Fixed Assets (in logs) (3)	Sales or output (en logs) (4)	Labor productivity (in logs) (5)	Capital per worker (in logs) (6)
Microcredit per capita (in logs)	-0.0106	0.0122	0.0951*	0.106*	0.117*	0.104*
	[0.00990]	[0.0128]	[0.0403]	[0.0473]	[0.0464]	[0.0394]
Manufacturing output per capita (in logs)	-0.0281	0.0860+	-0.439**	-0.243	-0.215	-0.400*
	[0.0473]	[0.0501]	[0.134]	[0.246]	[0.228]	[0.154]
Constant	0.711+	-0.651	16.78**	16.01**	15.30**	16.30**
	[0.374]	[0.425]	[1.114]	[1.828]	[1.658]	[1.169]
Number of observations	85,165	85,165	74,761	85,165	85,165	74,761
Adjusted R^2	0.557	0.166	0.132	0.298	0.208	0.048

Panel 2 - Categories by loans per capita x Time dummies

Dependent Variable	Employment (in logs)	Temporary employment as % of total employment	Fixed Assets (in logs)	Sales or output (en logs)	Labor productivity (in logs)	Capital per worker (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)
Microcredit per capita (in logs)	0.00139	0.0114	0.0945*	0.113*	0.112*	0.0967*
	[0.00871]	[0.0131]	[0.0381]	[0.0484]	[0.0466]	[0.0376]
Manufacturing output per capita (in logs)	-0.0796	0.125+	-0.403**	-0.290	-0.211	-0.339*
	[0.0606]	[0.0635]	[0.135]	[0.283]	[0.255]	[0.161]
Constant	0.983*	-0.927*	16.49**	16.35**	15.37**	15.87**
	[0.441]	[0.441]	[1.108]	[1.952]	[1.718]	[1.265]
Number of observations	84,820	84,820	74,463	84,820	84,820	74,463
Adjusted R^2	0.558	0.166	0.134	0.299	0.209	0.050

Panel 3 - Categories by manufacturing output x Time dummies

Dependent Variable	Employment (in logs)	Temporary employment as % of total employment	Fixed Assets (in logs)	Sales or output (en logs)	Labor productivity (in logs)	Capital per worker (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)
Microcredit per capita (in logs)	-0.00636	0.0124	0.0643+	0.0924*	0.0987*	0.0715+
	[0.00835]	[0.0114]	[0.0363]	[0.0418]	[0.0417]	[0.0354]
Manufacturing output per capita (in logs)	-0.0536	0.123*	-0.184	-0.173	-0.119	-0.133
	[0.0520]	[0.0572]	[0.162]	[0.268]	[0.243]	[0.167]
Constant	0.863*	-0.917*	15.16**	15.68**	14.82**	14.60**
	[0.398]	[0.419]	[1.241]	[1.847]	[1.646]	[1.222]
Number of observations	84,820	84,820	74,463	84,820	84,820	74,463
Adjusted R^2	0.558	0.167	0.134	0.300	0.211	0.050

Note: All regressions include time dummies, municipality dummies, firms' sector of activity dummies, firms' age category dummies, and firms' employment-size category dummies. Standard errors in parentheses are robust standard errors clustered at the municipality level. ** denotes significance at 1%, * denotes significance at 5%, + denotes significance at 10%.

Table 15 presents two sets of regressions using alternative definitions of banking services supply: the number of bank offices per capita in the municipality, and loans per capita in the municipality. Neither of these variables measures banking services availability to the micro firm sector specifically, but both are good measures of local banking services supply more generally defined.

The coefficients obtained by these banking services supply proxies are larger in magnitude but go in the same positive direction than before in the fixed assets, sales or output, labor productivity, and capital to labor ratio regressions, confirming the previous results. These proxies, once more, yield nil results on firm size by employment and on our employment quality measure.

Table 15: Robustness 3

Dependent variable	Employment (in logs) (1)	Temporary employment as % of total employment (2)	Fixed Assets (in logs) (3)	Sales or output (en logs) (4)	Labor productivity (in logs) (5)	Capital per worker (in logs) (6)
Bank offices per capita (in logs)	0.0342	-0.0565	0.393	0.778**	0.744**	0.359
	[0.0537]	[0.0864]	[0.347]	[0.246]	[0.233]	[0.343]
Manufacturing output per capita (in logs)	-0.0819	0.0813	-0.175	-0.0844	-0.00253	-0.0765
	[0.0635]	[0.0767]	[0.294]	[0.270]	[0.263]	[0.311]
Constant	1.170+	-0.754	18.12**	19.51**	18.34**	17.00**
	[0.597]	[0.744]	[2.741]	[2.349]	[2.389]	[2.888]
Number of observations	62,711	62,711	53,738	62,711	62,711	53,738
Adjusted R^2	0.551	0.173	0.119	0.299	0.209	0.045

Dependent variable	Employment (in logs) (1)	Temporary employment as % of total employment (2)	Fixed Assets (in logs) (3)	Sales or output (en logs) (4)	Labor productivity (in logs) (5)	Capital per worker (in logs) (6)
Loans per capita (in logs)	-0.000837	0.0442	0.429**	0.459**	0.460**	0.409**
	[0.0372]	[0.0605]	[0.142]	[0.181]	[0.163]	[0.139]
Manufacturing output per capita (in logs)	-0.0445	0.0746	-0.283	-0.166	-0.121	-0.235
	[0.0277]	[0.0624]	[0.201]	[0.0954]	[0.108]	[0.1433]
Constant	0.427	-0.549	8.269**	8.623**	8.197**	8.415**
	[0.549]	[0.883]	[2.034]	[2.671]	[2.397]	[1.998]
Number of observations	85,325	85,325	74,897	85,325	85,325	74,897
Adjusted R^2	0.557	0.165	0.132	0.298	0.207	0.047

Note: All regressions include time dummies, municipality dummies, firms' sector of activity dummies, firms' age category dummies, and firms' employment-size category dummies. Standard errors in parentheses are robust standard errors clustered at the municipality level. ** denotes significance at 1%, * denotes significance at 5%, + denotes significance at 10%.

Table 16 presents the results for the same set of regressions with the banking services supply variable entering lagged. This specification should capture any longer term effects (from t to t+1). This time results suggest a positive impact of banking services availability on firms' next period labor productivity but no effect at all on other firm-level outcomes for which there is a contemporaneous positive effect found in the previous sets of regressions: the significance on the variable of interest is lost in the fixed assets, the sales or output and the capital per worker regressions. Our interpretation is that while the positive shock on sales, assets and capital per worker is short-lived, the shock on labor productivity is more persistent over time.

Table 16: Robustness 4

Dependent Variable	Employment (in logs) (1)	Temporary employment as % of total employment (2)	Fixed Assets (in logs) (3)	Sales or output (en logs) (4)	Labor productivity (in logs) (5)	Capital per worker (in logs) (6)
Microcredit per capita (in logs) (t-1)	-0.0286	-0.0220	0.0564	0.131	0.159+	0.0843
	[0.0274]	[0.0274]	[0.0845]	[0.0923]	[0.0852]	[0.0851]
Manufacturing output per capita (in logs)	-0.0836	0.134	-0.0140	0.0461	0.130	0.0896
	[0.0548]	[0.0826]	[0.215]	[0.282]	[0.282]	[0.218]
Constant	1.277*	-0.686	14.48**	13.72**	12.44**	13.23**
	[0.589]	[0.611]	[1.678]	[2.592]	[2.400]	[1.682]
Number of observations	67,670	67,670	57,990	67,670	67,670	57,990
Adjusted R²	0.553	0.171	0.118	0.293	0.200	0.041

Note: All regressions include time dummies, municipality dummies, firms' sector of activity dummies, firms' age category dummies, and firms' employment-size category dummies. Standard errors in parentheses are robust standard errors clustered at the municipality level. ** denotes significance at 1%, * denotes significance at 5%, + denotes significance at 10%.

Table 17 presents a final set of exercises, this time using a probit model to explore whether banking services supply has an impact on formalization, measured by two firm characteristics: ownership of a commercial register, and formal accounting practices. Results say that local microcredit supply has no impact whatsoever on the probability that a firm becomes formal through the ownership of commercial register, and has a negative impact on formal accounting practices. These results may respond to two facts. First, while intermediaries are free to decide about firms' requirements to access microcredit, as mentioned above, microcredit regulations do not restrict access to informal firms. Second, financial intermediaries tend to impose more stringent requirements than NGOs and to the extent that much of microcredit growth in Colombia in the recent years comes from NGOs' activity, this may have served to make credit available to less organized micro firms at increasing rates, working as an incentive against formal accounting practices.

The lower panel of this table shows the results obtained when microcredit per capita is replaced by the number of bank offices per capita as a proxy of banking services supply. In this case, results yield a positive impact of banking services supply (from banks) on both measures of formalization. These results can be interpreted as confirming the insight from the previous paragraph.

Table 17: Probit Regressions

Dependent variable	Dummy Commercial register=1 (1)		Dummy Formal accounting=1 (2)	
	Coefficient	Marginal effect	Coefficient	Marginal effect
Microcredit per capita (in logs)	-0.0176 [0.0443]	-0.00684 [0.0172]	-0.0895+ [0.0541]	-0.0332+ [0.0201]
Manufacturing output per capita (in logs)	-0.0640 [0.250]	-0.0249 [0.0974]	0.231 [0.300]	0.0858 [0.111]
Constant	0.164 [2.153]		-1.677 [2.311]	
Number of observations	83,231	83,231	85,151	85,151
Log-likelihood	-51202.5		-37233.5	

Dependent variable	Dummy Commercial register=1 (1)		Dummy Formal accounting=1 (2)	
	Coefficient	Marginal effect	Coefficient	Marginal effect
Bank offices per capita (in logs)	0.101 [0.296]	0.0391 [0.115]	0.114 [0.286]	0.0423 [0.107]
Manufacturing output per capita (in logs)	-0.0215 [0.436]	-0.00833 [0.169]	0.143 [0.300]	0.0532 [0.112]
Constant	-0.00501 [3.963]		-1.249 [2.927]	
Number of observations	61,228	61,228	62,697	62,697
Log-likelihood	-49762.5		-36574.4	

Note: All regressions include time dummies, municipality dummies, firms' sector of activity dummies, firms' age category dummies, and firms' employment-size category dummies. Standard errors in parentheses are robust standard errors. ** denotes significance at 1%, * denotes significance at 5%, + denotes significance at 10%.

5. Concluding remarks

This paper explored the impact of local banking services supply on micro firm performance in Colombia in an empirical setting using microeconomic data from DANE's AMS, and a banking services database at the municipal level put together for the purpose of this research from publicly available information from Superintendencia Bancaria and Banca de Oportunidades.

DANE's AMS is representative of the micro firms' sector in the urban areas of the largest 14 cities of Colombia. It is not representative at the municipality level, and while it contains a set of variables that permit a rich characterization of Colombian micro firms, it does not contain information about the firms' interaction with the banking services sector and it is not panel shaped. These are its major drawbacks for the purposes of this research. It is however a rare source of microeconomic data about the micro firms

sector, the firms' size segment that has been most ignored by the economic literature due to data availability problems.

The Colombia case, moreover, offers an interesting setting to explore whether efforts towards facilitating access to financing of the smaller firms yield the expected returns in turns of promoting economic growth, because since 2002 there has been a clear-cut governmental policy to promote the expansion of microcredit supply across the country.

The empirical results obtained, robust across different model specifications, say that local availability of banking services directed to the micro firm sectors have a positive effect on firm size measured by sales or output, on labor productivity and on the capital to labor ratios with which firms operate. Effects on employment are found to be nil, suggesting financing availability has facilitated firms' transition towards more capital-intensive technologies but has not contributed to lower unemployment. The bias towards promotion of more capital based growth is confirmed by the effect on firm's fixed assets, which is found to be positive and significant in most model specifications. There is no impact found of banking services supply on employment quality measured as the ratio of temporary employment to total employment either.

Impact of banking services supply on firm size measured by sales or output or fixed assets, as well as on firms' capital to labor ratios is found to be short-lived. Results suggest that only the impact on labor productivity persists across periods.

Finally, there are two other empirical results worth underscoring. First, informal micro firms seem to benefit relatively more than formal ones from access to credit, in terms of both labor productivity gains, and growth measured by sales, suggesting that government efforts to target these firms specifically have the expected rewards in terms of economic growth. Second, microcredit availability in itself does not contribute to formalization and, moreover, increased flexibility in the requirements to access financing may, in fact, constitute a counter incentive for it.

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