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Second-tier Government Banks and Access to Credit

Micro-Evidence from Colombia

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Abstract*

Government-owned development banks have often been justified by the need to respond to financial market imperfections that hinder the establishment and growth of promising businesses, and as a result, stifle economic development more generally. However, evidence on the effectiveness of these banks in mitigating financial constraints is still lacking. To fill this gap, this paper analyzes the impact of Bancoldex, Colombia's publicly owned development bank, on access to credit. It uses a unique dataset that contains key characteristics of all loans issued to businesses in Colombia, including the financial intermediary through which the loan was granted and whether the loan was funded with Bancoldex resources. The paper assesses effects on access to credit by comparing Bancoldex loans to loans from other sources and study the impact of receiving credit from Bancoldex on a firm's subsequent credit history. To address concerns about selection bias, it uses a combination of models that control for fixed effects and matching techniques. The findings herein show that credit relationships involving Bancoldex funding are characterized by lower interest rates, larger loans, and loans with longer terms. These characteristics translated into lower average interest rates and larger average loans for firms that used Bancoldex credit. Average loans of Bancoldex' beneficiaries also exhibit longer terms, although this effect can take two years to materialize. Finally, the findings show evidence of a demonstration effect of Bancoldex: beneficiary firms that have access Bancoldex credit are able to significantly expand the number of intermediaries with whom they have credit relationships.

Keywords: Second-tier development banks, access to credit, impact evaluation, panel data, interest rates, loan size, loan term, demonstration effects.

JEL Classification: C23**,** G28, H43, O12, O16, O54

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Introduction

Financial market imperfections are widely recognized as an obstacle to entrepreneurs wanting to take advantage of promising business opportunities and thus as a threat to economic development. Restricted access to credit impedes investment in profitable projects (that is, projects that may constitute dynamic engines for growth) by firms the financial sector deems unworthy of credit. Why would a creditor abstain from funding a profitable project? Imperfect information and imperfect monitoring are standard answers in the literature (e.g., Schiantarelli, 1996). Creditors are unable to clearly identify promising projects or unable to assess whether all efforts to guarantee success are undertaken. As a result, financial institutions charge higher interest rates to firms that are more difficult to screen or monitor, and/or ration them out of credit (Jensen and Meckling, 1976; Stiglitz and Weiss, 1981). Small and early-stage firms are more likely to face these difficulties because they tend to lack verifiable credit histories to signal their potential and overall creditworthiness. The problem is particularly acute in the context of underdeveloped financial systems, where the potential supply of private funds may be limited to begin with. In addition, growth-enhancing projects may not be funded by credit-granting institutions because their impact on growth may be related to positive externalities, that is, to benefits that can be appropriated by neither the owner of the project nor the creditor (De Olloqui and Smallridge, 2011; IDB, 2005).

Theory indicates that governmental intervention should aim at mitigating the effects of this market failure, which usually results in outright lack of access to credit, high interest rates, or lack of long-term financing. But, how can the government attempt to reduce credit constraints? Public ownership of banks has been the answer in many countries, both developed and developing. In principle, the availability of credit from publicly owned banks could mitigate the effects of credit constraints in several ways. In the context of underdeveloped financial systems, where the supply of private funds is limited to begin with, public banks increase the overall supply of funds. They can also increase the supply of funds for certain types of projects for which credit rationing is particularly likely. This is the case, for instance, for projects that are perceived as particularly risky by financiers because they require longer-term financing

(Armendáriz, 1999). Public credit potentially relaxes credit constraints even when private funds are available because informational asymmetries are still likely to ration private credit from projects that seem particularly risky. Public credit provided to firms that are denied access by private sources will not only help satisfy the firms' current need for funding, but will also allow them to build a history of verifiable relationships with the financial sector. Such relationships may later improve a firm's access to private sources of funding.

This paper examines the impact of Bancoldex, Colombia's publicly owned development bank, on access to credit. We created a unique database, recording all loans issued to businesses in Colombia and including the loan's interest rate, term, and amount, as well as the financial intermediary through which the loan was granted and whether the loan was funded with Bancoldex resources. Using this dataset, we assessed the effects on access firm's access to credit comparing Bancoldex loans to loans from other sources and studied the impact of receiving credit from Bancoldex on a firm's subsequent credit history.

Bancoldex started operating in 1992, initially to foster exports. In 2003, it merged with Instituto de Fomento Industrial (IFI), a government agency with the broader mandate to promote industrial development. Bancoldex' operations include second-tier banking, as well as training and advising (these latter restricted to micro enterprises). The present study focuses exclusively on assessing the impact of Bancoldex' credit operations. Bancoldex' operates as a second-tier bank with rediscount credit operations, where its funds are lent to intermediary institutions, which then lend those funds, at higher rates, to final beneficiaries. With this system, where the intermediary institution takes on the risk of default, the public funds are subject to only moderate risk. The financial intermediary is unlikely to default, and the intermediary chooses the beneficiaries. Intermediaries are usually commercial banks, who have the incentive to carefully screen applicants and are, in principle, not subject to the type of political considerations that many have pointed as a source of inefficiency for direct public loans (e.g., Dinç, 2005; Cole, 2009; Micco et al., 2007; Sapienza, 2004).

Bancoldex offers a variety of credit lines. Bancoldex funds some directly (traditional lines), while others are funded with contributions from government agencies and local governments. While the latter are usually targeted to the sector or region an agency serves, traditional lines are

generally available to any type of business. The different products Bancoldex offers also vary in terms of rediscount interest rates, term, and uses for the funds.[1] As a result, this paper looks at the impact of Bancoldex loans on a wide range of firms and studies how interest rates (to the final beneficiary), loan terms, and loan sizes of Bancoldex loans differ from those of other loans[2] and how the underlying credit structure of a firm is affected when it enters into a credit relationship funded by Bancoldex.

By studying whether Bancoldex users have access to more, cheaper, or longer-term credit than they otherwise might have had access too, we want to answer the question of whether Bancoldex credit offers any de facto advantage to its beneficiaries. This is a quite open question, because generally Bancoldex products are not deliberately designed to provide specific advantages to their beneficiaries with respect to other types of available credit. The majority of Bancoldex credit is not subsidized, not targeted to disadvantaged producers, and not subject to other benefits (exceptions are some of the lines funded by specific local governments, which are targeted to their localities, and the AProgresar line, a progressive line of credit whereby the interest rate is inversely related to the term of the loan).

This paper differs from (the few) previous evaluations of the impact of publicly owned banks. First and foremost, rather than focusing explicitly on the impact of public credit on credit characteristics, other analyses concentrate only on measures of firms' performance computed on the basis of rather accessible information, such as aggregated economic surveys or firm-level surveys. To investigate the effect of Bancoldex on characteristics and access to credit, we had to access data on all loans made by the financial sector in Colombia. Second, most previous studies rely on cross-country data, while our study looks at detailed information at the level of credit operations. Very few studies, most of them focusing on the case of direct government lending in Brazil, use detailed micro-level data to assess the impacts of government-owned banks on firms using their loans. A group of studies use microdata to analyze the effects of credit lines of the Banco Nacional do Desenvolvimento (BNDES) on firm performance, reaching relatively mixed conclusions (Ottaviano and Sousa, 2008; Ribeiro and De Negri, 2009; Carvalho, 2010; De Negri

[1] A full description is provided in Eslava, Meléndez and Maffioli (2012).
[2] Given the structure of the data, we compare firm–intermediary relationships with and without Bancoldex loans, rather than directly comparing Bancoldex loans against non-Bancoldex loans. This is explained in detail in section 2.

et al., 2011). A companion paper to this document studies the impact of Bancoldex on the performance of Colombia's manufacturing establishments (Eslava, Maffioli, and Meléndez, 2012). Finally, the current study assesses the impact of public credit from a second-tier bank, whereas previous studies (with the exception of our other study on Bancoldex) either focus on direct lending by public banks or do not make a distinction between first- and second-tier activities.

Previous findings suggest that public lending is not beneficial in other countries. Such studies tend to find either negligible or negative effects on performance. Some of those studies provide evidence that suggests the perverse effect that these institutions have had on performance relates to a politicized allocation of credit. However, because Bancoldex is a second-tier bank, political targeting of loans is unlikely. Loan applicants are screened and financial intermediaries that take on the risk of default assign the loans, and thus face incentives to allocate credit on the basis of a project's expected profitability. In fact, our findings about the effect of Bancoldex loans on firm performance suggest a positive effect (Eslava, Maffioli, and Meléndez, 2012). In this paper, we intend to shed light on the channels that explain the positive impact Bancoldex loans have had on firms. With respect to studies of the impact of public credit in other countries, this paper differs in its focus on the characteristics of credit received by the firm, rather than on firm performance.

This paper is also related to the literature on credit constraints since the least controversial role for government-owned development banks is mitigating insufficient access to credit for some businesses (De Olloqui and Smallridge, 2011; Armendáriz, 1999).[3] Credit constraints can take the form of a shortage of resources to fund certain activities, such as investment in innovation. Alternatively they may take the form of access to credit in less favorable conditions than if creditors had perfect information about firms' ex-ante riskiness and ex-post performance. Jensen and Meckling (1976) show that, to compensate for higher risk, creditors may charge a premium to debtors they cannot monitor perfectly. Financial intermediaries may choose to ration the quantity of loans they grant—rather than charging a higher interest rate—, which forces some businesses to use trade credit to cover their funding

[3] Public development banks can also implement countercyclical policies and play a role as regulators (IDB, 2005; De Olloqui and Smallridge, 2010).

needs.[4] In the United States, for example, this is effectively equivalent to turning to more expensive credit (Petersen and Rajan, 1997). Credit constraints may also imply that businesses are unable to obtain loans for terms as long as their most profitable investment require, given the greater risks implicit in longer term projects (Dewatripont and Maskin, 1995.) Businesses that are perceived as risky may also be unable to access loans from a diverse basket of financial intermediaries. Only intermediaries that have already provided loans to such a business may be willing to lend again, thanks to the information generated by their pre-existing relationship.[5]

We set out to investigate whether obtaining one or more loans from Bancoldex helps a firm deal with any of the aforementioned dimensions of credit constraints. In particular, we look at how being a beneficiary of Bancoldex affects the number of financial intermediaries with which a firm had credit relationships, the interest rates the firm is charged, and the amounts and duration of the loans it receives. There are three reasons to expect a potential positive impact on these features of a firm's credit structure. First, Bancoldex may be providing liquidity to a bank system that lacks it, either structurally or because of difficult times. Second, the loan obtained from Bancoldex may in itself constitute a relaxation of constraints, providing the firm a lower interest rate or a longer term than what it would otherwise be able to obtain. Third, it may help the firm build a credit history useful to solve some of the informational problems that hinder access to credit. In this respect, it is particularly important that, by lending through intermediaries, Bancoldex guarantees that the firm establishes (or deepens) a relationship with at least one regular creditor.

Our findings indicate that Bancoldex beneficiaries end up with improved overall credit conditions after receiving Bancoldex credit: the amount of credit received goes up, the interest rates go down, and the duration of the loans increases. Not only are relationships involving Bancoldex credit characterized by lower interest rates, larger loans, and loans with longer terms, but Bancoldex support also translates into an improvement of the beneficiary's credit position beyond the loan or loans from Bancoldex, suggesting a "demonstration effect" (De Olloqui and Smallridge, 2010). The beneficiary credit position, in fact, also show lower average interest rates and larger average loans. These effects on interest rates and loan sizes exhibit some persistence

[4] Rationing quantities instead of increasing rates may be optimal in the presence of adverse selection problems, since higher interest rates may discourage the least risky businesses from applying for loans (Stiglitz and Weiss, 1981).
[5] See Petersen and Rajan (1994) regarding the value of pre-existing relationships.

over time. The terms of average loans of firms using Bancoldex also tend to be longer, but this effect can take two years to materialize. Finally, firms that have access to Bancoldex credit are able to significantly expand the number of intermediaries with whom they has credit relationships.

The rest of this paper provides a description of the data used in this evaluation and a general characterization of the dynamics of credit, both by Bancoldex and other sources, as recorded in our data. This is followed by a discussion of our empirical approach and then our empirical results. The end of this paper provides some conclusions based on the analysis.

Data

A fundamental feature of this research is the unique detailed data about each loan involving a formal financial intermediary in Colombia, including both recipients and nonrecipients of Bancoldex loans. Access to this breadth and depth of data allow us to evaluate the impact of Bancoldex by comparing firm–intermediary relationships involving Bancoldex loans with those funded exclusively from other sources, and by comparing beneficiaries and nonbeneficiaries of Bancoldex credit. Previous studies have not had access to this level of detail.

We use this data to evaluate the impact of Bancoldex' lending activities on access to credit as measured by the amount of credit a firm was granted and other credit characteristics. In particular, we investigate how firm–intermediary relationships involving a loan by Bancoldex differ from those funded from other sources in terms of interest rates, loan amounts, and loan terms. We use this indirect approach, based on firm-bank relationships rather than single loans, to study how Bancoldex loans differ from non-Bancoldex loans because the structure of our data prevents us from directly comparing loans (as explained in detail below). We then examine the impact of using Bancoldex' credit lines on the credit structure of the firm, including the number of intermediaries with which a firm has credit relationships, the amounts that have been lent to the firm, the interest rates that have been charged on those credits, and the term lengths of the loans the firm has received.

To characterize credit along the dimensions mentioned above, we combine two data sources. First, we have data provided by Bancoldex that lists each of the Bancoldex-funded loans

granted to firms from the beginning of 2000 through 2009.[6] The dataset lists the amount of the transaction, the Bancoldex credit line under which the loan has been granted, the rediscount rate the financial intermediary has paid Bancoldex, the interest rate the firm has paid the financial intermediary, the term, the date of disbursement, and the use of collateral. It also identifies both the financial intermediary and the recipient of the loan with identifiers (IDs) that allows us to later merge this information with data on credit provided by the financial sector to firms. Recipients in the database are also classified by size according to their assets.[7]

With regards to access to credit from the financial sector, we use information on all credit operations intermediated by supervised financial institutions from the beginning of 2004 through 2009.[8] These data is housed at the Colombia Financial Superintendency (Superfinanciera, by its acronym in Spanish), the agency that oversees the activities of all formal financial intermediaries. Superfinanciera requires all institutions it supervises to provide information on all financial transactions. The database contains annual information, as of the last quarter of each year, on each outstanding credit operation, detailing outstanding balance, date of disbursement, interest rate and term initially agreed upon, credit type,[9] and use of collateral. The beneficiary and financial intermediary are both identified with IDs—the same IDs used in the Bancoldex dataset.

Our estimation strategy requires us to match each loan recorded in the Bancoldex dataset with the record for the same loan in the Superfinanciera database. Since Superfinanciera only

[6] Before 2003, these included only loans from Bancoldex credit lines to exporters. From that year on, after the merger with IFI, Bancoldex has expanded its activity to assume its role as a fully fledged development bank.

[7] Bancoldex uses information on the recipients' assets to classify them in size categories, using the definitions provided by Law 905 of 2004 by which firms with total assets below 500 minimum legal monthly wages are micro firms; firms with total assets above 500 and below 5,000 minimum legal monthly wages are small firms; firms with total assets above 5,000 and below 30,000 minimum legal monthly wages are medium firms; and firms with total assets above 30,000 minimum legal monthly wages are large firms. Regretfully we have been unable to extend the size classification to the merged database because the Superfinanciera dataset does not include information about firms' assets.

[8] Though the database contains information for previous years, we have only been assured that the database has had full coverage since 2005. As a result, in general, the period we cover is 2005 through 2009. There is one exception: we use information going back to 2004 in the estimation of the participation model to take advantage of as much pre-treatment information as possible and because the number of loans recorded in the database in 2004 does not appear to be low given the trends observed for the years for which we are confident of the full coverage of the data (see Table 4).

[9] Our dataset comprises all loan operations classified as either commercial or microcredit loans, and excludes all consumption and mortgage loans.

records loans for formal financial intermediaries, the first step in the matching process is to eliminate all observations in the Bancoldex dataset corresponding to loans intermediated by nongovernmental organizations (NGOs) and nonfinancial cooperatives.

The two databases also differ in terms of structure. Bancoldex records each credit operation only once, at the time of disbursement; therefore, the amount recorded corresponds to the amount disbursed. The Superfinanciera database presents periodic records for each loan, where the amounts recorded are outstanding balances. To make the two databases comparable, we organize the Superfinanciera database keeping only one record per-loan corresponding to the year in which the loan was disbursed. We end up with two databases in which each unit of observation is a loan disbursement. The amount of the loan recorded in Superfinanciera is the outstanding balance at the end of the year the loan was disbursed. We treat this as the amount of the loan disbursed, assuming that this number is equal or very close to the actual disbursement that took place within the same year.[10] For each credit operation, both databases record the IDs of the firm and the financial intermediary, and the date the loan was disbursed. These fields were used to merge the two databases, adding Bancoldex information to the records corresponding to loans funded by Bancoldex in the Superfinanciera database. Given the confidentiality of the data, the Superfinanciera staff completed the process at their headquarters.

One additional problem that emerges when matching the two databases is a discrepancy in the date of disbursement.[11] The discrepancy could be related to the fact that Bancoldex can disburse funds on a different date than the intermediary makes the final disbursement, and it probably also reflects inexact reporting by the intermediaries. To address this difficulty, credit operations were aggregated to the level of firm–intermediary relationships.[12] That is, in each

[10] Since the time between the date of disbursement and the end of the year varies for each loan, but that variance should not correlate with the recipient´s characteristics, using this value can introduce classical measurement error in our estimates of the impact of Bancoldex in the amount of credit to the firm. Therefore, our estimates of this effect should be considered the lower boundary of the true effect.

[11] The level of discrepancy varied: operations could be recorded with two different days within the same month, or even different months within the same year. We determine that records with differing dates correspond to the same observation by inspecting other characteristics of the loans, for instance, by confirming that the outstanding balance at the end of the disbursement year was very close to the disbursed amount listed in the Bancoldex dataset, and the term and interest rate matched.

[12] We explore other ways to deal with the discrepancy in dates. We match operations by month of disbursement rather than the exact date, and we match them only by year but eliminated all credits to firms with more than one loan from the same intermediary. The former leads to too few successful matches. The latter is quite successful in

database, we summarize in one observation the information corresponding to loans obtained by each firm from each financial intermediary within a year. Thus, the amounts of the loans to the same firm, in the same year, by the same intermediary are added to determine the total amount lent in that relationship. The interest rates and terms of those loans are averaged, and thus we end up with observations that no longer reflect the characteristics of a single credit operation, but rather the characteristics of the firm's credit relationship with that particular intermediary in the given year. Though this may have result in a loss of precision, the vast majority of firm–intermediary relationships are single-operation relationships: 93 percent of the operations in Superfinanciera's data and 90 percent of the operations in the Bancoldex data fall in this category. However, this does not mean that the aggregation is completely innocuous. In terms of value, the relatively few firms that have obtained more than one loan per year from the same financial intermediary represent 51 percent of all credit disbursed by the financial sector in the period.

After having homogenized the structure of the two databases, credit operations funded with Bancoldex resources in the Superfinanciera data were identified by using the IDs of beneficiaries and financial intermediaries, as well as the year of disbursement. The result was a unique database containing annual observations from the beginning of 2005 through 2009 for all commercial credit[13] or microcredit[14] operations disbursed by the supervised Colombian financial system. The unit of observation is a firm–intermediary credit relationship in a given year, with relationships for which at least one loan came from Bancoldex identified. This database, which we used for the analysis presented below, records, for each relationship, the total amount of credit disbursed, the average loan term, the average interest rate, the amount borrowed that was covered by a guarantee, and the credit category (commercial or microcredit). We also recorded

terms of numbers of matches and produces results that are very close to those reported here; however, the observations that have been eliminated represent a large fraction of the total amounts being lent.

[13] Commercial credit is all credit granted to businesses.

[14] Microcredit definitions have varied over time. Between 2000 and 2007, microcredit was defined as credit granted to micro firms, not exceeding 25 minimum legal monthly wages by operation, and subject to the condition that the total outstanding loans of a single firm could never exceed this value (Law 590 of 2000). In 2008, this definition was extended to include as microcredit all loan operations with micro firms as long as the source of payment is the micro firm's business activity and the total credit outstanding does not exceed 120 minimum legal monthly wages at the time of loan approval (Decree 919 of 2008).

the balance, as of the last quarter of the corresponding year, on all outstanding loans in the relationship.

Though by aggregating observations in the Superfinanciera database to the level of relationships we are able to match most information in Bancoldex records to Superfinanciera records, two remaining potential problems deserve mention. First, precision is lost when looking at characteristics that are averaged across loans rather than the direct features of each loan. Fortunately, this problem is minimized since most observations in the data correspond to firms obtaining a single loan per intermediary per year. A second problem that may undermine our match still comes from the discrepancy in dates between the two databases. If Bancoldex disbursed the loan at the end of one year, but the final beneficiary only obtained the money at the beginning of the following year, we may date the treatment incorrectly, or fail to match it (if in the year of the Bancoldex record, the firm did not have another loan with the corresponding intermediary)[15]. This type of mistake introduces standard measurement error, and a resulting attenuation bias in our estimates. If anything, then, our estimates of the impact of Bancoldex could be a lower bound for the true effect.

It is important to note that our use of Superfinanciera data is limited by confidentiality restrictions that prevent us from undertaking any further analyses that would require us to match the two sources of data used for this paper with other sources of information.

Bancoldex and Other Credit to Firms in Numbers

This section presents descriptive statistics about both Bancoldex' activities and the credit relationships recorded in the database obtained after we merged the Bancoldex and Superfinanciera databases. Since no previous study systematically analyzes the function of Bancoldex within the Colombian financial sector, our comparison of Bancoldex credit to credit provided by other financial operators is a key step toward a better understanding of the bank's role in the country's financial system.

[15] We are unable to match 0.8 percent of firm-intermediary relationships corresponding to 1.2 percent of Bancoldex loan disbursements between 2005 and 2009.

Table 1 summarizes Bancoldex beneficiaries by firm size after removing observations that correspond to loans granted through institutions not supervised by Superfinanciera. Since 71 percent of Bancoldex loans fall in this category, this filter substantially downsizes the original Bancoldex database.[16]

Table 1: Bancoldex:
Number of Beneficiaries of Loans through Supervised Financial Intermediaries

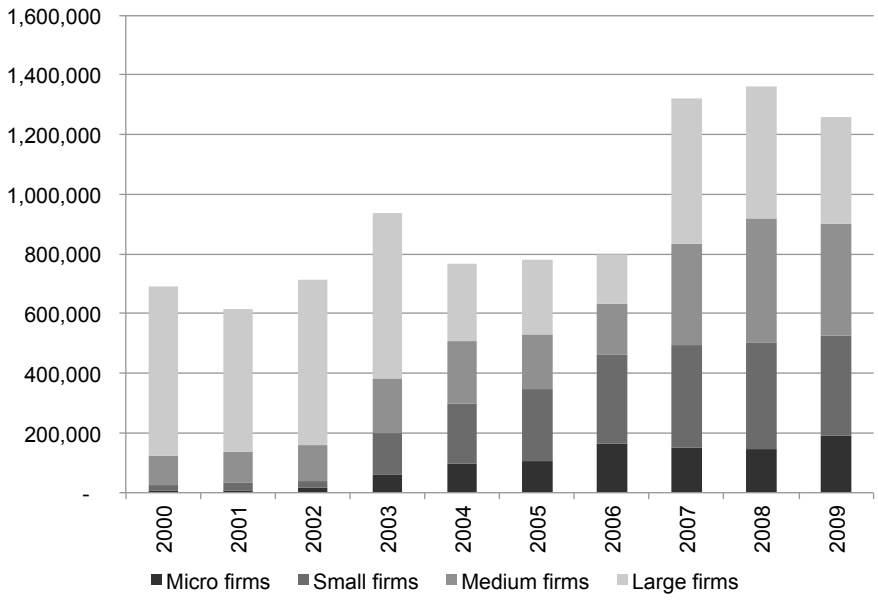
Year	Micro firms	Small firms	Medium firms	Large firms	Total
2000	12	131	302	219	664
2001	26	214	384	237	861
2002	29	254	447	275	1,005
2003	5,062	2,505	933	331	8,831
2004	8,978	4,076	1,158	312	14,524
2005	10,663	4,970	1,052	253	16,938
2006	14,290	5,220	948	149	20,607
2007	12,769	5,057	1,417	306	19,549
2008	16,941	5,159	1,737	423	24,260
2009	83,302	5,511	1,750	381	90,944

Source: Bancoldex and authors' calculations.

On the other hand, the evolution of Bancoldex financing activity between 2000 and 2009, as measured by the number of firms with credit relationships backed by Bancoldex rediscount credit lines, is quite similar to that observed in the data before imposing this filter (Eslava, Maffioli, and Meléndez, 2012). The number of firms with access to this type of credit increases dramatically over time. Not only is the change in scope of activity related to the merger with IFI in 2003 evident from these numbers, but also a change in policy by which extending credit to the smaller firms became a priority. The contrasting trends between large firms and the other firm-size categories can also be observed in Figure 1, which shows the evolution of total Bancoldex credit value in U.S. dollars by firm size during the same period.

[16] Observations erased by this filter were only microcredit operations.

Figure 1: Bancoldex: Total Loan Value by Firm Size (in USD thousand)



Note: Monetary values converted to 2009 pesos using the CPI and to U.S. dollars at the December 2009 average peso/dollar exchange rate. Values correspond to loan operations through financial intermediaries.

Source: Bancoldex and authors' calculations.

In addition to reaching out to the smaller firms, after 2003 there was a notable decrease in both the size of the average loan and the number of credit operations per firm. The average loan size decreased over time for micro and small firms, with the change being more marked for micro enterprises (Table 2). Meanwhile, the average number of loans per firm went to 1.1 from 2.7 between 2000 and 2009 (Table 3). The change was most important for large firms: from 4.1 in 2000 to 1.7 in 2009. The large firm category not only experienced the most notable change in the number of loans per firm, but was also the only category where the decrease in the number of loans per firm was not accompanied by a marked increase in the number of beneficiaries.

Table 2: Bancoldex: Average Loan Size (in USD thousand)

Year	Micro firms	Small firms	Medium firms	Large firms	Total
2000	232.2	113.9	154.4	716.8	400.2
2001	216.6	80.9	125.9	629.2	308.4
2002	252.0	72.0	127.0	606.9	305.9
2003	11.0	46.8	116.8	593.0	74.8
2004	9.9	40.6	110.6	357.0	40.8
2005	9.4	39.6	106.1	472.5	35.4
2006	10.1	45.8	122.3	620.4	30.6
2007	11.1	56.2	150.1	851.5	52.1
2008	8.3	56.7	148.9	597.3	44.0
2009	2.2	48.8	137.1	626.0	11.6

Note: Monetary values converted to 2009 pesos using the CPI and to dollars at the December 2009 average peso/dollar exchange rate. Values correspond to loan operations through financial intermediaries.

Source: Bancoldex and authors' calculations.

Table 3: Average Number of Loans by Firm

Year	Micro firms	Small firms	Medium firms	Large firms	Total
2000	1.8	1.5	2.3	4.1	2.7
2001	1.3	1.4	2.4	4.0	2.6
2002	1.6	1.3	2.3	3.8	2.6
2003	1.0	1.2	1.9	3.1	1.3
2004	1.0	1.3	1.9	2.9	1.2
2005	1.0	1.2	1.8	2.5	1.2
2006	1.0	1.3	1.7	2.2	1.1
2007	1.0	1.2	1.7	2.4	1.2
2008	1.0	1.2	1.9	2.2	1.1
2009	1.1	1.3	1.9	1.7	1.1

Note: Numbers refer to loan operations through financial intermediaries.

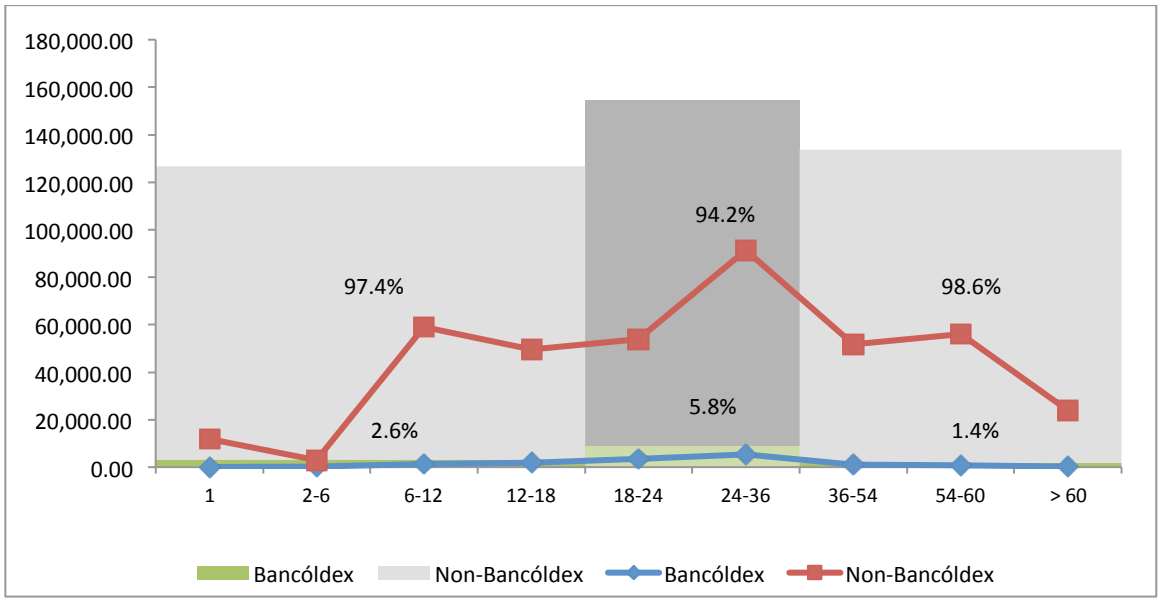
Source: Bancoldex and authors' calculations.

Figure 2 presents Bancoldex and non-Bancoldex credit categorized by loan terms. As a share of total credit to businesses, Bancoldex participation increased both in number of credit relationships and total credit value between 2005 and 2009. While in 2009 Bancoldex' share of the first of these categories was higher for loan terms below 18 months (13.1 percent) and between 18 and 36 months (12.9 percent), Bancoldex also increased its presence among the longer-term loans of more than 36 months, from 1.4 percent in 2005 to 4.4 percent in 2009. With respect to credit value, in 2009, Bancoldex loans represented the same share of 4.7 percent over both the shorter-term loans (less than 18 months) and the longer-term loans (more than 36 months), and Bancoldex participation was highest (5.2 percent) over the middle category of loans, between 18 and 36 months.

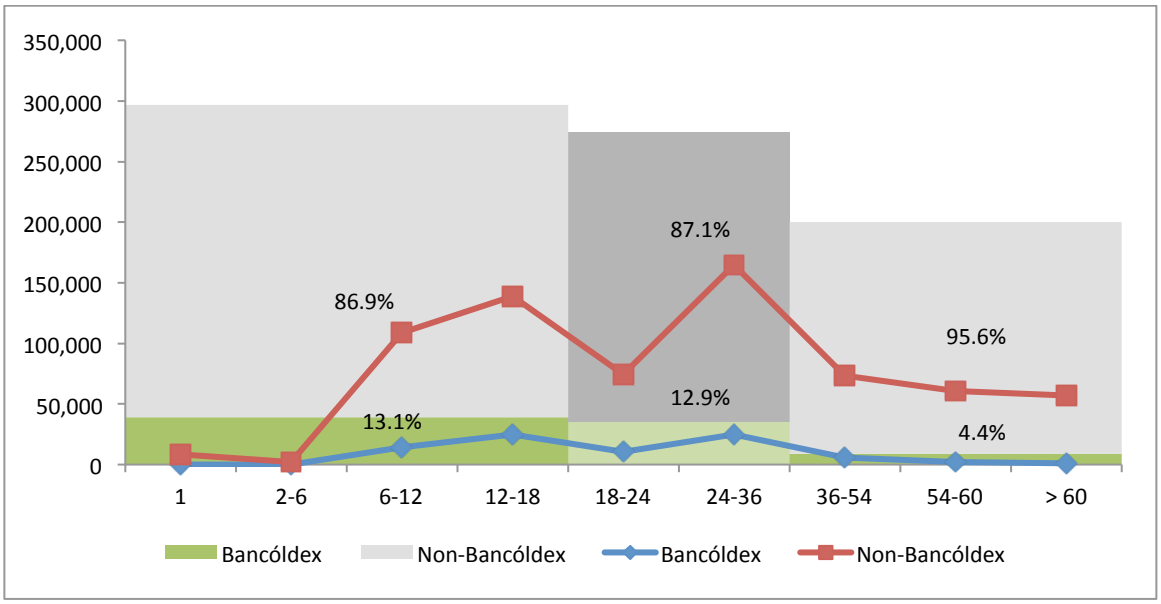
Figure 2: Credit Operations by Loan Maturity (in months), Bancoldex and Non-Bancoldex

Number of Credit Relationships

2005

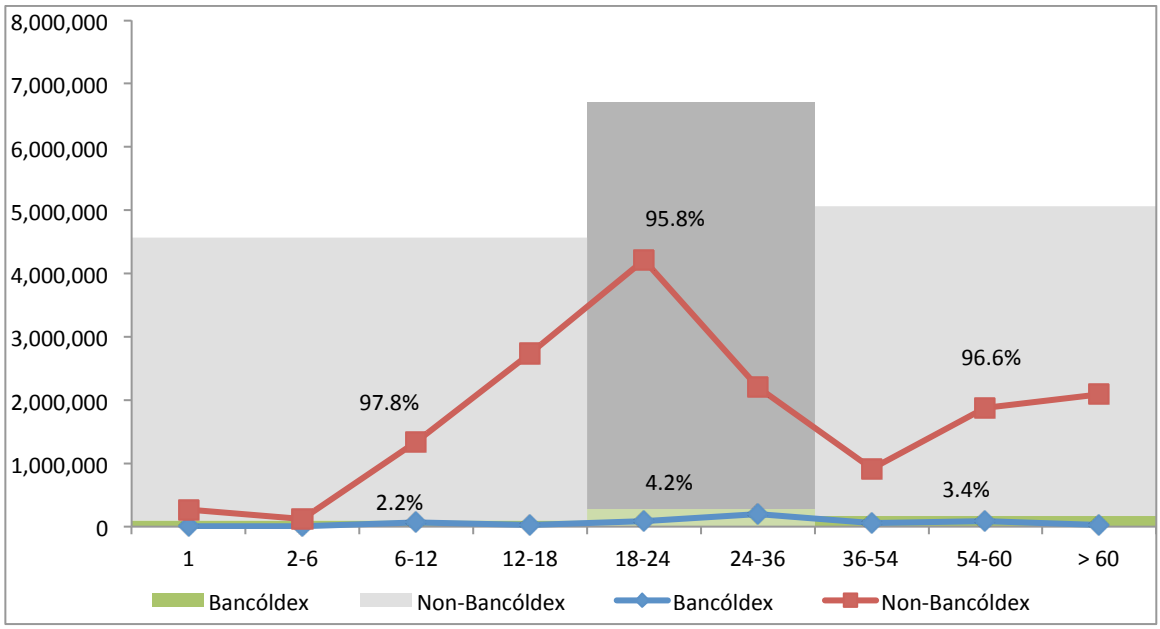


2009

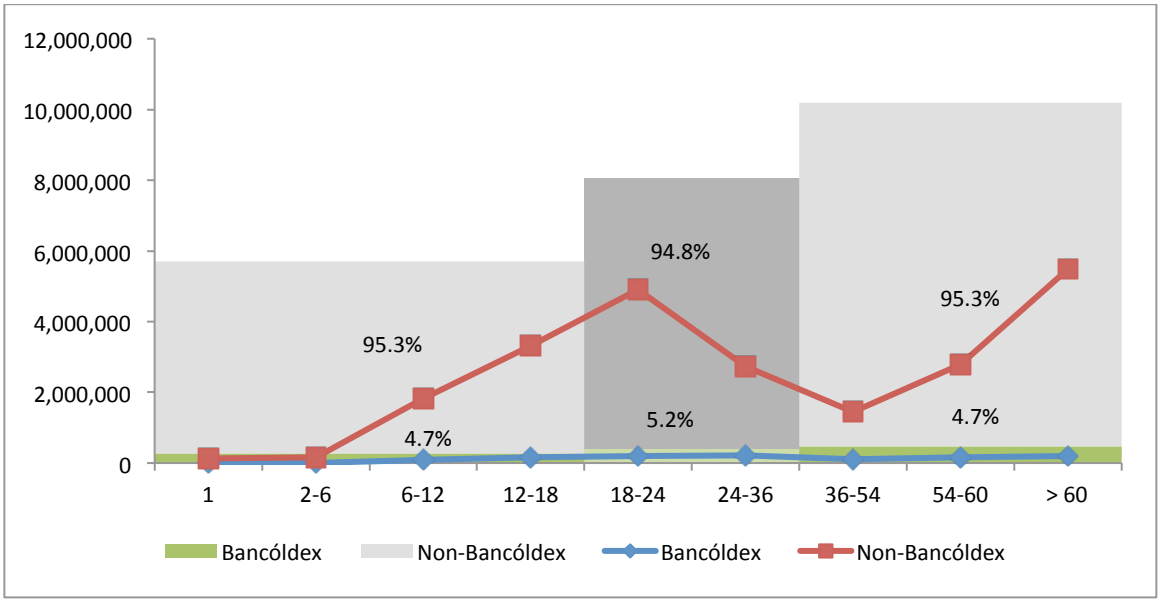


Credit Value (in USD thousand)

2005



2009



Note: Monetary values converted to 2009 pesos using the CPI and at the December 2009 peso/dollar exchange rate. Numbers refer to loan operations through financial intermediaries.

Source: Bancoldex, Superfinanciera, and authors' calculations.

Table 4 presents statistics from the database that resulted from merging Bancoldex and Superfinanciera records. In 2005, 3.3 percent of all credit relationships had at least one loan from Bancoldex credit lines; in 2009, that number had increased to 12 percent. Even more interesting is the evolution over time of Bancoldex' participation in the two different types of credit in our data: commercial credit and microcredit. We classify relationships into those involving at least one microcredit loan and those where only commercial loans were present.[17] While Bancoldex had a higher presence in the commercial credit category than in the microcredit category until 2008 (average participation of 4.8 percent in commercial credit compared to 2.2 percent in microcredit between 2005 and 2008), this reversed in 2009. In this last year of our sample, 13.7 percent of credit relationships involving microcredit include at least one loan from Bancoldex resources, while the corresponding figure for the commercial credit category is 6.4 percent.

[17] The overwhelming percentage of observations refers to single-loan relationships, implying this categorization is close to simply dividing our loans into commercial credit and microcredit.

Table 4: Credit Relationships

		All credit relationships					Bancoldex					
All credit relationships	Year	No.	Average interest rate (%)	Average term (days)	Average loan size (USD 000)	Total loan value (USD 000)	No.	%	Average interest rate (%)	Average term (days)	Average loan size (USD 000)	Total loan value (USD 000)
	2005	411,867	16.9	1,016	43.9	18,066,540	14,867	3.6	15.5	889	43.3	643,637
	2006	510,183	17.1	1,075	48.3	24,623,054	16,707	3.3	16.5	1,009	42.3	706,605
	2007	550,363	22.5	1,127	45.9	25,244,632	16,695	3.0	19.8	1,033	93.4	1,558,545
	2008	663,051	27.1	1,003	43.1	28,587,679	21,761	3.3	25.2	1,066	92.8	2,019,711
	2009	699,470	25.3	971	36.7	25,656,604	83,847	12.0	30.6	719	15.8	1,328,223
Commercial relationships	Year	No.	Average interest rate (%)	Average term (days)	Average loan size (USD 000)	Total loan value (USD 000)	No.	%	Average interest rate (%)	Average term (days)	Average loan size (USD 000)	Total loan value (USD 000)
	2005	192,577	17.4	985	91.4	17,604,349	10,804	5.6	14.7	956	58.8	634,774
	2006	231,735	17.0	1,123	103.9	24,073,446	10,455	4.5	16.2	1,158	66.5	695,016
	2007	265,011	21.3	1,265	93.2	24,703,698	10,429	3.9	16.9	1,239	148.5	1,548,585
	2008	198,096	23.3	1,246	139.7	27,668,913	10,238	5.2	19.2	1,386	194.5	1,991,749
	2009	163,764	17.9	1,237	150.7	24,673,490	10,467	6.4	14.2	1,211	119.4	1,250,152
Microcredit relationships	Year	No.	Average interest rate (%)	Average term (days)	Average loan size (USD 000)	Total loan value (USD 000)	No.	%	Average interest rate (%)	Average term (days)	Average loan size (USD 000)	Total loan value (USD 000)
	2005	219,290	16.4	1,044	2.1	462,191	4,063	1.9	17.7	712	2.2	8,863
	2006	278,448	17.2	1,035	2.0	549,608	6,252	2.2	16.9	759	1.9	11,589
	2007	285,352	23.7	998	1.9	540,933	6,266	2.2	24.6	690	1.6	9,960
	2008	464,955	28.7	900	2.0	918,766	11,523	2.5	30.4	783	2.4	27,961
	2009	535,706	27.5	890	1.8	983,114	73,380	13.7	32.9	649	1.1	78,071

Note: Monetary values converted to 2009 pesos using the CPI and at the December 2009 peso/dollar exchange rate. Numbers refer to loan operations through financial intermediaries.

Source: Bancoldex, Superfinanciera, and authors' calculations.

Because credit characteristics are markedly different across credit types, the most informative numbers are presented in the two lower panels of Table 4. Credit operations involving microcredit loans are more expensive, as expected, and of shorter terms, and this is true in general for all credit relationships. It is noteworthy, however, that credit relationships involving only commercial loans are granted at lower interest rates on average when they involve Bancoldex' credit lines. In credit relationships involving microcredit, Bancoldex credit lines appear to be associated with shorter terms and higher interest rates.

Finally, Table 5 takes a different look at our data, this time aggregated at the beneficiary level. Because the number of beneficiaries having more than one credit relationship per year is very small, Bancoldex participation in terms of beneficiaries is similar to its participation over credit relationships, only slightly higher. The increase in the number of firms that obtained credit from Bancoldex resources (from 16,106 in 2007, to 21,128 in 2008, and to 82,827 in 2009) is explained by Bancoldex' increasing participation in microcredit activities. This is in contrast with the number of beneficiaries obtaining commercial credit involving Bancoldex resources, which remained relatively steady over the period.

Table 5: Firm-Level Credit Characteristics

		All credit operations				Bancoldex			
ALL	Year	Number of firms	Number of loans by firm	Number of credit relationships by firm	Average credit by firm (USD 000)	Number of firms using Bancoldex loans	% of firms using Bancoldex	Number of Bancoldex credit relationships by firm	Average Bancoldex credit by firm (USD 000)
	2005	368,618	1.15	1.12	22.7	14,238	3.9	1.04	45.2
	2006	456,478	1.16	1.13	24.2	16,288	3.6	1.03	43.4
	2007	490,626	1.17	1.13	24.8	16,106	3.3	1.04	96.8
	2008	592,568	1.16	1.13	21.8	21,128	3.6	1.03	95.6
	2009	638,791	1.12	1.10	19.2	82,827	13.0	1.01	16.0
Commercial Credit	Year	Number of firms	Number of loans by firm	Number of credit relationships by firm	Average credit by firm (USD 000)	Number of firms using Bancoldex loans	% of firms using Bancoldex	Number of Bancoldex credit relationships by firm	Average Bancoldex credit by firm (USD 000)
	2005	157,508	1.31	1.24	50.4	10,231	6.5	1.06	62.0
	2006	189,756	1.32	1.24	55.3	10,071	5.3	1.04	69.0
	2007	219,325	1.31	1.23	52.8	9,869	4.5	1.06	156.9
	2008	159,372	1.39	1.28	75.8	9,658	6.1	1.06	206.2
	2009	132,819	1.35	1.26	85.6	9,789	7.4	1.07	127.7
Microcredit	Year	Number of firms	Number of loans by firm	Number of credit relationships by firm	Average credit by firm (USD 000)	Number of firms using Bancoldex loans	% of firms using Bancoldex	Number of Bancoldex credit relationships by firm	Average Bancoldex credit by firm (USD 000)
	2005	214,818	1.02	1.02	2.1	4,046	1.9	1.00	2.2
	2006	271,359	1.03	1.03	2.0	6,239	2.3	1.00	1.9
	2007	276,779	1.03	1.03	1.9	6,253	2.3	1.00	1.6
	2008	438,449	1.06	1.06	2.0	11,484	2.6	1.00	2.4
	2009	510,088	1.05	1.05	1.8	73,084	14.3	1.00	1.1

Note: Monetary values converted to 2009 pesos using the CPI and at the December 2009 peso/dollar exchange rate. Numbers refer to loan operations through financial intermediaries.

Source: Bancoldex, Superfinanciera, and authors' calculations.

Empirical Approach:
Evaluating the Impact of Bancoldex on Credit Characteristics

To capture the degree to which Bancoldex helps to relax credit constraints (or the informational problems underlying them), we analyze the effect of its loans on different dimensions of a firm's credit structure. In particular, we study how the amount of credit, average interest rates, and average terms 1) differ between relationships with and without at least one Bancoldex loan, and 2) depend on whether the firm has had a loan from Bancoldex in the past. Our baseline independent variable is a dummy variable indicating whether a firm (or a bank-firm relationship) is or is not "treated", meaning that it has been a beneficiary of a Bancoldex loan (or made use of Bancoldex resources). Our dependent variables are the amount of credit, interest rates, loan terms, and (when evaluating the subsequent impact on the firm) the number of relationships the firm entered into. Specifically, Bancoldex is considered to have had a positive impact on a firm's access to credit not only if the amount of credit it has received or the number of intermediaries with which it has interacted has expanded, but also if the term of loans has increased or if interest rates paid by the firm have declined.

One problem with estimating the impact of Bancoldex on a firm's credit relationships and/or credit structure is selection bias. A financial institution or intermediary studying an application for a loan decides whether to grant the loan and whether to fund it with Bancoldex resources or from its own sources. Sometimes the applicant may also suggest the use of Bancoldex funds. Two selection problems may then arise. First, if Bancoldex credit is indeed a helpful tool to relax credit constraints, then financially constrained firms may be more likely to apply, through their financial intermediary, for a Bancoldex loan. Because these constrained firms are also those who receive less credit, face higher interest rate, and obtain shorter terms, not addressing this self-selection problem may bias our results toward incorrectly assigning a negative impact to Bancoldex credit activities. However, selection bias may also occur in the opposite direction. Since beneficiaries are chosen by financial intermediaries who take on the risk of default, they are likely less risky than other applicants, who may end up left without credit from either public or private sources.

To deal with concerns that beneficiaries may, ex-ante, be different from nonbeneficiaries in terms of the characteristics that determine access to credit, we take advantage of the panel nature of our data. We follow two different, complementary strategies. First, we include fixed effects that address selection biases related to fixed firm characteristics. Second, we create a control group of firms with similar past credit history, the underlying assumption being that these are firms with similar current access to credit. We use the dataset that brings together information from Bancoldex and Superfinanciera, covering the use of Bancoldex credit lines from the beginning of 2004 through 2009 and covering each firms' credit history over the same period. To create our control group, we use Propensity Score Matching (PSM), explained in detail below.

We study Bancoldex credit activities on two dimensions. First, we are interested in establishing differences between Bancoldex and non-Bancoldex loans in terms of their amounts, interest rates, and terms. However, given that the unit of observation in our database is not a loan but a credit relationship, what we in fact characterize is how relationships involving at least one Bancoldex loan differs from those in which Bancoldex is not involved. Fortunately, as stated, the bulk of our observations corresponds to single-loan relationships—for over 93 percent of the loans in our records, the firm did not enter into another loan with the same intermediary in that year. To that extent, our characterization of how relationships in which Bancoldex is involved differs from others is a good approximation to the differences between Bancoldex and non-Bancoldex loans.[18]

To establish differences between relationships with at least one Bancoldex loan and those with none, we run regressions of the following form:

$$x_{jit} = \alpha_i + \gamma_j + \beta_t + \eta BX_{ijt} + \sum_{k=1}^{n} \lambda_k Z_{kjit} + \varepsilon_{jit} \qquad (1)$$

where x_{ijt} is a characteristic of credit relationship between firm *i* and financial intermediary *j* during year *t*; BX_{ijt} is a dummy variable that indicates whether the credit relationship involves a loan from Bancoldex; Z_{jit} are other characteristics of the relationship potentially correlated with

[18] A robustness check, which is available from the authors on request, proves that our results are robust based on doing the same analysis with a sample limited to single-loan relationships.

the dependent variable; and we control for firm, intermediary, and year effects. Our set of dependent variables includes interest rate, loan term, and the monetary value of the loan size. Characteristics of the relationship included as controls are the number of loans in the relationship (equal to 1 for most observations), a dummy variable indicating if the relationship includes at least one microcredit loan, and a dummy variable indicating if at least one loan involved in the relationship is covered by a guarantee. Results regarding the effect of access to a Bancoldex loan are qualitatively similar if we do not include these controls, but the estimated magnitudes are larger in that case because users of Bancoldex credit tend to systematically differ from others in the use of guarantees to back their loans and the frequency with which they used microcredit. Monetary values have been adjusted to 2009 constant prices.

We perform a second set of estimates to establish whether the use of a Bancoldex loan affects a firm's overall credit structure (which in turn characterized the firm's access to credit) in the year the firm receives that loan and in subsequent years. The regressions are of the following form:

$$x_{it} = \alpha_i + \beta_t + \eta_1 BX_{it} + \eta_2 BX_{it-1} + \eta_3 BX_{it-2} + \sum_{k=1}^{n} \lambda_k Y_{kit} + \varepsilon_{it} \qquad (2)$$

where x_{it} is a characteristic of the credit received by the firm, aggregated over all credit relationships entered into by firm *i* at time *t* (average interest rate, average term, average loan size, total amount of credit, number of financial intermediaries the firm entered into relationships with); BX_{it}, BX_{it-1}, and BX_{it-2} are dummies indicating whether the firm's credit relationships at times *t*, *t−1*, and *t−2*, respectively, involve at least one loan from Bancoldex; and the set of *k* variables Y_{kit} is a set of controls for observed credit characteristics that may vary across firms and over time. As for the timing (the range of years in the above equation), we examine the effect of becoming a beneficiary in the current period, one year previously, and two years previously. Mirroring the previous set of regressions, the controls we include in our estimates are an indicator of whether credit obtained by the firm at time *t* includes loans in the microcredit category, the percentage of the credit package covered by a guarantee, and the maximum number of loans obtained from a single intermediary within a year in the previous three years. We also include the value of the firm's loans outstanding as of the end of *t−1* and the total amount of credit disbursed to the firm in

period $t-1$ among the controls. All of these controls capture some dimension related to access to credit. As before, in this set of regressions, we control for firm and year effects.

As mentioned above, all equations are estimated for a sample of firms within a common support, which is constructed using PSM. The sample includes beneficiary firms (those that had at least one loan from Bancoldex) and a control group of firms that have not been beneficiaries of a Bancoldex loan in any year of our study but share similar characteristics with beneficiaries. We choose firms in our control group from those that have never received Bancoldex loans to ensure that the distinction between beneficiary and control firms in our estimations calculations are as clear-cut as possible. For each treated firm we include a control firm with a similar estimated probability of receiving credit from Bancoldex resources (the "nearest neighbor"). Notice that we use the same sample to calculate both equation 1 and equation 2, even though the former is estimated at the level of the firm–intermediary relationship rather than the firm. The reason to focus on the same common support is that the selection problems we see for the estimates refer to the fact that the characteristics of the beneficiary, in other words the firm, may impact its probability of being treated. In this sense, the relevant dimension over which selection biases must be addressed is at the firm level.

The probability of being treated is estimated, using a logit probability model, as a function of variables capturing the firm's pre-treatment credit structure:

- the number of financial intermediaries from which the firm obtained credit the year before benefiting from a Bancoldex loan;
- the value of loans outstanding at the end of the year before treatment;
- the number of new credit relationships acquired the year before treatment;
- the percentage of credit acquired the year before treatment that was backed by a guarantee;
- the average interest rate and term of credit relationships entered into in the three years before treatment; and
- the maximum number of loans obtained within a year from the same financial intermediary in the three years before treatment.

Estimations are made at both the credit-relationship level (equation 1) and the firm level (equation 2), keeping in the database only observations that correspond to firms in the region of common support.

To implement this general strategy, we have to make choices regarding the timing of treatment we will focus on and the time span over which we will estimate the effects of being treated. Regarding the first dimension, we restrict our attention to firms benefiting for the first time in one specific year of our sample period: 2007. Focusing on a single treatment year has the advantage of allowing, in a single estimation, a clean definition of the pre- and post-treatment periods. There were two reasons to take 2007 as our baseline. First, by focusing on 2007, we are left with three years of pre-treatment information. Being able to follow firms for a relatively long period before treatment is important to ensure that the firms we include in our control group share similar pre-treatment trends with the treated ones. Second, we have data on access to credit up to 2009, which leaves us with a three-year window to examine the immediate and future effect of loans disbursed in 2007. Since access to Bancoldex credit may impact the characteristics of a firm's future access to credit, having a window beyond just one year is desirable for a variation of our baseline exercise. Mechanically, this means that in our dataset we keep all firm–intermediary relationships that occurred between 2005 and 2009, all firms that accessed Bancoldex credit for the first time in 2007, and all those that did not receive Bancoldex credit in any year of our sample, but otherwise shared credit characteristics with the beneficiary firms before treatment.[19]

With equation 1, we attempt to determine the extent to which Bancoldex loans differ from other loans, thus our treatment dummy in that equation, BX_{ijt} , is contemporary to the outcome being examined, x_{it}. Equation 2 simply replicates that exercise at the firm level. In other words, we first try to see whether the differences between Bancoldex credit relationships and access to other loans translate into similar differences for the average relationship of the firm. As a result, the treatment variable in our baseline firm-level estimation takes a value of 1 if

[19] As mentioned before, however, to estimate the participation model used to build the common support, we have used information going back to 2004.

the firm had at least one loan from Bancoldex in year *t*.[20] In alternative sets of estimations, we explore not only the contemporaneous effect of treatment, but also its effect over time to take into account that, for instance, it may take time for demonstration effects to become apparent. To calculate the effect over time, we include dummies to indicate whether the firm received a Bancoldex loan in the current year, whether it received such loan one year ago, or two years ago.[21] Finally, using a variation of equation 2, we explore the effect of being a beneficiary of a Bancoldex loan on credit characteristics of future relationships that did not involve Bancoldex resources.

Results

Participation Model

In the participation model, receiving Bancoldex credit for the first time in 2007 is modeled as a function of the pre-benefit credit characteristics mentioned above. Results are summarized in Table 6. We find that participation is positively correlated with a firm's pre-treatment use of credit, as measured by

- the value of loans outstanding;
- the number of financial intermediaries a firm obtained loans from in the previous year;
- the number of loans obtained within a year from a sole intermediary in the three years prior to treatment; and
- the percentage of loans obtained in the previous year that were covered by a guarantee.

[20] We keep in the common support all observations of firms in the beneficiary and control groups. Alternatively we may have dropped the observations of the beneficiary firms in the years in which they obtained credit only from other sources. We call attention to this methodological decision because, if Bancoldex has a persistent effect over time on the credit conditions a firm is able to obtain (even from other sources), our coefficients on the Bancoldex dummy may be downward biased, that is, our estimates may be underestimating Bancoldex' true impact.

[21] It is also worth noting that our model includes time effects. The specific choice of 2007 (or any other year) as the first year in which the beneficiary obtains credit should thus not be driving the estimated differences between current and lagged effects, even if the credit market as a whole behaved differently between 2007, 2008, and 2009.

Table 6: Participation Model

Variable	Dummy=1 if first treated in *t*=2007 (1)
Average loan term between *t−1* and *t−3* (in logs)	−0.0423**
	[0.00695]
Average interest rate between *t−1* and *t−3*	0.697**
	[0.161]
Number of financial intermediaries in *t−1*	0.130**
	[0.0124]
Loans outstanding in *t−1* (in logs)	0.0827**
	[0.0115]
Loan disbursements in *t−1* (in logs)	−0.0181+
	[0.0108]
% of loans disbursed that had a guarantee in *t−1*	0.0656**
	[0.0158]
Maximum number of loans obtained within a year from the same financial intermediary between *t−1* and *t−3*	0.135**
	[0.0287]
Constant	−3.37**
	[0.0967]
Observations	134,381
Pseudo R2	0.087
Log likelihood	−13708.6
ISIC 2-digit sector dummies	Yes

Note: Robust standard errors in brackets. ** denotes significance at 1 percent level, * denotes significance at 5 percent level, + denotes significance at 10 percent level.

These results suggest that allocating Bancoldex credit lines through financial intermediaries, which have market incentives for risk evaluation, results in firms that are less risky and have a more established credit history having a higher probability of obtaining loans from Bancoldex credit lines. These findings are in line with those of the companion paper previously mentioned (Eslava, Maffioli, and Meléndez, 2012), where we explore the impact of Bancoldex on firm performance and also find evidence that intermediaries have strong incentives to carefully screen applicants. While these findings provide evidence of a careful allocation of the public resources made available by Bancoldex, they may also suggest that public credit is not going to those firms that are most constrained to begin with. This may reflect the difficult challenge of adequately designing an intervention to provide access to credit to constrained firms with a reasonable risk profile. Considering this challenge, the estimated effects of the cost of previous loans and their terms, as well as that of a variable reflecting whether the firm received new loans in the previous year, indicate that, among those firms with reasonably low risk, it is the most credit constrained that benefited from Bancoldex credit lines. In particular, we find that firms that have faced harsh credit conditions in the past, in the form of lower loan maturities or higher interest rates, have a higher probability of being beneficiaries of a Bancoldex loan. Also, firms that receive new loans the year before becoming a beneficiary have a lower probability of participating, as would probably be expected of firms that recently obtained external financing and may not need to enter into new credit relationships for a while.

The model seems to do a good job of matching beneficiary firms with similar control firms. Figure 3 presents the distributions of the propensity scores for the beneficiary and control firms before matching (left chart), and for the beneficiary and control groups within the common support (right chart). While the overall sample shows widely different propensity scores between beneficiary and control firms, the corresponding distributions are practically identical within the common support. The Kolmogorov-Smirnov test of the equality of distributions of the propensity scores shows that the hypothesis that beneficiary and control firms have equal p-score distributions cannot be rejected—after matching and using the common support, the p-value for this test is 0.80 (Table 7). As for individual variables, while the (unconditional) means of most firm characteristics included in the estimation were higher for beneficiary firms in the overall sample—except that of the average loan term which was lower—there was no statistically significant difference in the common support and this is true for all variables in the estimation,

except the average interest rate of past loans (Table 8). The bias that persists in terms of the interest rate (close to 30 basis points) should be kept in mind when interpreting our results.

Figure 3: Propensity Scores

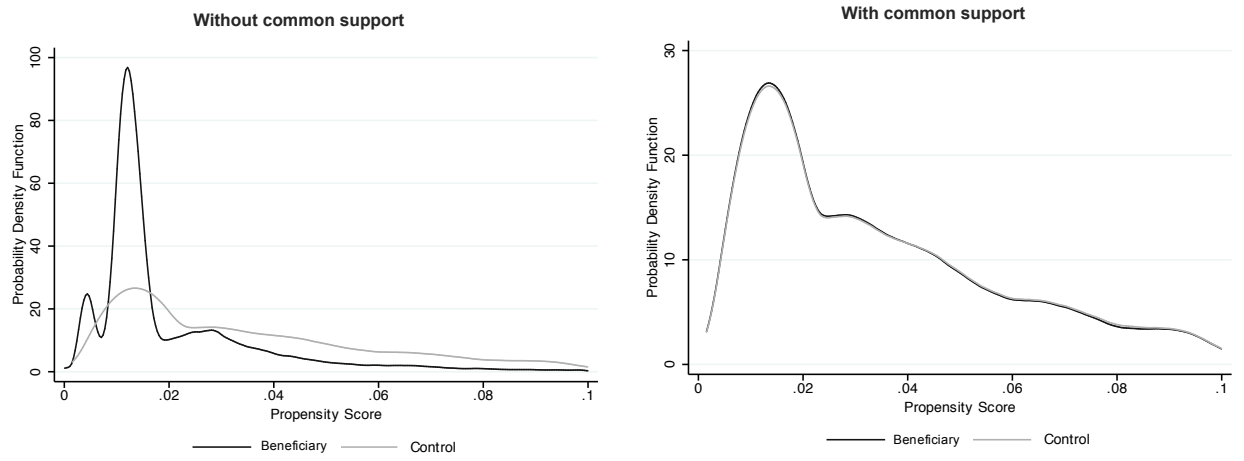


Table 7: Kolmogorov-Smirnov Test

Without common support			
Group	Difference	p-value	Corrected
Control	0.353	0.000	
Beneficiary	0.000	1.000	
Combined K-S	0.353	0.000	0.000
With common support			
Group	Difference	p-value	Corrected
Control	0.0164	0.436	
Beneficiary	−0.0005	0.999	
Combined K-S	0.0164	0.801	0.792

Table 8: Balance Test

Variable	Sample	Beneficiary	Control	% bias	% reduction bias	t-statistic	p-value
Average loan term between *t−1* and *t−3* (in logs)	Unmatched	6.4797	6.537	−5.5		−2.92	0.003
	Matched	6.4797	6.4387	4	28.4	1.35	0.176
Average interest rate between *t−1* and *t−3*	Unmatched	0.17769	0.17515	4.8		2.47	0.014
	Matched	0.17769	0.18047	−5.2	−9.6	−2.24	0.025
Number of financial intermediaries in *t−1*	Unmatched	1.6874	1.1652	57.9		50.45	0.000
	Matched	1.6874	1.6707	1.9	96.8	0.56	0.573
Loans outstanding in *t−1* (in logs)	Unmatched	17.244	15.799	61.7		39.31	0.000
	Matched	17.244	17.154	3.9	93.7	1.42	0.155
Loan disbursements in *t−1* (in logs)	Unmatched	17.053	15.682	58.4		36.88	0.000
	Matched	17.053	16.985	2.9	95.1	1.06	0.288
% of loans disbursed that had a guarantee in *t−1*	Unmatched	0.95833	0.83321	20.8		14.03	0.000
	Matched	0.95833	0.95315	0.9	95.9	0.29	0.770
Maximum number of loans obtained within a year from the same financial intermediary between *t−1* and *t−3*	Unmatched	1.1776	1.045	42.8		34.4	0.000
	Matched	1.1776	1.1776	0	100	0.00	1.000

Note: 2-digit ISIC sector dummies were included in the balance test, and they all become balanced within the common support.

Bancoldex vs. Non-Bancoldex Relationships

Table 9 presents descriptive statistics to help interpret the results of our regression analyses. Results for our first set of estimations (equation 1) are presented in Table 10. Recall that this first group of regressions is aimed at simply characterizing whether relationships involving Bancoldex loans differed from non-Bancoldex relationships (as a close to proxy to, simply, comparing Bancoldex and non-Bancoldex loans). These regressions are estimated using the dataset on credit relationships by firm and financial intermediary. Odd-numbered columns in Table 10 present the results obtained before restricting observations to firms in the common support, while even-numbered columns present those obtained within the common support. We focus on that latter, but results for the overall sample are provided to assess the importance of selection biases.

Table 9: Summary Statistics, Credit Relationships

Variable	Number of observations	Mean	Standard deviation	Min	Max
All operations					
Dummy=1 if firm received a loan from Bancoldex	52,943	0.09	0.28	0.0	1.0
Interest rate	51,856	0.19	0.09	0.0	1.0
Loan term (in logs)	52,244	6.35	1.36	0.0	10.3
Loan size (in logs)	52,943	17.43	2.41	−4.6	25.2
Number of loans from the financial intermediary in the year (in logs)	52,943	0.06	0.20	0.0	1.1
Dummy=1 if at least one loan from intermediary has a guarantee	52,943	0.63	0.48	0.0	1.0
Dummy=1 if at least one loan from intermediary is a microcredit loan	52,943	0.18	0.38	0.0	1.0
Non-Bancoldex loans					
Interest rate	47,355	0.19	0.09	0.0	1.0
Loan term (in logs)	47,709	6.32	1.40	0.0	10.3
Loan size (in logs)	48,398	17.41	2.42	−4.6	25.2
Number of loans from the financial intermediary in the year (in logs)	48,398	0.06	0.20	0.0	1.1
Dummy=1 if at least one loan from intermediary has a guarantee	48,398	0.61	0.49	0.0	1.0
Dummy=1 if at least one loan from intermediary is a microcredit loan	43,398	0.17	0.37	0.0	1.0
Bancoldex loans					
Interest rate	4,501	0.19	0.07	0.0	0.3
Loan term (in logs)	4,535	6.76	0.66	0.0	9.6
Loan size (in logs)	4,545	17.58	2.27	11.3	24.9
Number of loans from the financial intermediary in the year (in logs)	4,545	0.08	0.22	0.0	1.1
Dummy=1 if at least one loan from intermediary has a guarantee	4,545	0.81	0.39	0.0	1.0
Dummy=1 if at least one loan from intermediary is a microcredit loan	4,545	0.28	0.45	0.0	1.0

Focusing on the even-numbered columns in Table 10, we learn that credit relationships that included at least one loan from Bancoldex:

- paid average interest rates of roughly 300 basis points;
- had an average term that was 14.2 percent longer than credit relationships from other sources of credit used by similar firms; and
- were 59.7 percent larger.

That is, we find that loans from Bancoldex represent improved access to credit for their beneficiaries. In particular, they are significantly larger than typical non-Bancoldex loans obtained by firms with similar pre-treatment characteristics, offer longer terms, and are granted at lower interest rates. This is a first central result of our analysis.

Table 10: Panel Regressions 1: Characteristics of Bancoldex vs. Non-Bancoldex Credit Relationships

	Interest rate		Loan term (in logs)		Loan size (in logs)	
	Without common support	With common support	Without common support	With common support	Without common support	With common support
Variable	(1)	(2)	(4)	(5)	(7)	(8)
Dummy=1 if firm received a loan from Bancoldex	−0.0318**	−0.0295**	0.100**	0.142**	0.387**	0.597**
	[0.000732]	[0.00107]	[0.0103]	[0.0167]	[0.0157]	[0.0244]
Dummy =1 if at least one loan from intermediary has a guarantee	−0.0219**	−0.0129**	0.383**	0.418**	0.690**	0.566**
	[0.000239]	[0.000929]	[0.00462]	[0.0204]	[0.00663]	[0.0278]
Dummy =1 if at least one loan from intermediary is a microcredit loan	0.0202**	0.0212**	−0.0833**	−0.0231	−0.411**	−0.554**
	[0.000251]	[0.00197]	[0.00347]	[0.0287]	[0.00545]	[0.0445]
Number of loans from the financial intermediary in the year (in logs)	0.0172**	0.0191**	0.474**	0.195**	1.102**	0.884**
	[0.000502]	[0.00153]	[0.0107]	[0.0278]	[0.0116]	[0.0345]
Constant	0.199**	0.166**	6.269**	5.836**	15.44**	16.94**
	[0.000344]	[0.00149]	[0.00725]	[0.0330]	[0.00905]	[0.0365]
Observations	1,148,209	40,961	1,146,266	41,256	1,157,494	41,844
Number of firms	420,947	6,192	420,153	6,192	421,106	6,192
Adjusted R-squared	0.345	0.287	0.103	0.128	0.119	0.116

*Note: All regressions include firm-level fixed effects, financial intermediary dummies and year dummies. Robust standard errors in brackets. ** denotes significance at 1% level, * denotes significance at 5% level, + denotes significance at 10% level.*

Comparing these results with those in the odd-number columns of Table 10, we observe that the correction for selection plays an important role. The coefficients estimated for within the common support are slightly lower than those obtained without common support in the interest rate regressions and substantially higher in both the loan term and the loan size regressions. Also, coefficients on both the use of guarantees and the presence of microcredit are significant and show the expected signs:

- credit relationships involving a guarantee result in
  - interest rates that are lower by 130 basis points;
  - loan terms that are longer by 41.8 percent; and
  - loan sizes that are larger by 56.6 percent; and
- credit relationships involving microcredit result in
  - interest rates that are higher by 212 basis points;
  - loan terms that are shorter by 2.3 percent; and
  - loan sizes that are smaller by 55.4 percent.

The signs and significance of our coefficients of interest remain unchanged across models and slightly decrease with the inclusion of the additional controls.

Bancoldex Beneficiaries vs. Nonbeneficiaries

Table 11 presents summary statistics for the variables used in the regressions for equation 2, which we use to calculate the impact of having accessed Bancoldex credit on a firm's overall credit structure and assess the effect of receiving a Bancoldex loan on access to credit more generally. Table 12 presents results for equation 2, including three dummies with a value of 1 if the firm used Bancoldex credit in the current year, the previous year, or two years ago.

Table 11: Summary Statistics, Firms

Variable	Number of observations	Mean	Standard deviation	Min	Max
All firms					
Dummy=1 if firm received a loan from Bancoldex	30,345	0.14	0.35	0	1.0
Average interest rate	30,146	0.20	0.08	0	0.9
Average loan term (in logs)	30,067	6.44	1.20	−0.7	9.7
Number of financial intermediaries	30,345	1.74	1.26	1	17.0
Average loan disbursements (in logs)	30,345	17.03	2.24	−4.6	24.3
Total amount of credit (in logs)	30,345	17.41	2.54	−4.6	25.9
Maximum number of loans received in a year from one intermediary (in logs)	30,345	0.09	0.24	0	1.1
Dummy=1 if at least one loan from intermediary is a microcredit loan	30,345	0.27	0.45	0	1.0
Beneficiaries for the first time in 2007					
Average interest rate	16,701	0.20	0.08	0	0.9
Average loan term (in logs)	16,669	6.48	1.04	−0.7	9.7
Number of financial intermediaries	16,814	1.82	1.28	1	13.0
Average loan disbursements (in logs)	16,814	17.11	2.22	−4.6	24.3
Total amount of credit (in logs)	16,814	17.54	2.52	−4.6	25.6
Maximum number of loans received in a year from one intermediary (in logs)	16,814	0.10	0.24	0	1.1
Dummy=1 if at least one loan from intermediary is a microcredit loan	16,814	0.27	0.45	0	1.0
Control					
Average interest rate	13,445	0.20	0.08	0	0.6
Average loan term (in logs)	13,398	6.39	1.36	−0.7	9.7
Number of financial intermediaries	13,531	1.66	1.23	1	17.0
Average loan disbursements (in logs)	13,531	16.92	2.27	−3.7	24.3
Total amount of credit (in logs)	13,531	17.25	2.56	−3.7	25.9
Maximum number of loans received in a year from one intermediary (in logs)	13,531	0.09	0.23	0	1.1
Dummy=1 if at least one loan from intermediary is a microcredit loan	13,531	0.27	0.45	0	1.0

Even-numbered columns in Table 12 show the results of estimations on firms within the common support. Consistent with the results from the previous set of regressions, these estimates show that receiving a loan from Bancoldex produces a credit package with an average interest rate that is 221 basis points lower and an average loan size that is 29.8 percent larger the year a firm became a beneficiary. Larger average loans ultimately translate into larger total amounts of credit to the firm at 40.5 percent more credit in the year in which they were granted a Bancoldex loan. The negative effect on the interest rate is considerably larger (in absolute value) than the 30 basis points downward bias that remain after introducing the common support (see Table 8), so it should not be fully attributed to a selection bias we are unable to solve using PSM. In contrast, however, we find no significant effect on the average term of the loans obtained by the firm in the year of benefit. Coefficients on the variables controlling for guarantee availability and presence of microcredit are, once again, significant and show the expected signs.

In terms of longer-run impact, the effect on the interest rate is not sustained over time, but our results show that the impact of being a beneficiary on the amount of credit a firm obtains persists over time. The average loan is 24.4 percent higher the year after becoming a beneficiary and 18.2 percent higher two years after, while total credit is 29.8 percent and 26.6 percent higher, respectively, in the first and second years after benefiting from Bancoldex credit. This suggests that Bancoldex plays a role in terms of reducing credit constraints on beneficiary firms. It is most interesting that the positive effect on the term of loans granted to a firm appears to consolidate over time. In particular, two years after receiving a loan from Bancoldex, the average beneficiary firm is able to secure credit with an average term that is 6.2 percent longer than its counterparts that have not received Bancoldex loans two years before. The magnitudes and statistical significance of the coefficients present important differences with respect to the estimations performed for the overall sample (odd-numbered columns). This suggests that the correction for selection biases plays an important role. As an additional test of whether we are correcting those biases, we perform a placebo test, where we include a lead beneficiary variable (1 if the firm received Bancoldex credit in the upcoming year) in our estimations. This regressor comes out insignificant in all of our regressions, supporting our method for selection correction.[22]

[22] Results are available on request.

Table 12: Panel Regressions 2: Firm-Level Credit Characteristics as a Function of Having Received a Loan from Bancoldex

Variable	Average interest rate		Average loan term (in logs)		Average loan size (in logs)		Total amount of credit (in logs)	
	Without common support	With common support	Without common support	With common support	Without common support	With common support	Without common support	With common support
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy =1 if firm received a loan from Bancoldex t	−0.0159** [0.00103]	−0.0221** [0.00172]	0.0203 [0.0137]	0.0363 [0.0296]	0.0960** [0.0187]	0.298** [0.0326]	0.184** [0.0193]	0.405** [0.0341]
Dummy =1 if firm received a loan from Bancoldex in t−1	0.0136** [0.000979]	−0.00107 [0.00171]	0.00923 [0.0167]	0.0181 [0.0349]	0.0825** [0.0223]	0.244** [0.0424]	0.124** [0.0231]	0.298** [0.0441]
Dummy =1 if firm received a loan from Bancoldex in t−2	−0.0103** [0.00176]	0.000794 [0.00247]	−0.0591** [0.0222]	0.0621+ [0.0373]	−0.0458 [0.0302]	0.182** [0.0461]	0.00133 [0.0317]	0.266** [0.0491]
Percentage of loans covered by a guarantee	−0.0176** [0.000180]	−0.00548** [0.000545]	0.294** [0.00315]	0.239** [0.0120]	0.541** [0.00439]	0.264** [0.0134]	0.776** [0.00445]	0.569** [0.0146]
Dummy=1 if at least one loan from intermediary is a microcredit loan	0.0121** [0.000277]	0.0185** [0.00214]	−0.108** [0.00352]	−0.0683* [0.0301]	−0.335** [0.00650]	−0.480** [0.0419]	−0.294** [0.00647]	−0.383** [0.0422]
Maximum number of loans received in a year from one intermediary (in logs)	0.00604** [0.000527]	0.00737** [0.00156]	0.606** [0.0129]	0.350** [0.0349]	1.161** [0.0120]	0.738** [0.0310]	1.317** [0.0121]	0.971** [0.0331]
Constant	0.192** [0.000257]	0.201** [0.00120]	6.324** [0.00418]	6.275** [0.0240]	15.12** [0.00722]	16.78** [0.0282]	15.00** [0.00722]	16.78** [0.0297]
Observations	969,496	23,426	966,802	23,324	974,119	23,565	974,119	23,565
Number of firms	405,673	6,192	404,877	6,192	405,831	6,192	405,831	6,192
Adjusted R-squared	0.268	0.289	0.047	0.055	0.082	0.102	0.127	0.202

Note: All regressions include firm-level fixed effects, financial intermediary dummies and year dummies. Robust standard errors in brackets. ** denotes significance at 1% level, * denotes significance at 5% level, + denotes significance at 10% level.

If the overall credit package obtained by the firm in the current year includes a Bancoldex loan, then that package will at least partially reflect the differential characteristics of the Bancoldex loan (see Table 10). To explore the magnitude of effects beyond this possibility, we run an alternative set of regressions focusing solely on non-Bancoldex loans (Table 13) by reconstructing our firm–level information using all loans but those funded by Bancoldex. Besides re-estimating the effects on interest rates, loan sizes, and loan terms, we also look at whether having a loan from Bancoldex affects the number of intermediaries with which the firm had non-Bancoldex loans. Our findings indicate that Bancoldex loans have a positive effect on the availability of other sources credit, both in the extensive and the intensive margins, meaning the number of relationships the firm enters into (Column 2) and the size of the average loan (Column 8) increases. As a result, the total amount of credit the firm receives from non-Bancoldex relationships also increases significantly (Column 10). No significant effect has been identified for interest rates charged by intermediaries with whom the firm had non-Bancoldex loans or on the term of loans from these intermediaries.

Table 13: Panel Regressions 3: Characteristics of Non-Bancoldex Credit as a Function of Having Received a Loan from Bancoldex in the Previous Year

	Number of financial intermediaries (non-Bancoldex loans)		Average interest rate (Non-Bancoldex loans)		Average loan term (non-Bancoldex loans) (in logs)		Average loan size (non-Bancoldex loans) (in logs)		Total amount of credit (non-Bancoldex loans) (in logs)	
	Without common support	With common support	Without common support	With common support	Without common support	With common support	Without common support	With common support	Without common support	With common support
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dummy =1 if firm used Bancoldex loan in *t−1*	0.0727**	0.187**	0.00499**	−0.00145	−0.0298	−0.000241	0.0210	0.166**	0.0600*	0.260**
	[0.0154]	[0.0262]	[0.000932]	[0.00154]	[0.0197]	[0.0348]	[0.0253]	[0.0414]	[0.0271]	[0.0442]
Percentage of firm loans covered by a guarantee	0.613**	0.711**	−0.00926**	−0.00476**	0.306**	0.219**	0.419**	0.232**	0.715**	0.513**
	[0.00393]	[0.0133]	[0.000228]	[0.000563]	[0.00507]	[0.0128]	[0.00666]	[0.0154]	[0.00695]	[0.0168]
Dummy=1 if at least one loan from intermediary is a microcredit loan	0.0978**	0.127**	0.0128**	0.0132**	−0.0692**	−0.0169	−0.218**	−0.348**	−0.147**	−0.244**
	[0.00378]	[0.0321]	[0.000569]	[0.00335]	[0.00817]	[0.0545]	[0.0156]	[0.0648]	[0.0156]	[0.0666]
Maximum number of loans received in a year from one intermediary (in logs)	0.330**	0.419**	0.00671**	0.00473**	0.505**	0.269**	1.007**	0.665**	1.158**	0.855**
	[0.00921]	[0.0327]	[0.000627]	[0.00168]	[0.0157]	[0.0389]	[0.0153]	[0.0396]	[0.0157]	[0.0429]
Constant	0.772**	0.952**	0.196**	0.191**	6.106**	6.163**	15.27**	17.11**	15.17**	17.17**
	[0.00549]	[0.0217]	[0.000618]	[0.00122]	[0.00958]	[0.0284]	[0.0168]	[0.0332]	[0.0169]	[0.0352]
Observations	423,612	15,485	421,751	15,357	419,384	15,258	423,612	15,485	423,612	15,485
Number of firms	258,335	5,179	257,822	5,173	257,012	5,172	258,335	5,179	258,335	5,179
Adjusted R-squared	0.340	0.410	0.249	0.321	0.049	0.041	0.063	0.051	0.120	0.133

Note: All regressions include firm-level fixed effects, financial intermediary dummies and year dummies. Robust standard errors in brackets. ** denotes significance at 1% level, * denotes significance at 5% level, + denotes significance at 10% level.

In summary, we find evidence that Bancoldex contributes to relaxing credit constraints faced by a firm in several ways. First, the mere access to a Bancoldex loan implies better credit conditions: Bancoldex loans are, on average, larger, cheaper, and longer than other loans received by similar firms. Being granted a loan from Bancoldex thus implies an advantage in itself. Moreover, these benefits translate into an overall credit package that displays

characteristics that are more favorable for the recipient. In particular, the average (not necessarily Bancoldex) loan received by Bancoldex beneficiaries is larger and cheaper than those received by nonbeneficiaries. Most interestingly, at least in terms of the effect on the amount of credit received by a firm, the identified impact of using Bancoldex loans is not simply mechanical. First, the average loan increases in size beyond the year in which the firm receives a Bancoldex loan. Second, not only the size of an average loan, but also the number of relationships the firm engages in, goes up for intermediaries with which the firm has non-Bancoldex relationships. We also find a lagged positive effect on the term of loans received by a firm, which takes two years after benefit to materialize.

It should be noted that all of the aforementioned results apply only for firms that, by 2007 (the treatment year we focused on), have had an established credit relationship with the financial sector. This is so by construction: all of the preceding exercises have been estimated over the common support of firms with similar pre-treatment (that is pre-2007) credit histories, which allows us to address concerns about selection biases. We can only determine the characteristics of pre-treatment credit history if such a history exists. However, for two reasons, the effect of Bancoldex may be particularly important for firms that have had no previous credit history. First, it may be the case that they are more likely to get credit from Bancoldex than from other sources. Second, the "demonstration effect" of Bancoldex suggests by some of our previous results may be particularly relevant for a firm without verifiable previous credit history. We address this possibility in the following section.

Firms Receiving Their First Loans

As just mentioned, the methodological approach in the previous section precludes us from studying the possibility that Bancoldex credit becomes the door a firm uses to establish its first credit relationship with the financial sector. There are interesting questions relating to this possibility. Is Bancoldex providing credit to firms that have no previous credit history? If it is, do the chances that the firm receives credit funded from other sources improve after receiving a loan from Bancoldex? Do those new sources of funding charge different interest rates to firms that entered the system through Bancoldex? We shed some light on these questions, though with caveats imposed by the data we have available.

We approach these questions by re-estimating equations 1 and 2 for the set of firms that "entered the credit market" in 2007 (Tables 14 and 15, respectively). The estimation period is 2007 through 2009. We include in this set all firms without credit records in the Superfinanciera database for years preceding 2007. Since the dataset covers all loans from the financial system, firms without prior records are, in principle, those that do not have previous credit relationships in the system. Our regressions were simple fixed effects regressions. By focusing on firms that received their first loan in 2007, we are already making sure that we compare across firms with similar credit histories; that is, they did not have previous access to credit. Selection biases related to previous credit history should thus not be a major concern in these regressions. Still, some biases could be related to unobservable pre-treatment characteristics, which we have to assume would be constant over time.

Table 14: Panel Regressions 4: Characteristics of Bancoldex vs. Non-Bancoldex Credit Relationships of Firms that Received Credit for the First Time in 2007

	Average interest rate		Average term		Average loan size	
	(1)	(2)	(3)	(4)	(5)	(6)
Dummy=1 if firm received a loan from Bancoldex	−0.0355**	−0.0318**	0.0395*	−0.0121	0.170**	0.0683*
	[0.00139]	[0.00139]	[0.0185]	[0.0184]	[0.0281]	[0.0274]
Dummy=1 if at least one loan from intermediary has a guarantee		−0.0270**		0.379**		0.743**
		[0.000510]		[0.0115]		[0.0133]
Dummy=1 if at least one loan from intermediary is a microcredit loan		0.0279**		−0.0651**		−0.371**
		[0.000558]		[0.00849]		[0.0112]
Constant	0.282**	0.277**	6.547**	6.435**	15.40**	15.32**
	[0.000827]	[0.000883]	[0.0180]	[0.0199]	[0.0191]	[0.0202]
Observations	199,218	199,218	198,527	198,527	200,233	200,233
Number of firms	81,667	81,667	81,410	81,410	81,690	81,690
Adjusted R-squared	0.309	0.351	0.073	0.094	0.095	0.143

Note: All regressions include firm-level fixed effects, financial intermediary dummies and year dummies. Robust standard errors in brackets. ** denotes significance at 1% level, * denotes significance at 5% level, + denotes significance at 10% level.

Table 15: Panel Regressions 5: Firm-Level Credit Characteristics of Firms that Received Credit for the First Time in 2007

Variables	Average interest rate		Average term		Average loan size		Total amount of credit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy=1 if firm received a loan from Bancoldex	−0.0340**	−0.0292**	0.0483*	−0.0137	0.115**	−0.00131	0.160**	0.000540
	[0.00153]	[0.00153]	[0.0204]	[0.0202]	[0.0284]	[0.0274]	[0.0309]	[0.0287]
% loans covered by a guarantee		−0.0255**		0.305**		0.595**		0.791**
		[0.000419]		[0.00720]		[0.00919]		[0.00934]
Dummy=1 if at least one loan from intermediary is a microcredit loan		0.0225**		−0.104**		−0.397**		−0.352**
		[0.000641]		[0.00849]		[0.0114]		[0.0115]
Constant	0.279**	0.282**	6.616**	6.451**	15.27**	15.10**	15.35**	14.99**
	[0.000165]	[0.000620]	[0.00282]	[0.00956]	[0.00365]	[0.0120]	[0.00383]	[0.0122]
Observations	182,086	182,086	181,435	181,435	182,783	182,783	182,783	182,783
Number of firms	81,667	81,667	81,410	81,410	81,690	81,690	81,690	81,690
Adjusted R-squared	0.090	0.147	0.005	0.037	0.010	0.082	0.013	0.122

Note: All regressions include firm-level fixed effects, financial intermediary dummies and year dummies. Robust standard errors in brackets. ** denotes significance at 1% level, * denotes significance at 5% level, + denotes significance at 10% level.

Our treatment dummy for these estimations has a value of one if the firm's first credit relationship, occurring in 2007, included at least one Bancoldex loan and zero otherwise. Our approach aims to identify whether firms that entered the system through Bancoldex show relationships with different credit conditions. Our results indicate that first relationships in which Bancoldex is involved exhibit lower interest rates, longer terms, and larger average sizes (Table 14, focusing first on the left column for each dependent variable). That is, for firms entering the system, Bancoldex loans also have clear advantages compared to loans from other sources. These characteristics translated into better overall credit conditions (Table 15).

Interestingly, however, the effects on the average term and size of loans disappear once we introduce controls differentiating loans with and without guarantees, and microcredit loans from other commercial loans (last column for each dependent variable). That is, though Bancoldex grants larger and longer-term loans to firms just entering the credit market, it is apparently because these loans are more likely to be backed by a guarantee and less likely to be microcredit. These latter findings may be interpreted as evidence against the idea that firms without a credit history find it easier to access Bancoldex credit than other sources. In fact this finding could be interpreted as suggesting that Bancoldex makes a stronger point of requiring a guarantee and is less likely to grant micro loans. However, an alternative explanation seems more reasonable. With regard to guarantees, Bancoldex credit lines make a point of promoting the use of guarantees from the Fondo Nacional de Garantías (FNG), a public agency that provides partial credit guarantees. In principle, the FNG backs loans from all sources, but the use of those services may be favored by Bancoldex' policy of explicitly advertising this possibility. As for microcredit, the fact that in the later years a large share of (Bancoldex and non-Bancoldex) resources for microcredit were channeled through nonfinancial intermediaries makes it less likely that the first Bancoldex loan obtained from a supervised financial institution would be in the microcredit category.

Conclusions

This paper examines the impact of Colombia's publicly owned development bank, Bancoldex, on credit to businesses. The paper differs from (the few) previous analyses of the impact of publicly owned banks in several aspects. First and foremost, because of data restrictions, previous studies concentrate on the impact of public credit on different measures of performance, rather than focusing explicitly on the impact on credit characteristics. Second, previous evaluations do not specifically analyze the impact of public funding provided under a second-tier public credit mechanism. Because Bancoldex is a second-tier bank, our study is the first to provide evidence of the effectiveness of this model.

For the purpose of our study, we have built a unique database of all loans issued by the financial system to businesses and flagged loans that have used Bancoldex funds. Using this database, we examine the differential characteristics of Bancoldex loans compared to those

funded from other sources. We also study the impact of receiving credit from Bancoldex on a firm's subsequent credit history. To address concerns about selection biases, we focus on within-firm variation and combined fixed effects models with PSM.

We find that lower interest rates, larger loans, and loans with longer terms characterize relationships involving Bancoldex credit. These characteristics translate into lower average interest rates and larger average loans for firms that use Bancoldex credit compared to those that do not. Such effects exhibit some persistence over time. As for terms, average loans of firms using Bancoldex resources also tend to exhibit longer terms, even though this effect can take two years to materialize.The number of intermediaries with whom the firm has credit relationships also expand after having had access to Bancoldex credit.

Our findings show that beneficiaries enjoy better credit conditions after receiving Bancoldex credit, as compared with firms that have accessed credit from other sources. That is, Bancoldex offers some "additionality", rather than simply substituting credit that private sources would be willing and able to offer under similar conditions. This suggests a potential role for Bancoldex in facilitating access to credit. Given that imperfect access to credit, widely understood as imperfect substitutability between internal and external sources of financing, constitutes a market failure that potentially impedes growth, these results are consistent with Bancoldex helping foster development. In a companion paper (Eslava, Maffioli, and Meléndez, 2012), we also find a positive impact of receiving a loan from Bancoldex resources on firm performance, in the form of increased output, employment, investment, and productivity.

Our finding that Bancoldex helps relax credit constraints is in contrast to anecdotes about businessmen complaining that any advantages Bancoldex funding may offer are fully appropriated by the financial intermediaries. Our results suggest that lower costs and longer terms offered by Bancoldex are at least partially transferred to the final recipients of the loans. However, what remains an open question is why Bancoldex funding offers those better conditions to begin with. Financial intermediaries presumably have access to low-cost sources of funds, such as current accounts. What restricts them from lending the funds they have at the lower interest rates and longer terms they are willing to offer when using Bancoldex funds is not clear. This is particularly interesting since there is no stated attempt by Bancoldex to subsidize

interest rates. One possible answer is that better conditions on Bancoldex loans come from the fact that Bancoldex has lines specifically targeted at longer-term uses—such as investment in fixed assets and modernization—and that its most rapidly growing credit line has an inverted curve (lower interest rates for longer terms). Another, not necessarily competing, explanation is that financial intermediaries face a shortage of low-cost deposits. Any of these explanations is consistent with Bancoldex effectively playing its role as a development bank—one that helps businesses overcome the limitations imposed by restricted access to credit.

Our findings also shed light on how Bancoldex beneficiaries differ from recipients of other types of credit. On one hand, firms receiving Bancoldex credit have been paying higher interest rates, facing shorter terms, and using guarantees more often than others, an indication that they have been subject to more restrictive credit and/or that they are perceived as more risky. On the other hand, Bancoldex beneficiaries have been using credit more intensively than other firms, showing that they are not completely rationed out of credit markets to begin with. There are two sides to this last finding. First, financial intermediaries seem to be adequately performing their role of assigning credit only to firms that can reasonably be expected to pay back the loan. This is one of the main expected advantages of the second-tier design—private intermediaries take on the risk of default, and therefore have the incentives to screen profitable from unprofitable projects. Public funds are therefore less subject to an inadequate targeting that ends up fostering unprofitable activities. On the other hand, it is also true that these funds may be most effective in generating a positive impact on performance when directed at firms that face the most stringent difficulties to access credit.

There is a trade-off between targeting firms that face the most limitations in accessing credit and those from which it is most reasonable to expect good future performance. A public policy decision has to be made as to where between these extremes targeting by Bancoldex should stand. Targeting the most promising has presumably been the strategy adopted by the financial intermediaries that channel Bancoldex funds, and this evaluation has shown there are undeniable benefits of that strategy. But perhaps even more could be gained from at least some level of targeting of firms that face stringent limitations in access to credit, when there is some level of confidence that these limitations do not reflect poor prospects but rather stronger informational problems that lead private institutions to abstain from lending to them. One

example is the case of young firms that lack a credit history but are entering an apparently promising line of business with apparent good planning. Lines targeted specifically at young firms could be an example of targeting that focuses funds where they are most badly needed, while still taking advantage of the benefits of the second-tier model. If financial intermediaries indeed face a shortage of funds to be lent, then it is possible that by making funds available to them for these specific uses, there would be incentives for those intermediaries to generate mechanisms to evaluate the risk of firms that, by their very nature, lack a credit history on which to base that evaluation. In absence of such targeted funds, however, developing those mechanisms could seem unreasonable to a financial institution that would rather dedicate its own funds to other uses.

The questions raised above point to complementary avenues for future research, which would shed further light on how best to channel Bancoldex funds to maximize their impact on economic activity. Many of these additional research questions require different types of data and are thus beyond the scope of this study. For instance, it seems crucial to understand what motivates financial intermediaries to use Bancoldex funds as opposed to their own sources of funding. For instance, if it is indeed decided that Bancoldex will attempt to target specific types of firms that are likely severely constrained in their access to external funds, such targeting would only be effective if financial intermediaries find it attractive to use those targeted credit lines. With this as a given, it is clear that an optimal design needs to understand the incentives that move financial institutions to use Bancoldex funds. In a similar manner, it is important to find out whether beneficiaries play an important role in the decision to use credit that originates in Bancoldex as opposed to other lines of credit used by the financial institutions those firms work with. The aforementioned questions can be potentially addressed through a characterization of the competing sources of funds used by the intermediating institutions and with surveys directed at both financial institutions and beneficiaries. These surveys should enquire about perceptions of the role Bancoldex plays, and the reasons to use or not use Bancoldex credit lines.

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