

Untargeted public lending: adding to private credit or substituting it? Evidence from Colombia

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Abstract

Does public credit to firms have to be targeted and subsidized to play its “additive” role? We analyze how an untargeted-unsubsidized government lending program in Colombia affects firm performance, and the financial mechanisms at play. We use uniquely comprehensive data on all non-micro manufacturing firms and all formal credit operations in the country. Beneficiaries end up interacting with more banks, receiving longer-term credit, and receiving more credit from other sources, with a lag; they also increase output, investment and use of inputs. We conclude that, despite not targeting the likely credit-constrained, the program is not simply substituting available private credit.

Keywords: Public development banks, government lending, credit constraints, firm growth.

JEL Codes: G28, L25, O54

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1. Introduction

The concern that public credit to businesses may inefficiently substitute private credit, rather than add to it, has led to the common practice of targeting public lending to firms likely excluded from the market—e.g. micro- and small- firms, certain sectors—and to subsidize these targeted loans, so they are different from those provided by the financial sector. But this practice is in itself source of concern: it may stimulate unproductive businesses activity, and also be prone to political manipulation. How to shield government lending programs against these perils, while making sure that they do add by helping alleviate credit rationing? May it be the case that targeting and subsidizing government loans are not really necessary to reach that “additionality” goal?

In this paper, we undertake an empirical exploration related to the latter question. We use uniquely comprehensive data on all non-micro manufacturing firms and all formal credit operations in Colombia to investigate whether a wide, unsubsidized, untargeted government lending program has had effects on its beneficiaries that suggest it has eased credit constraints, complementing the role of the private financial sector. In particular, we analyze lending by Bancóldex, Colombia’s main development bank, and its relationship to the credit conditions faced by beneficiary firms, and, ultimately, to the economic performance of those beneficiaries.

Over our period of study, Bancóldex only conducted second-tier lending operations, and most of its loans were not explicitly subsidized, nor targeted at specific types of firms. The second-tier model is one where the public bank lends to other financial intermediaries for them to provide credit to, in this case, businesses. In the Bancóldex model, credit was allocated by private intermediary banks, which had all incentives to allocate it to the most promising projects and firms.¹ Arguably, this model implies that Bancóldex credit in our data is not politicized, and that it is as efficiently allocated as private credit, at least partially addressing the concern that public credit may be enabling inefficient entrepreneurial initiatives. Given Bancóldex’ lending model, moreover, the group of beneficiaries also encompasses businesses of different sizes and in different activities. We use this fact to study whether the effects of Bancóldex on its beneficiaries are restricted to small firms, which would have been ex - ante labeled as credit constrained.

¹ The lending model used by Bancóldex is explained in greater detail in Section 2.

We analyze two different dimensions of the effect on Bancóldex' loan beneficiaries: firm performance, and credit conditions. In particular, we use data on all non-micro manufacturing establishments in the country to study how firms' output, investment, and demand for inputs change after receiving Bancóldex credit, relative to non-recipients. To understand the channels by which public credit may be affecting firm's performance, we then use data on all commercial- and micro- credit operations of the supervised financial system to analyze how conditions such as interest rates on loans, loan maturities, and number of banks that lend to a firm, change after a firm has received Bancóldex credit, relative to non-beneficiaries. In the absence of a natural experiment to cleanly identify the impact of Bancóldex, we take advantage of uniquely rich coverage of our data and its panel structure, and of econometric techniques, to deal with the potential selection biases that arise in this context. Our period of analysis is 2004-2009. A simple model of lending to firms is used to interpret the implications of our findings about the role that Bancóldex is playing vis-a-vis private credit.

One strand of the empirical literature on the usefulness of public development banking focuses on cross-country or cross-industry studies.² Another wide strand provides micro econometric analyses of lending programs, concentrating on microenterprises and microcredit, targeted by definition and frequently subsidized.³ These studies are based on Randomized Control Trials, leaving open the question of how efficient the allocation of public credit is or can be. Other micro-econometric studies concentrate precisely on whether the allocation of public lending is efficient, in particular looking at how politicized it is. These studies of the political economy of public lending cover a wide range of firms, but largely ignore the effects of public credit on firm growth.⁴

² This evidence indicates that growth is slower in countries with low financial depth and in sectors with high dependence on external financing, but also in countries where public banks play a more prominent role. See, e.g., Galindo and Micco (2004); La Porta, Lopez de Silanes, and Shleifer (2002); Barth, Caprio and Levine (1999); Beck and Levine (2002).

³ Attanasio et al. 2011; Augsburg et al. 2012; Banerjee et al. 2013; Crepon et al. 2011; Karlan and Zinman 2010; Karlan and Zinman 2011; McKenzie and Woodruff, 2008; De Mel, McKenzie and Woodruff, 2008; Tarozzi, Desai, and Johnson 2013.

⁴ See Carvalho (2014); Dinç (2005); Cole (2009); Micco et al. (2007); and Sapienza, 2004. Their findings suggest that the disappointing results of public lending found in cross-country studies may be related to politicized credit allocation.

For relatively large firms, Banerjee and Duflo (2014) examine the effect of subsidized credit by one public bank in India on the growth of beneficiaries. They compare the growth of beneficiaries of subsidized public credit to the growth of beneficiaries of unsubsidized public credit by the same bank, and estimate the effect by taking advantage of a natural experiment that changed conditions for access to the subsidized loans. They find evidence consistent with lack of credit being an important obstacle for the growth of these businesses. Given heavy subsidization of public credit in their setting, and direct beneficiary selection by public bank officials, a question is left open about the possibility that institutional settings less prone to politicization and to inefficient credit allocation can generate similarly positive effects. Moreover, by contrast to India public banks in the Colombian context represent a small chunk of lending to manufacturing firms, which makes the question of how public lending complements private lending relevant.⁵

Beyond the innovative analysis of a program whose potential effect is particularly interesting given the absence of targeting and subsidies, our study complements previous literature in other dimensions. To the extent of our knowledge, this is the first direct econometric assessment of how public lending affects not only firm performance but also the conditions of credit faced by beneficiary firms, which helps understand the channels by which public credit affects firm growth.⁶ Second—as in Banerjee and Duflo (2014)—our findings are not limited to microenterprises, which typically represent a small chunk of aggregate business activity and for which there is little room for controversy about the importance of credit constraints. Our study, in fact, covers a wide population of firms and a very large fraction of non-agricultural recipients of public credit to firms. In that sense, our findings are more widely applicable to other contexts than experimental analyses of the public provision of microcredit. The wider focus, as is frequently the case with non-experimental studies, comes at the cost of a less stark identification of effects than the one obtained in experimental settings.

After correcting for selection biases using econometric techniques, we find that Bancóldex' beneficiaries end up with improved overall credit conditions after receiving Bancóldex credit: the amount of credit received goes up by around 50%, the duration of the loans

⁵ The lending model used by Bancóldex is explained in greater detail in Section 2.

⁶ Chodorow-Reich (2014) studies the effects of credit constraints on loan interest rates for U.S. firms, though his focus is not public lending.

increases by 20% from an average of around 18 months, and one out of two beneficiaries is able to establish a credit relationships with one additional financial intermediary. The interest rates go down, an effect that we relate with the fact that beneficiaries are able to access longer-term credit. Our findings also indicate that receiving Bancóldex loans is ultimately associated with an increase in firms' employment, purchases of inputs, investment, and output. Small firms do seem to benefit over a wider set of performance dimensions than large firms (over 200 employees), but even the latter experience increases in their use of variable inputs. While both short-term and long-term Bancóldex loans are found to be associated with increases in output, input demand and employment, only long-term loans are related to increases in investment. Moreover, short-term loans have a larger impact on input demand than long-term loans.

Our results are consistent with Colombian non-micro firms facing significant obstacles in their access to credit, particularly important for projects that require long-term lending, and even for large firms. But they also shed light on the sensitive issue of how to design public lending programs so that they are at once as shielded as possible from political pressure and the risk of incentivizing inefficient activity, and not used to fill demands already satisfied by the private financial system. The Bancóldex second-tier model seems ideal in terms of allocating the funds to their most efficient use, but generates lots of concerns about the possibility that it ends up going to the firms that already had access to credit. Our findings suggest that the latter is not the case, despite the fact that Colombia has a relatively well established financial sector.

The paper is organized as follows: Section 2 describes the institutional environment and the data; Section 3 presents a conceptual framework and reviews previous studies. Section 4 discusses our empirical approach. Section 5 presents the results of our study, and Section 6 concludes.

2. Institutional Background and Data

a. Institutional Background

Bancóldex started operating in its current form after 2003.⁷ Over our period of study (2004-2009), its credit operations focused on second-tier lending. The second-tier model implies that funds are lent to intermediary financial institutions, which lend those funds, at higher rates, to

⁷ Its current-day operations were previously divided between credit for exporting, in charge of Bancóldex itself, and more general development credit, in charge of IFI (which disappeared in 2003).

final beneficiaries. Since the intermediary institution takes on the risk of default, Bancóldex funds are subject to only moderate risk. In fact, as of December 2013 Bancóldex' bad credit was at 0.001% of its total credit (Bancóldex, 2014). 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).

With few exceptions, Bancóldex credit is not subsidized, not targeted to specific types of producers, and not subject to other benefits. Bancóldex has a mandate to provide credit for banks to serve firms in all sectors and of all sizes, and to engage only in profitable credit operations. The only targeted credit lines are those called special lines, which amount to less than 5% of credit value over our period of analysis.⁸

In terms of its funding, Bancóldex obtains funds from Term Deposit Certificates (50% of liabilities); bonds (20%), credit from multilaterals (about 25%), and credit from other sources. (Participations as of December of 2013, according to Bancóldex, 2014). Therefore, Bancóldex does not have a clear advantage compared to private banks in terms of the cost of its funding. In fact, its short-term funding is more costly than that of standard banks, given that it cannot rely on checking or savings accounts. Its long-term funding seems to be similar in cost to other sources used by private banks (Vargas, 2014).

Bancóldex keeps lines of credit open to financial intermediaries. All banks in the system can apply to these loans, and in fact at any given point in time it is the case that most banks in the system have lent Bancóldex resources. Bancóldex provides the resources to the bank as long as those resources are available, and the bank has a designated beneficiary for the loan. The terms under which these funds are lent does not depend on the identity or characteristics of either the financial intermediary or the final beneficiary, but rather on general guidelines established by Bancóldex to satisfy its mandate of providing only credit that is profitable. Bancóldex keeps continuous efforts to increase the amount of resources available for their lending operations; the amount of resources available to banks depends on how successful these efforts are. As discussed

⁸ Special lines are usually funded by specific local governments, restricted to the respective region, and frequently targeted to specific types of firms within the region. They are also generally restricted to a specific period of time.

in section 2.3., over our period of observation Bancóldex funds have amounted to about 5% of all funds channeled to businesses through loans from the financial sector.

A bank that receives a loan application from a firm decides whether to grant the loan or not, and whether to fund the loan using own resources or lending them from Bancóldex. Evidence from a survey applied to heads of lending at banks (Vargas, 2014) suggests that this choice does not depend on the characteristics of the borrower, but rather on factors related to the liquidity available to the bank at the time of the loan, and the term of the loan—with Bancóldex resources particularly attractive for long-term loans, given the long horizons available to lend from Bancóldex---. Banks also lend from Bancóldex just to keep a relationship with the public bank, which may prove useful should they find themselves facing tight liquidity. Given this context, Bancóldex main role seems to be to provide liquidity banks may be short on at specific points in time, and to provide long term funding that banks find harder to obtain on their own.

Bancóldex' potential impact on firms is particularly intriguing given the absence of strategies to target most of Bancóldex funding to specific firms, or to provide special benefits to recipients. Is it necessary for a development bank to provide subsidized or targeted credit in order to add to the services already provided by private banks? This is partly what the current study aims at responding.⁹

2.2. Data

One fundamental feature of this study is the use of detailed data on each credit recipient, as well as for counterpart non-recipients, to evaluate the effects of government-funded credit. These data include measures of firms output and inputs, as well as the conditions under which the firm receives credit. With very few exceptions, on the side of firm performance previous studies on the effects of public lending have lacked access to this level of detail and have therefore used highly aggregated data to infer the effect of government-owned banks. Moreover, we go beyond

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the effect of public loans on firm performance to also characterize the effect on the conditions of credit that the firm faces. This angle is novel.

Our performance analysis focuses on how obtaining credit from Bancóldex relates to a firm's output, use of labor, purchases of materials, and investment. To this end, we use information from the Annual Manufacturing Survey (AMS). The AMS database, developed and owned by the National Statistical Agency DANE (*Departamento Administrativo Nacional de Estadística*), provides annual information on all manufacturing establishments with 10 or more employees, and allows tracking each establishment over time.¹⁰ The unit of observation in our performance analysis is thus the establishment rather than the firm, though one should note 97% of firms in the Survey own a single establishment.¹¹

The AMS provides information on production; use of labor; purchases of inputs and purchases of fixed assets; and interest payments. We use purchases of fixed productive assets, in particular machinery and buildings, as our definition of investment. All values are expressed in pesos of 2009 using the CPI as a common deflator. Location and sector of activity, at a three-digit level of the ISIC classification (rev.3) are also provided. Bancóldex beneficiaries are flagged in the version of the data that we use, together with the amount of Bancóldex credit, and the agreed maturity of the loan.¹² All establishments belonging to a firm that received Bancóldex credit are marked as beneficiaries.

The kind of rich information the AMS provides for the manufacturing sector is not available for other sectors of the economy. Our analysis of performance thus has the limitation of covering manufacturing only. Still, a large chunk (about 25 percent) of the Bancóldex beneficiaries with 10 or more employees is covered by the survey.¹³ While businesses with fewer than 10 employees represent the most numerous group of Bancóldex beneficiaries, they receive

¹⁰ Establishments with fewer employees are included in the survey if they either belong to firms that have assets above 500 minimum monthly wages or have other establishments with 10 or more employees.

¹¹ In any case, all of our estimations control for a dummy equal to one for establishments belonging to multi-establishment firms. We have also conducted a similar analysis restricting our sample to single-establishment firms, with similar qualitative results.

¹² We thank Bancóldex and DANE for agreeing on terms that allowed flagging Bancóldex beneficiaries in EAM data.

¹³ The distribution of Bancóldex loans in 2000-2007 received by firms of 10 or more employees is as follows: wholesale and retail trade, 32 percent; manufacturing, 25 percent; nonfinancial services, 23 percent; transport, storage and communications, 14 percent; and other sectors, 6 percent.

less than 20 percent of Bancóldex' credit disbursements during the observed period (see below). Even with the limitation of focusing on just one major activity, the AMS is also a particularly valuable source given its census-type coverage of establishments over nine employees: firm-level surveys in other countries frequently cover only random samples of small and medium-size businesses.

With regards to access to credit from the financial sector, we use information on all credit operations intermediated by formal financial intermediaries from the beginning of 2004 through 2009. These data are housed at the Colombian Financial Superintendence, the agency that oversees the activities of all formal financial intermediaries, including all banks. All institutions supervised by the Superintendence are required to provide information on all financial transactions. The database we use contains annual information, as of the last quarter of each year, on each outstanding credit operation, reporting outstanding balance, date of disbursement, interest rate and maturity initially agreed upon, and use of collateral. We have information on all microcredit and commercial credit operations, to firms in all sectors of the economy.¹⁴ The version of the data we use has been aggregated at the firm level, for which we observe total credit; number of loans; number of individual financial institutions that provided these loans; average interest rate; and average loan duration. Bancóldex beneficiaries are marked in the version of the data we use, in each year in which they received Bancóldex credit.

Ideally, we would have merged the two datasets, the AMS and the Superfinanciera, but confidentiality restrictions prevent us from doing this. Therefore, the two analyses proceed separately. We would have also ideally dropped microenterprises from the dataset used to conduct our analysis relating credit conditions, to make it more consistent with the performance analysis, but the Financial Superintendence data has no record of the size of credit recipients.

2.3. Bancóldex in numbers

Table 1 shows the evolution of Bancóldex financing activity by the size of the beneficiary. The source is Bancóldex' own records, which contain a categorical variable

¹⁴ That is, personal loans, including consumption and mortgages, are excluded.

classifying loan recipients by their size.¹⁵ The lower panel of the Table reproduces the upper one restricting the sample to loans intermediated by formal financial institutions, again as reported by Bancóldex.

Though most loans are directed to micro beneficiaries, as mentioned above they represent less than 20% of total value over the period. Most Bancóldex credit is intermediated by the formal financial sector, particularly for non-micro firms (the only ones included in our performance estimations). Bancóldex lending activity has been growing over time. In 2009 there was a discrete jump in the number of loans to micro enterprises intermediated by the supervised financial sector. Because of the very small size of these loans, the extreme increase in numbers was not reflected in a proportionally large increase in the fraction of value represented by lending to micro firms. To avoid biases related to this change in the composition of loans, our baseline estimations regarding credit conditions (based on data for the supervised financial sector) exclude 2009, though we also check the robustness of findings to keeping 2009 in the sample. A similar adjustment is not necessary in our performance estimations, as micro establishments are not covered in that part of the analysis.

To assess the relative importance of Bancóldex in the provision of credit in the country, we compare Bancóldex to non-Bancóldex credit using the data from the Financial Superintendence. Table 2 summarizes several features of bank-firm relationships with at least partial Bancóldex funding, compared to features of non-Bancóldex relationships.¹⁶ Over the period of our analysis, lending funded from Bancóldex represented about 5% of all credit operations in the country. That is, it is far from being negligible as a single source of funding, but it is also far from dominating total credit in the country. These numbers also reveal the predominance of privately-funded credit in the country: though there are other public banks, Bancóldex is by far the largest.

Table 2 also reveals other interesting patterns. First, in terms of numbers of relationships, Bancóldex' participation is greater in the segment of commercial credit than that of microcredit

¹⁵ Size categories in Table 1 are based on assets held by the firm, as reported in its loan application. The size indicator differs from the information on firm size based on employment that we use later in our estimations, which comes from the Annual Manufacturing Survey and is available only for firms contained in that dataset, both beneficiaries and non-beneficiaries.

¹⁶ Because of the structure of the data, we compare relationships rather than loans. A given loan is either totally funded by Bancóldex or totally funded from other sources. But, a firm can have more than one loan with a given bank, some of those funded from Bancóldex and other from other sources. Still, over 90% of relationships in our database, feature a single loan.

up to 2009. Consistent with Table 1, however, this is reversed in 2009.¹⁷ Bancóldex credit is on average cheaper than average private credit, with similar maturities. But, these patterns are dominated by commercial credit. Microcredit by Bancóldex, in fact, tends to be shorter term and more expensive than microcredit funded using other sources. These differences may be related to banks using Bancóldex credit to serve different segments of the market, a potential selection that we try to address in the empirical section using econometric techniques.

3. Conceptual framework

We motivate our empirical analysis using a simple static model of credit for working capital, in the spirit of that presented by Banerjee and Duflo (2014).¹⁸ Consider a firm that produces revenue $F(X)$ using a vector of variable inputs X , generating profits

$$f(X) = F(X) - PX$$

where P is a (row) vector of factor prices, and $f(X)$ is assumed increasing and strictly concave in X . Inputs X must be paid for before revenue is realized. Working capital for this purpose must be obtained from credit. For simplicity we, assume away internal funding. Credit can be obtained from the market at rate r^m .

Optimal demand for inputs by this firm is given by

$$f'(X^*) = r^m$$

associated with an optimal production level of $F(X^*)$.

Suppose now that the firm faces credit rationing at rate r^m —the amount of funds it can access at this cost falls short of what it would demand at that rate. This scenario is represented in Figure 1, denoting as X^m the maximum level of funds available to the firm. Firm output is $F(X^m)$ rather than $F(X^*)$.

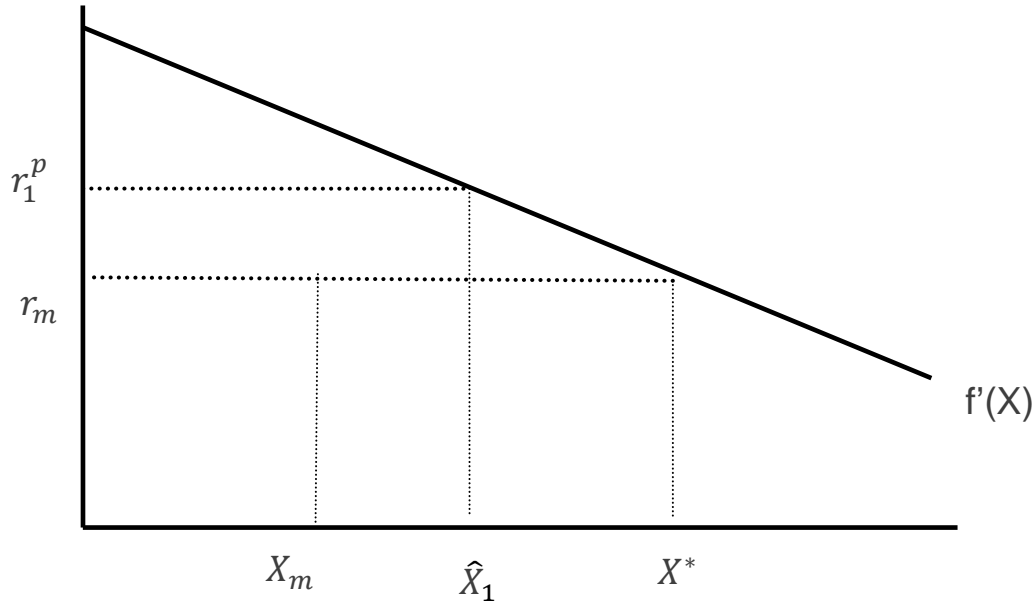
When does public lending simply substitute the available private lending, and when does it really provide “additionality” in the sense of helping ease the loss of efficient activity derived from

¹⁷ Care must be exercised when comparing Table 1 to Table 2, however, as Table 1 classifies loans according to the size of the recipient while Table 2 classifies them according to the size of the loan.

¹⁸ As will become clear, the model does not literally represent a static situation (in which credit would not play any role). Rather, it collapses the problem of a firm that needs credit to fund its activity to a static model.

credit rationing, but without generating inefficiently high activity? The answer depends on the rate at which these funds are made available to the firm and the amount offered at this rate.

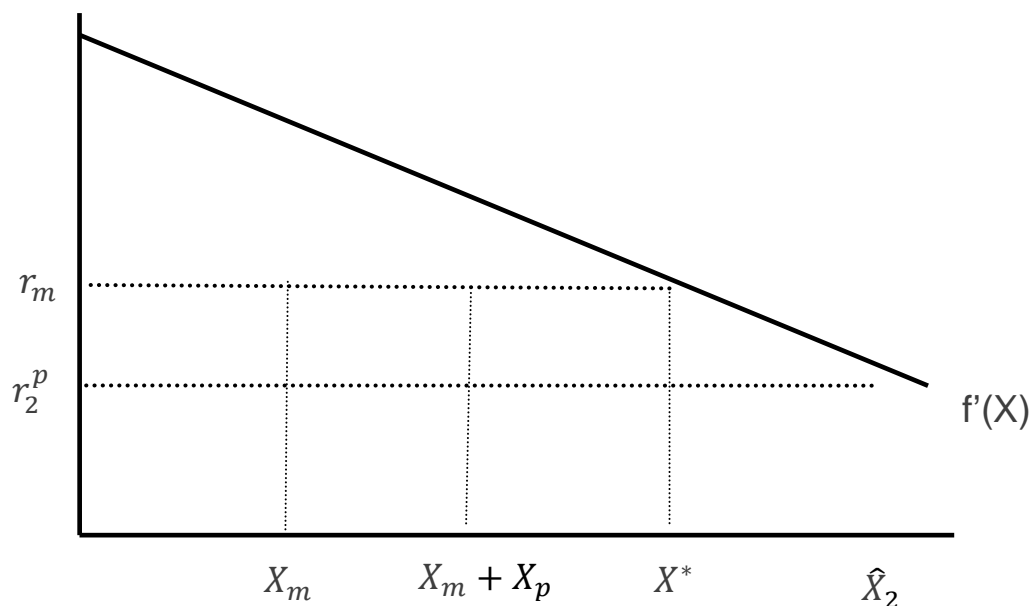
Figure 1: Demand and supply for funds, unsubsidized public credit



Suppose that the public bank offered funds at the market rate or above it, say r_1^p . Then the firm would use those funds to complement market lending, increasing its input demand to a maximum of \hat{X}_1 . The level of activity would grow closer to its optimal level, with the firm using market credit to fund X_m and complementing these funds with public credit up to \hat{X}_1 .

Now take the opposite case in which public loans are subsidized, say being offered at rate $r_2^p < r_m$. Even in this case public lending can offer additionality. Take Figure 2, and suppose that an amount X_p is offered by the public bank at this rate. The firm takes these funds, uses private funds to complement the public loan, and its level of input use grows closer to the efficient level, from X_m to $X_m + X_p$.

Figure 2: Demand and supply for funds, subsidized public credit



Clearly, inefficient public lending is also possible. Suppose that in Figure 2 unlimited funds were offered by the public bank at the subsidized rate r_2^p . Then the firm would demand an amount \hat{X}_2 of these funds, and no market funds. Its level of economic activity would grow, but it would do so beyond the efficient level X^* , and public credit would be simply substituting market credit.

The following result can now be stated.

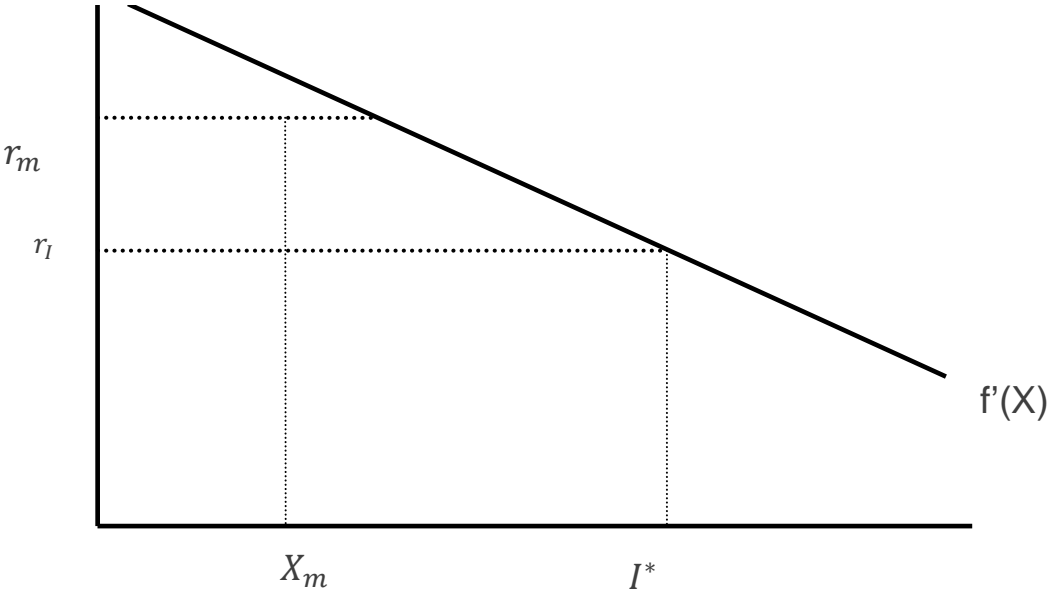
Result 1:

- 1.1. *Public lending generates additionality if it is offered at market rates or above (but not so high that the firm does not take up public funds) and at that rate the firm is credit rationed.*
- 1.2. *Subsidized public lending also generates additionality as long as the firm is credit rationed at market rates and the amount of public funds offered to the firm at the subsidized rate is not enough to fully substitute market credit.*
- 1.3. *Observing that the use of public funds generates increased activity by the firm implies that the firm was credit rationed at market rates and that public credit generates additionality, except if public credit fully substitutes market credit.*

One additional observation is useful before proceeding. Though this conceptual framework has been presented in terms of credit for working capital, it can plausibly accommodate public credit for investment in fixed capital. The main difference between investment and purchases of

variable flexible inputs is the lumpy character of investment. But if we collapse all of the complexities that arise in the context of dynamic decisions subject to non-convexities to the assumption that investment can only be undertaken in chunks, investment can be easily studied in our framework. Suppose that the purchase of a desired machine costs an amount I^* in Figure 3. Then public credit expands investment, and subsequently output, only if provided in an amount sufficiently large that the firm can borrow from the public bank $I^* - X_m$ at a cost not above r_l . Moreover, in particular cases (e.g. Figure 3 with $0 < I^* - X_m \leq X_p$) the availability of public credit also induces the firm to use private credit that would not be accepted without complementary credit funding, as using the two sources is necessary to make possible a level of investment (I^*).

Figure 3: Demand and supply for funds, indivisible inputs



Another important feature of investment is that it tends to require longer term funding than variable inputs. Though our simple static framework does not accommodate differential maturities for credit, each of the Figures in this section should be understood as referring to credit with maturities suitable to the respective activity.

Motivated by these implications of the conceptual analysis, we take advantage of the rich longitudinal data on both recipients and non-recipients of Bancóldex credit to address a series of

questions: 1) does receiving a loan from Bancóldex increase the level of economic activity at the firm?; 2) do we see evidence that these effects are stronger for smaller than for larger firms, where the latter are less likely to be rationed?; 3) to what extent Bancóldex credit substitutes/complements/induces the use of other types of credit by the firm?; 4) is Bancóldex credit generally associated with lower interest rates?; 5) are these effects heterogeneous for loans of different maturity? Is this specially the case for investment, compared to variable input demand?.

2. Empirical Approach

We attempt to identify whether firms that received credit from Bancóldex increased their performance more or saw more marked changes in the conditions of their credit, compared to firms that arguably had similar access to credit but did not benefit from Bancóldex lines. Our baseline independent variable is a dummy indicating whether the firm received credit from Bancóldex in the respective year. We estimate equations of the form:

$$y_{it} = \gamma + \delta B_{it} + \beta' X_{it} + \gamma_t + \omega_{it} \quad (1)$$

where B_{it} is a dummy indicating whether the firm had loans funded by Bancóldex in year t , X_{it} is a vector of control variables, γ_t is a vector of year dummies, and ω_{it} is a random error term. When estimating the effect of Bancóldex on performance, y_{it} is one of four alternative measures of factor demand and output: labor, input consumption, investment, and output. When, instead, we estimate how Bancóldex affects the conditions of credit faced by the firm, y_{it} is, alternatively, the firm's credit balance; the number of financial intermediaries from which it received loans in the period; the average interest rates on its loans; or the average maturity of those loans.

A set of control variables, X_{it} , is introduced in our specifications. These capture some observable variable characteristics possibly correlated with both our dependent variables and the dummy for having received Bancóldex loans. For performance estimations, conducted using Manufacturing Survey data, we include a dummy for establishments belonging to multi-establishment firms; age and age squared; and a dummy for whether the firm paid interest over financial liabilities in the previous year. The latter is intended to control for previous access to overall credit, very crudely given the impossibility to bring together the Manufacturing Survey data and the data on loans from the Financial Superintendence. In turn, in estimations for credit

conditions, which use the Superintendence data, we include controls for whether the firm had only commercial loans, or had at least one loan classified as micro-credit in the respective year; the percentage of loans to the firm on which a guarantee was required in that year; and the maximum number of loans that the firm received from a single bank in the period (in logs), to proxy for firm size.

As is always the case when estimating the effect of a given program on its beneficiaries, a major source of concern is the possibility that firms that receive Bancóldex credit are selected according to characteristics that are also correlated with the outcome variables we consider.¹⁹ It is difficult to a priori establish what those characteristics may be: there is no explicit criterion according to which Bancóldex gives credit to firms. In fact, the allocation of its loans is not even in the hands of Bancóldex, as it is the intermediary banks to assign Bancóldex funds to loans. As discussed above, there is similarly no clear unique criterion for intermediary banks to use Bancóldex funds rather than other funds to finance a loan to a given firm, nor does it seem to be the case that firms decide themselves whether to take a loan funded by Bancóldex or by the bank's own resources—so that it is not clear that self-selection should be an issue---. A bank's decision to use Bancóldex funding for particular loans has more to do with conditions faced by the bank than with characteristics of the loan recipient.

Still, it may well be that firms with given characteristics are more likely assigned Bancóldex' funded loans, biasing OLS estimates of δ in equation (1), though it is difficult to sign potential biases, precisely because there is no clear definition of selection criteria. As there is no experiment or quasi-experiment that we can take advantage of for stark identification (as do Banerjee and Duflo, 2014, or McKenzie and Woodruff, 2008, or De Mel, Mc Kenzie and Woodruff, 2008), we use econometric techniques to address concerns about potential endogeneity.

In the end, we want to compare Bancóldex beneficiaries to firms that faced similar conditions in accessing credit but did not benefit from Bancóldex funding. Because the likelihood of accessing credit is not directly observable, we create these comparison groups by using fixed effect estimators, either alone or in combination with propensity score matching

¹⁹¹⁹ It is important to note that Bancóldex recipients are not being compared to firms that cannot access credit; in the loan data the counterfactual are firms that received credit from other sources, while in the manufacturing survey data businesses in the control group include credit recipients (from other sources) and non-recipients.

techniques, where the latter help us equate treatment and control groups in terms of observable characteristics in the year prior to receiving Bancóldex credit.

In particular, we use two different estimation approaches. The first approach includes plant- or firm-level fixed effects (depending on the level of observation in the respective set of data).²⁰ This approach has the advantage of controlling for unobservable characteristics, but the problem that it assumes all those characteristics to be fixed over time for a particular firm. We then complement this estimation strategy with another that restricts the dataset to beneficiaries and their “nearest neighbors”, identified using propensity score techniques. The propensity score—predicted probability of receiving Bancóldex credit in a given year—is estimated on the basis of a set of observable outcomes in the previous year (see below). Each beneficiary is then matched to a firm that did not receive Bancóldex credit (over our whole period of observation), whose propensity score in the respective year was closest to that of the beneficiary among the group of non-beneficiaries.²¹ This generates a restricted dataset for each year, including that year’s beneficiaries and their nearest neighbors. A panel is finally constructed including the full history of each beneficiary and nearest neighbor. It is over this end panel that our estimations are conducted for our second estimation approach.

Propensity scores are established by estimating models where the probability of receiving Bancóldex in a given year is a function of different performance variables lagged one period;²² the first lags of the control variables of the baseline regression; and, in the performance estimations, fixed effects by four-digit sector, location, and type of legal organization. A separate participation model is estimated in each year, and a nearest neighbor is found for each Bancóldex beneficiary in that particular year. Equation (1) is then estimated over a set of data that pools across years and includes all firms that received Bancóldex in at least one year, and all firms that were identified as nearest neighbors to those beneficiaries, with their respective full histories.

²⁰ The unit of observation in the Manufacturing Survey is the plant, while the unit of observation in the Financial Superintendence data is a firm.

²¹ We match to a single nearest neighbor although less strict matching algorithms are obviously available, because going to the finest matching strategy and contrasting it with simple (un-matched) fixed effect estimates, we are able to establish bounds for the effects.

²² The set of lagged characteristics included in the models covers output, TFP, exports, and investment for the performance analysis. The analogous set for the analysis of credit conditions includes the lags of the interest rate; loan maturity; number of financial intermediaries; and credit.

Our baseline estimation of equation (1) is also extended to examine potential heterogeneous effects. In particular, we differentiate long- from short-run Bancóldex loans; and larger vs. smaller establishments. We also examine alternative timings for the effect of Bancóldex credit. Robustness tests have been conducted including lagged dependent variables rather than fixed effects in the different specifications, and restricting the matching to firms that received Bancóldex in 2004 for the first time and their nearest neighbors in that year, rather than the full 2004-2009 database.

3. Results

5.1. Bancóldex and firm performance

We begin by discussing our findings regarding the effect of Bancóldex credit on firms' demand for inputs and output. This estimation uses data from the Annual Manufacturing survey, covering all non-micro manufacturing establishments in the country. Descriptive statistics for this estimation are presented in Table 3. 11% of all observations correspond to Bancóldex beneficiaries.

Results of estimating equation (1) are presented in Table 4. For each outcome under consideration, two adjacent columns present results using the two estimation strategies described in Section 4: a FE estimation, and a FE estimation conducted over the dataset restricted to include only beneficiaries and their nearest neighbors in terms of the probability of receiving Bancóldex (marked as FE+PSM in our tables). The different vertical panels present different specifications for the treatment variable. Figure 4 summarizes the results of the propensity score matching approximation, depicting the distribution of propensity scores in both the unrestricted and the restricted datasets. Restricting to beneficiaries and their nearest neighbors eliminates pre-existing differences in these scores. For individual outcomes, pre-existing differences in each of the outcomes of interest also become negligible after the restriction (Appendix A1).

The use of Bancóldex is associated with an increase in the demand for inputs and a related increase in output (Panel A). Within plants, employment increases around 4% for Bancóldex beneficiaries in relation to non-beneficiaries, input demand increases above 5%, output increases a little below 5%, and investment grows markedly by about 20%. Investment comes in spikes (Haltiwanger and Cooper, 2006; Doms and Dunne, 1998), so that, contingent on part of the credit being used for purchases of fixed capital, large investment effects are not

surprising. Interestingly, results are very similar after restricting the database using propensity score matching.²³

The positive effects of Bancóldex credit on employment and output exhibit persistence over time (Panel B). In fact, though the coefficient associated with the treatment variable decays over time, it does so at a very slow pace. By the third year, the effect over employment is still above 2.5%, and that over output remains in a similar neighborhood. Similar persistency is not found for the effect on investment. Although the coefficient for the current Bancóldex dummy is still positive and large (but imprecisely estimated), the one on the lagged treatment becomes negative. This could reflect the well-known lumpy behavior of investment, which implies that a large investment episode today reduces the probability that the firm invests tomorrow. The effect on material purchases exhibits only moderate persistence: the coefficient halves by year two and becomes insignificant by year three. Together, these results suggest that Bancóldex loans are at least partly used to undertake investments that have persistent effects on the operation of plants. In light of the conceptual framework discussed in section 3, they also suggest that these firms are rationed in their access to private credit, in a way that prevents them from undertaking investments and growing to their optimal size.²⁴

Table 5 shows the results of re-estimating equation (1) separately for small and large establishments (excluding medium establishments). Following Colombian legal definitions, small establishments are those with 50 or less employees, and large establishments those with 200 or more employees. Our conceptual framework suggests that large establishments should see a lesser impact from public credit on their use of inputs and output if, as is plausible, they have more internal financing and are less rationed with respect to external financing. Results in Table 5 are broadly consistent with this view. For employment, output, and investment, the coefficients estimated for large establishments are about half the size of those for small establishments. They are also imprecisely estimated, though in some of our robustness proofs do turn out to be

²³ This is consistent with the view that intermediaries, once having decided to grant credit, choose whether to use Bancóldex funding or their own sources based on conditions faced by the bank rather than systematic criteria relating observed time-varying recipient characteristics.

²⁴ Note, from section 3, that this interpretation holds as long as Bancóldex credit is not offered at subsidized rates and in amounts sufficiently large to fully substitute private credit. Section 5.2 shows that Bancóldex is not reducing interest rates importantly, and certainly not reducing rates beyond the opportunity costs of funds. Results in that section also suggest that Bancóldex credit does not fully substitute private credit.

statistically significant. Interestingly, however, the effect of Bancóldex on material purchases is particularly large for large establishments.²⁵ That is, small establishments seem to use Bancóldex funding relatively more intensely for funding investments, while large establishments seem to use it mainly for working capital, and especially at times of particularly large working capital needs.

Table 6 presents results of estimating separately the effect of long- and short-run Bancóldex loans. Firms are more likely to face credit rationing from banks for long run projects. The reasons are varied: long run projects also tend to be large projects and may thus require co-financing by several banks (Dewatripont and Masking, 1995; Armendáriz, 1999); there may also be greater uncertainty about their returns; moreover, the deposits from which private banks frequently fund loans are mostly short run.

In our estimations, long-run loans are defined as those with maturity of at least three years, short-run ones as those with maturity of up to eighteen months. Establishments that obtained other types of Bancóldex credit are left out, so that the control group corresponds to those that did not obtain Bancóldex loans. New participation models are estimated for the probability of receiving the respective type of loan. The restricted dataset used for columns marked FE+PSM in this case was constructed using a re-estimated matching exercise where inclusion in the restricted dataset is based on the probability of receiving a long-run Bancóldex loan in the upper panel, and the probability of receiving a short-run Bancóldex loan in the lower panel.

Our results show that long-run Bancóldex loans are associated with a large increase in investment that is not observed when focusing on short-run loans. Not only are the coefficients for short-run Bancóldex loans on investment statistically insignificant, but they are also less than a third in magnitude of those for long-run loans. The opposite is true regarding the effect of Bancóldex on materials purchases; it is short run loans that show a tighter relationship to this outcome. Meanwhile, the Bancóldex coefficients in the employment and output regressions are

²⁵ The effect on materials is insignificant (both statistically and economically) for small establishments in this baseline specification). In robustness tests it becomes significant for this segment of plants (see below), but still with a magnitude much smaller than that estimated for large plants.

positive and significant when considering both long-run and short-run loans, though the coefficients are slightly smaller for long-run loans.

Table 7 complements these findings by estimating the heterogeneous effects of long- vs. short-run loans over time on materials, employment, and output.²⁶ The effects on materials purchases do not exhibit persistence for either type of loan—while in these results the effect on materials continues to be particularly large for short-run loans. For employment and output, the effect of long-run loans exhibits persistence over time, while the effect of short-run loans does not. These findings suggest that: 1) Bancóldex short-run loans play an important role in the provision of working capital but apparently not in the financing of investment projects, while its long-run loans are used to fund investments; and 2) at least part of the effect of long-run loans, initially reflected on investment, takes time to translate into complementary demand for labor and into greater output, but once it does that effect is more permanent in nature.

Finally, Table 8 examines the robustness of our results to controlling for the lagged dependent variable rather than introducing establishment fixed effects as our approach to deal with potential selection concerns. Each vertical panel examines one of the four outcomes (employment, materials purchases, investment, and output). Starting with the first column, and comparing it to results in Table 4, our results regarding the effect of Bancóldex loans on materials, employment and output are robust to this alternative estimation method. For employment and output this is true not only in terms of direction and statistical significance, but also in terms of the magnitude of the estimated coefficients. The estimated magnitude is sensible to controlling for the lagged dependent variable in the case of investment and materials purchases, both outcomes likely much more volatile than employment. For these outcome variables we continue to find a positive and significant effect, but now with a much larger magnitude, especially for investment. As previously pointed out, investment is known to exhibit a lumpy behavior. It is thus not surprising to find stark differences when approaching potential

²⁶ Results on investment are also reported for consistency, but we abstain from emphasizing them on the basis of the difficulties that the lumpy nature of investment imposes on the interpretation of coefficients (see our discussion of Table 4). Still, results for investment in this Table are consistent with long-term loans being used to fund investment, increasing it when the loan is received but not later (apparently, according to these results, increasing it sufficiently that average investment over the period raises importantly rendering investment in other years lower than the average).

selection by including fixed plant effects or by including variable effects (in this particular case, the lagged dependent variable).

Results in Table 8 are also consistent with our baseline specifications in terms of the heterogeneity of effects between small and large plants (second and third column). In particular, the effects of Bancóldex loans on all outcomes but materials are stronger for small establishments than for large ones. In fact, for large establishments the only statistically significant effects in Table 8 are those on employment and materials, the latter with a particularly large associated coefficient. Finally, the results in Table 8 regarding long vs. short run loans are also consistent with the previous ones for output, materials purchases and employment as dependent variables. For investment, however, the specification including the lagged dependent variable does not identify any major difference between the two types of credit, for both of which a large and significant effect on investment is estimated. This comes in contrast with our baseline results, which suggest that short-run credit does not affect investment while long-run credit does. We therefore take our results regarding heterogeneous impacts by loan maturity as only suggestive.

5.2. Bancóldex and credit conditions

We now move to the estimations of the effect of Bancóldex on the credit conditions faced by firms. That is, we estimate equation (1) but now setting the dependent variable to be one of several characteristics of a firm's basket of loans from supervised financial intermediaries. These characteristics are: the average interest rate over the loans obtained in the period; the average maturity specified for those loans;²⁷ the number of intermediaries from which the firm obtained loans over the period; and the amount of credit granted to the firm. In light of the conceptual framework in Section 3, we aim at understanding to what extent Bancóldex credit is substituting private credit rather than complementing it.²⁸

²⁷ That is, the maturity initially agreed upon. Firms in Colombia are able to repay a loan in advance of the pre-set maturity, though over the period of study advanced payment was sometimes penalized.

²⁸ As mentioned, the results we report in this section exclude year 2009, given the stark increase in loans classified as microcredit that occurred that year. Such increase implies a change in the composition of Bancóldex loans likely to have changed the type of beneficiaries; these compositional effects may end up captured by the results. Alternative results including year 2009 were also produced. They are not reported here in the interest of succinctness, but they lead to similar qualitative conclusions, in general with smaller magnitudes but similar levels of statistical significance. Results are available from authors upon request.

Because the set of data we use in this section is constructed from records on supervised credit operations, only firms receiving at least one loan from a supervised financial intermediaries over a given year are included in that particular year. This implies that in this section we only estimate the effect on credit conditions contingent on receiving at least one loan in the period. At the same time, recipient firms from all sectors are included. Even if we wanted to restrict the data to manufacturing firms for consistency with our results on performance, we would not be able to do so due to the lack of sector identifiers in the credit data.²⁹

Descriptive statistics for estimations relating the effect of Bancóldex on credit conditions are presented in Table 9. About 6% of all observations correspond to Bancóldex beneficiaries. The average interest rate is 21.7%;³⁰ the average agreed maturity of a loan—expressed here in logs of days to facilitate the interpretation of regression results—is about 18 months; and while most firms have loans from a single financial intermediary, the range is wide, going up to 17 intermediaries for a single firm.

As in the analysis of performance of the previous section, we conduct estimations using fixed effects—at the firm level in this case—and also estimations combining fixed effects with propensity score matching. Matching is done on the basis of year $t-1$ conditions of credit, as described in section 4. Figure 5 depicts the distribution of propensity scores in both the unrestricted and the restricted datasets. Restricting to beneficiaries and their nearest neighbors eliminates pre-existing differences in propensity scores. For individual outcomes of interest, pre-existing differences between treatment and control groups are also strongly reduced by the matching. Some remain statistically significant but their magnitudes are much smaller than that found below as a result of receiving a Bancóldex loan (Appendix A2).

Table 10 shows our results. Consistent with our findings of positive effects on firm performance, we find that Bancóldex beneficiaries see their total credit increased by almost 50%.

There are several indications that Bancóldex is not simply substituting market credit. The use of Bancóldex is associated with an increase in the number of lenders from which the firm obtains loans of 0.4, which is more than half a standard deviation. Interestingly, the average maturity of

²⁹ The firm identifiers in this dataset are fictitious, so we are also unable to link firms to their sectors using other sources.

³⁰ The average interest rate level of 21pp is likely more than 10 pp above the opportunity cost of funds to the firm. As a metric for this opportunity cost, take the average yield of long-term (10-year) government bonds in 2009, of 8%.

loans also goes up by about 20%. Bancóldex seems to be actually widening the access of firms to private lenders, and at the same time providing access to a type of credit (long run) from which firms seem to have been most strongly rationed. This interpretation is also consistent with the fact that Bancóldex credit is not explicitly subsidized, and that the sources of funding that Bancóldex itself uses are not cheaper, probably even more expensive, than those of private banks, mainly for short-run funds, so that the take-up of Bancóldex funds would be hard to understand if it were not offering funds with differential characteristics.

Bancóldex beneficiaries also see the average interest rates of their loans reduced by about 2 p.p. (in the context of an average rate of 22%), an indication that Bancóldex loans are making credit cheaper to the firm, and thus potentially displacing, at least partially, market credit. In the absence of explicit subsidies, however, the fall in average interest rates associated with Bancóldex credit probably reflects the expanded access to long run loans, for which Bancóldex may indeed be competitive in terms of the costs of funds.

Table 11 gets at the question of how Bancóldex affects market lending to firms from a different angle. It shows the results of estimating the effect of Bancóldex credit on the amount of credit *from sources other than Bancóldex*. That is, we calculate total credit and the number of lenders from which those loans come but excluding now all loans with Bancóldex funding. While a contraction in other sources of credit is indeed observed in the current year, the result is not robust to controlling for the lagged dependent variable (see below), and even in Table 11 its magnitude is far from implying a full substitution of market credit by Bancóldex. Moreover, such contraction lasts for a single period, and is then followed by an expansion in non-Bancóldex credit. The simple model presented in Section 3 cannot account for these dynamic effects. But, even in the absence of a tight interpretation in light of the model, these findings are at least suggestive that the persistent effects on performance found in the previous subsection are at least partly attributable to sustained credit that, despite being associated with having had a Bancóldex loan, is not coming solely from Bancóldex.

Table 12, presents robustness exercises including the lagged dependent variable as a regressor in lieu of fixed effects. Results for the effect of Bancóldex credit on overall credit conditions are remarkably similar to those shown in Table 10 (the baseline specification), in

terms of sign, magnitude and significance. For credit from non-Bancóldex sources, however, controlling for lagged credit from non-Bancóldex sources changes the sign of the estimated contemporaneous effect of Bancóldex, suggesting that even in the current period Bancóldex credit does not reduce the use of market credit, and may even increase it.

As is the case of our findings relating performance, results in this section suggest that Bancóldex resources are not simply substituting banks' own resources in terms of lending to firms. As should be clear from the conceptual framework in section 3, Bancóldex could conceivably play the sole role of providing cheaper resources that firms would anyway find elsewhere and indeed use. If this were the case, credit would likely not be expanded: though firms would take-up Bancóldex-funded loans, they would use them to replace more costly loans from other sources. We do observe a reduction in the average interest rate faced by recipients of Bancóldex, but short lived, and a subsequent increase in lending from other sources. Meanwhile, firms do see their credit expanded after receiving Bancóldex, interact with new intermediaries, and do not fully substitute market credit for Bancóldex credit. Positive effects on credit are long-lived despite the interest rate effect disappearing.

6. Conclusions

Isn't untargeted, unsubsidized public credit bound to simply substitute resources already available from the market? The answer would probably be yes if "being subject to credit rationing" was an observable characteristic of firms, and the government could perfectly target its credit to firms with this characteristic. But credit constraints are a complex phenomenon, and it is likely that their correlation with observable firm characteristics is far from perfect, especially when one realizes that the projects to be funded vary widely even within a firm. The case for untargeted government lending further strengthens if we add the fact that targeting necessarily distorts incentives leading to inefficiencies. And the second-tier model looks particularly good when noticing that the direct selection of beneficiaries of any government program is subject to political challenges.

So, there are potential merits to this type of government lending, and the question of whether they are realized becomes empirical. We use information on a program of second-tier public lending in Colombia that, by design, is not subsidized and is allocated using the same criteria according to which private banks allocate funds to loan applicants. Our findings imply that use of

public credit in the context analyzed tends to complement, even expand, access to privately funded credit, rather than substituting it, leading to an expansion of the economic activity of the firm. This is despite the fact that micro-firms are not included in these estimations, and despite Colombia being a middle income country with a relatively dynamic financial sector.

Our evidence is consistent with small businesses indeed being much more limited by credit access than large businesses, but even the latter seem to face difficulties in accessing credit for specific working capital needs. Long-term public credit has a particularly large and long-lasting effect on investment and economic activity, and access to long-maturity loans is expanded for beneficiaries of public loans. Though these findings suggest that long-term lending is a particularly worthwhile focus for public credit, even short term credit has impact on performance, indicating that firms are also constrained in their access to working capital.

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Figure 4: Distribution of Propensity Scores, Performance Analysis

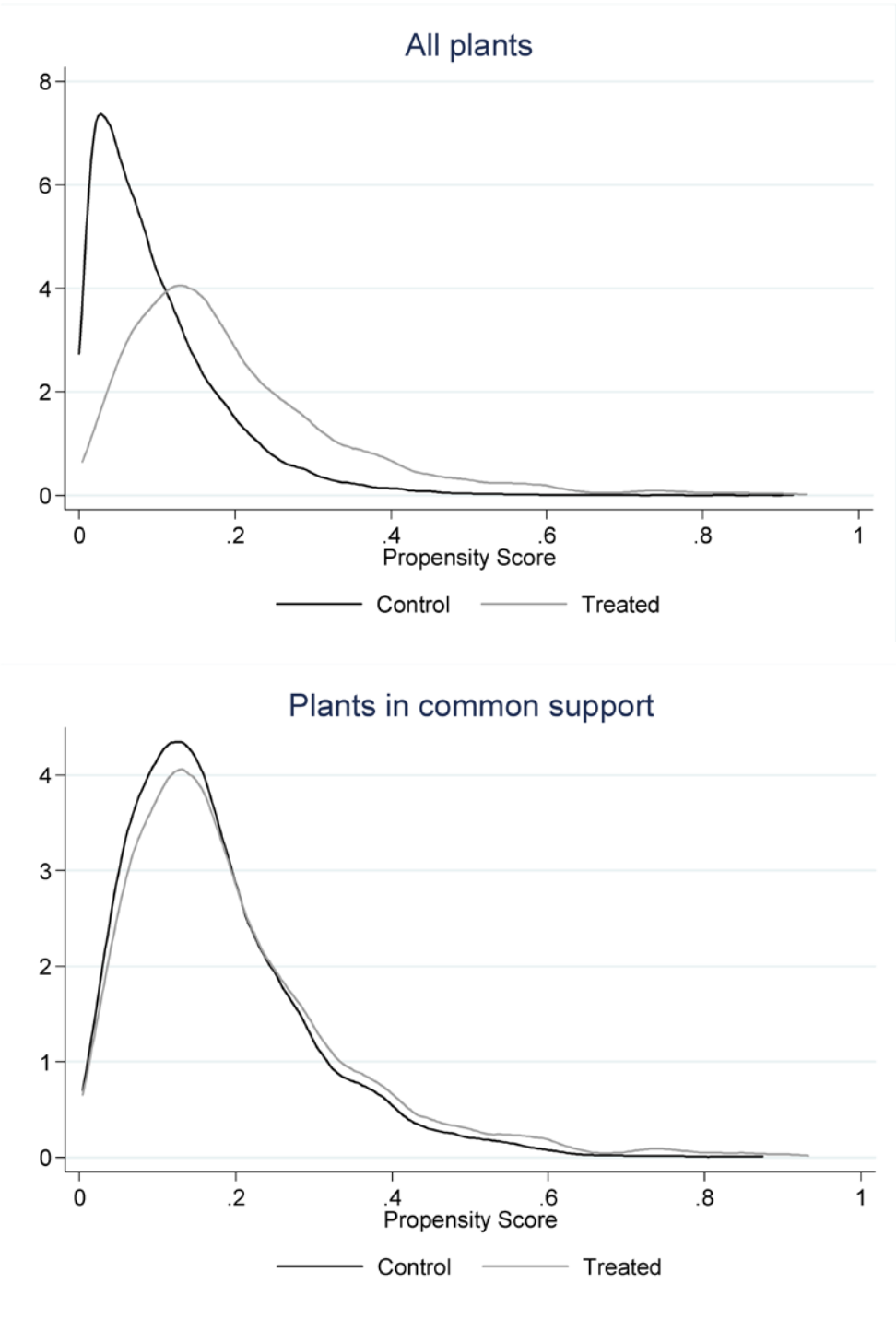


Figure 5: Distribution of Propensity Scores, Credit Analysis

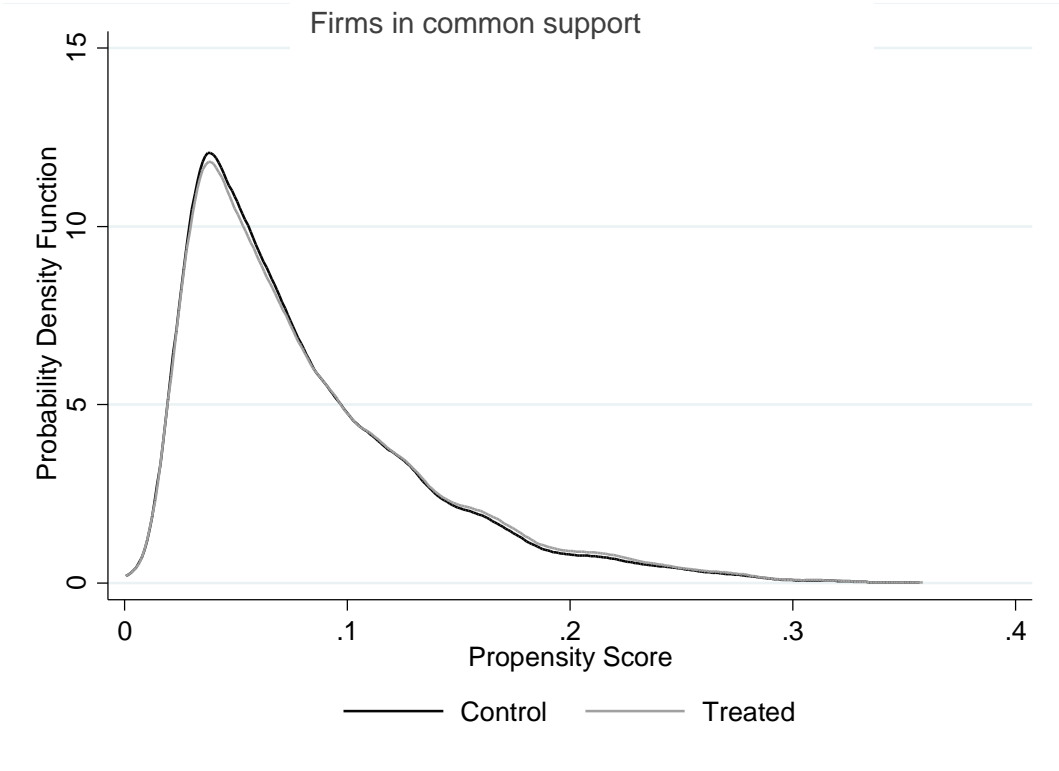
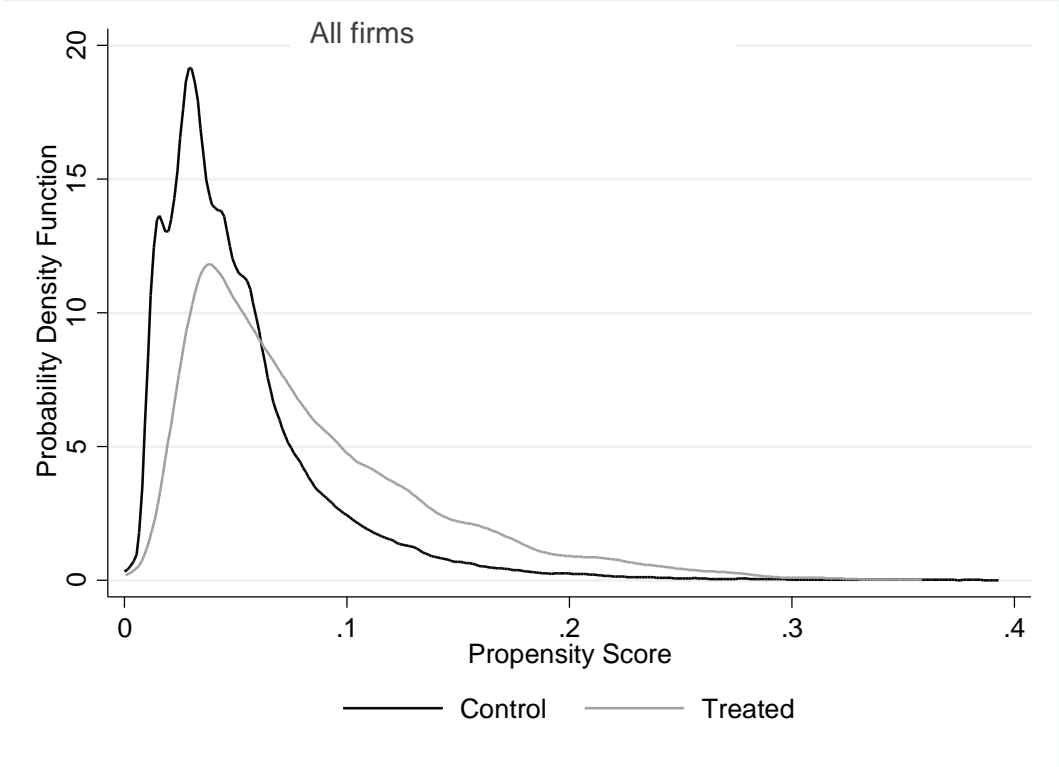


Table 1. Bancóldex credit, total and intermediated by supervised financial system. 2004-2009

	Number of recipients					Credit				
	Total	Micro firms	Small firms	Medium firms	Large firms	Total	Micro firms	Small firms	Medium firms	Large firms
Panel A. Total										
2004	64,841	90.6%	6.6%	2.1%	0.7%	1,084,601	15%	20%	23%	42%
2005	69,824	90.3%	7.5%	1.7%	0.5%	1,007,385	19%	26%	21%	35%
2006	114,091	94.1%	4.8%	0.9%	0.2%	981,248	27%	32%	20%	21%
2007	133,187	94.6%	4.0%	1.2%	0.3%	1,693,248	16%	21%	22%	40%
2008	117,689	93.4%	4.6%	1.6%	0.4%	1,718,301	15%	22%	26%	37%
2009	149,710	94.6%	3.8%	1.3%	0.3%	1,539,698	17%	24%	27%	33%
Panel B. Through supervised financial intermediaries										
2004	14,955	60.1%	28.0%	9.0%	3.0%	1,016,319	10%	21%	25%	45%
2005	17,323	61.6%	29.5%	6.9%	2.0%	920,869	12%	27%	23%	38%
2006	20,825	68.4%	25.6%	5.0%	0.9%	880,302	19%	35%	22%	24%
2007	19,746	64.0%	26.2%	7.9%	1.9%	1,571,607	10%	23%	24%	44%
2008	24,242	68.4%	21.7%	7.8%	2.2%	1,601,497	9%	23%	28%	39%
2009	87,377	90.8%	6.4%	2.2%	0.6%	1,470,883	13%	24%	28%	34%

Table 2: Bancóldex credit vs. all credit in supervised financial system

Year	All credit relationships			Bancóldex credit relationships			Bancóldex participation	
	Average interest rate (%)	Average term (in days)	Average loan size (USD thousand)	Average interest rate (%)	Average term (in days)	Average loan size (USD thousand)	In credit value	In number of relationships
Panel A: All								
2004	18.3	889	60.5	16.6	681	69.2	5.0%	4.4%
2005	17.0	933	50.2	15.5	802	51.2	3.7%	3.6%
2006	17.3	992	55.0	16.5	973	48.6	2.9%	3.3%
2007	22.6	1,039	51.3	19.7	1,002	117.4	6.9%	3.0%
2008	27.1	924	48.4	24.9	1,013	120.3	8.1%	3.2%
2009	25.2	892	41.0	30.3	652	21.4	5.9%	11.4%
Panel B: Commercial credit								
2004	18.4	847	98.2	15.8	770	91.2	5.1%	5.5%
2005	17.9	889	98.4	14.9	882	64.1	3.6%	5.5%
2006	17.4	1,027	111.9	16.3	1,156	68.2	2.7%	4.4%
2007	21.3	1,157	97.6	16.6	1,233	173.8	6.7%	3.8%
2008	23.4	1,140	146.6	18.9	1,361	235.7	8.2%	5.1%
2009	17.9	1,127	163.3	13.9	1,195	143.9	5.5%	6.3%
Panel C: Microcredit								
2004	18.6	961	2.2	18.9	461	2.2	2.7%	2.8%
2005	16.5	988	2.1	17.7	611	2.2	1.9%	1.9%
2006	17.2	981	2.0	16.9	699	1.9	2.1%	2.2%
2007	23.7	948	1.9	24.6	660	1.6	1.8%	2.2%
2008	28.7	841	2.0	30.3	704	2.5	3.0%	2.4%
2009	27.5	825	1.9	32.9	573	1.1	7.7%	13.0%

Source: Superfinanciera and authors' calculations. Monetary values converted to 2009 pesos using the CPI and then to dollars at the December 2009 peso/dollar exchange rate. Numbers refer to loan operations through financial intermediaries.

Table 3: Descriptive Statistics

	N	Mean	Std. Dev.
Dummy Bancoldex=1	22,386	0.11	0.31
Log employment	22,382	3.37	1.21
Log input consumption	22,386	6.76	5.47
Log investment	19,519	7.11	5.39
Log output	22,386	14.59	1.72
Dummy multiestablishment firm =1	22,386	0.08	0.27
Age	22,386	25.79	14.25
Dummy for positive interest payments on financial obligations	22,386	0.68	0.47
Dummy Bancóldex long run loan =1	21,522	0.07	0.26
Dumm Bancóldex short run loan =1	20,597	0.03	0.17
Bancóldex loan value	22,386	1.30	3.76

Table 4. Effect of Bancóldex on plant performance.

	Log employment		Log input consumption		Log investment		Log output	
	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM
Panel A: Contemporaneous effect								
Dummy Bancoldex=1	0.0378** [0.00750]	0.0337** [0.00751]	0.0555* [0.0227]	0.0512* [0.0219]	0.215* [0.0923]	0.215* [0.0927]	0.0493** [0.00882]	0.0467** [0.00868]
Observations	22,379	13,183	22,356	13,175	22,386	13,186	22,386	13,186
Number of establishments	5,030	2,801	5,028	2,801	5,030	2,801	5,030	2,801
Adjusted R-squared	0.018	0.027	0.005	0.009	0.006	0.008	0.042	0.058
Panel B: Effects over time								
Dummy Bancoldex=1	0.0425** [0.00861]	0.0380** [0.00870]	0.0756** [0.0244]	0.0811** [0.0246]	0.170 [0.112]	0.168 [0.113]	0.0486** [0.00958]	0.0470** [0.00969]
First Lag Dummy Bancoldex=1	0.0233* [0.0104]	0.0215* [0.0105]	0.0410+ [0.0229]	0.0394+ [0.0233]	-0.0149 [0.123]	-0.0313 [0.125]	0.0322** [0.0107]	0.0311** [0.0109]
Second Lag Dummy Bancoldex=1	0.0270** [0.00948]	0.0257** [0.00956]	0.0339 [0.0270]	0.0332 [0.0274]	0.160 [0.122]	0.167 [0.123]	0.0249* [0.0101]	0.0253* [0.0101]
Observations	17,281	10,354	17,261	10,346	17,281	10,354	17,281	10,354
Number of establishments	4,754	2,748	4,752	2,748	4,754	2,748	4,754	2,748
Adjusted R-squared	0.028	0.035	0.007	0.011	0.009	0.010	0.028	0.035

The table presents results from estimating equation 1. All regressions control for the establishment belonging to a multiestablishment firm, a dummy for making positive interest payments on financial obligations, age and age squared, as well as establishment-level fixed effects. For each outcome, the second column is obtained after restricting the dataset to beneficiaries and their nearest neighbors in terms of participation probability.

Errors clustered at the plant level in parentheses. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

Table 5. Effect of Bancóldex on plant performance. Large vs. small establishments

	Log employment		Log input consumption		Log investment		Log output	
	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM
Panel A: Small establishments (50 employees or less)								
Dummy Bancoldex=1	0.0243*	0.0216*	0.00434	0.0122	0.295*	0.315*	0.0483**	0.0477**
	[0.00975]	[0.00975]	[0.0247]	[0.0245]	[0.137]	[0.137]	[0.0125]	[0.0125]
Observations	15,651	8,014	15,631	8,006	15,658	8,017	15,658	8,017
Number of establishments	3,899	1,961	3,898	1,961	3,900	1,961	3,900	1,961
Adjusted R-squared	0.019	0.023	0.007	0.009	0.006	0.008	0.036	0.049
Panel B: Large establishments (200 employees or more)								
Dummy Bancoldex=1	0.0160	0.0158	0.210+	0.152	0.0941	0.00981	0.0258	0.0231
	[0.0167]	[0.0167]	[0.116]	[0.0985]	[0.261]	[0.250]	[0.0264]	[0.0230]
Observations	1,607	1,297	1,607	1,297	1,607	1,297	1,607	1,297
Number of establishments	408	326	408	326	408	326	408	326
Adjusted R-squared	0.094	0.096	0.002	0.003	0.014	0.014	0.089	0.085

The table presents results from estimating equation 1. All regressions control for the establishment belonging to a multiestablishment firm, a dummy for making positive interest payments on financial obligations, age and age squared, as well as establishment-level fixed effects. For each outcome, the second column is obtained after restricting the dataset to beneficiaries and their nearest neighbors in terms of participation probability.

Errors clustered at the plant level in parentheses. ** p<0.01, * p<0.05, + p<0.1

Table 6. Effect of Bancóldex on plant performance. Long vs. short-run Bancóldex loans

	Log employment		Log input consumption		Log investment		Log output	
	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM
Panel A: Bancóldex loans with maturity at or above three years.								
Dummy Bancoldex=1	0.0431**	0.0396**	0.0349	0.0373	0.307**	0.322**	0.0483**	0.0466**
	[0.00905]	[0.00909]	[0.0259]	[0.0260]	[0.109]	[0.110]	[0.0111]	[0.0110]
Observations	21,323	9,723	21,300	9,720	21,330	9,725	21,330	9,725
Number of establishments	4,965	2,160	4,963	2,160	4,965	2,160	4,965	2,160
Adjusted R-squared	0.018	0.033	0.005	0.007	0.007	0.008	0.041	0.064
Panel B: Loans with maturity at or below one year.								
Dummy Bancoldex=1	0.0501**	0.0385*	0.147**	0.121**	0.0964	0.0735	0.0687**	0.0561**
	[0.0151]	[0.0156]	[0.0442]	[0.0375]	[0.178]	[0.180]	[0.0155]	[0.0149]
Observations	18,758	3,785	18,747	3,786	18,762	3,786	18,762	3,786
Number of establishments	4,504	885	4,504	885	4,504	885	4,504	885
Adjusted R-squared	0.016	0.022	0.005	0.005	0.006	0.010	0.039	0.059

The table presents results from estimating equation 1. All regressions control for the establishment belonging to a multiestablishment firm, a dummy for making positive interest payments on financial obligations, age and age squared, as well as establishment-level fixed effects. For each outcome, the second column is obtained after restricting the dataset to beneficiaries and their nearest neighbors in terms of participation probability.

Errors clustered at the plant level in parentheses. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

Table 7. Effect of Bancóldex on plant performance over time. Long vs. short-run Bancóldex loans

	Log employment		Log input consumption		Log investment		Log output	
	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM
Panel A: Bancóldex loans with maturity at or above three years.								
Dummy Bancoldex=1	0.0443**	0.0391**	0.0615*	0.0689**	0.195	0.206	0.0400**	0.0391**
	[0.0113]	[0.0115]	[0.0268]	[0.0259]	[0.150]	[0.152]	[0.0130]	[0.0131]
First Lag Dummy Bancoldex=1	0.0315*	0.0292*	0.0364	0.0388	-0.0848	-0.0926	0.0324*	0.0333*
	[0.0130]	[0.0132]	[0.0336]	[0.0342]	[0.161]	[0.162]	[0.0151]	[0.0152]
Second Lag Dummy Bancoldex=1	0.0317**	0.0305*	0.0607	0.0620	-0.0290	-0.0413	0.0236+	0.0245+
	[0.0121]	[0.0122]	[0.0470]	[0.0478]	[0.166]	[0.168]	[0.0138]	[0.0139]
Observations	15,555	7,071	15,540	7,070	15,560	7,072	15,560	7,072
Number of establishments	4,608	2,062	4,607	2,062	4,609	2,062	4,609	2,062
Adjusted R-squared	0.019	0.020	0.007	0.010	0.008	0.010	0.028	0.036
Panel B: Loans with maturity at or below one year.								
Dummy Bancoldex=1	0.0429*	0.0323+	0.136*	0.111*	-0.0709	-0.0395	0.0597**	0.0560**
	[0.0177]	[0.0187]	[0.0609]	[0.0483]	[0.226]	[0.226]	[0.0176]	[0.0167]
First Lag Dummy Bancoldex=1	-0.0241	-0.0278	0.0770	0.0531	0.0921	0.0336	0.0335	0.0427+
	[0.0316]	[0.0331]	[0.0575]	[0.0478]	[0.272]	[0.299]	[0.0242]	[0.0250]
Second Lag Dummy Bancoldex=1	-0.00575	-0.0114	0.0167	0.00251	0.103	0.134	0.0249	0.0336
	[0.0299]	[0.0318]	[0.0346]	[0.0347]	[0.299]	[0.322]	[0.0276]	[0.0290]
Observations	12,826	2,473	12,818	2,474	12,828	2,474	12,828	2,474
Number of establishments	4,026	796	4,027	796	4,027	796	4,027	796
Adjusted R-squared	0.019	0.025	0.008	0.007	0.007	0.005	0.027	0.036

The table presents results from estimating equation 1. All regressions control for the establishment belonging to a multiestablishment firm, a dummy for making positive interest payments on financial obligations, age and age squared, as well as establishment-level fixed effects. For each outcome, the second column is obtained after restricting the dataset to beneficiaries and their nearest neighbors in terms of participation probability.

Errors clustered at the plant level in parentheses. ** p<0.01, * p<0.05, + p<0.1

Table 8. Robustness exercises performance: regressions including lagged dependent variable instead of fixed effects or PSM

	All	Small establishments	Large establishments	Short-run loans	Long-run loans
Panel A: Dependent variable = log employment					
Dummy Bancoldex=1	0.0402** [0.00591]	0.0416** [0.00820]	0.0343* [0.0156]	0.0315* [0.0123]	0.0459** [0.00668]
Observations	22,379	15,651	1,607	18,758	21,323
Adjusted R-squared	0.944	0.834	0.850	0.943	0.943
Panel B: Dependent variable = log input consumption					
Dummy Bancoldex=1	0.0997** [0.0181]	0.0633** [0.0218]	0.184+ [0.0959]	0.168** [0.0440]	0.0783** [0.0188]
Observations	22,356	15,631	1,607	18,747	21,300
Adjusted R-squared	0.836	0.803	0.731	0.826	0.833
Panel C: Dependent variable = log investment					
Dummy Bancoldex=1	0.831** [0.0908]	0.962** [0.130]	-0.0569 [0.228]	0.921** [0.164]	0.915** [0.111]
Observations	22,386	15,658	1,607	18,762	21,330
Adjusted R-squared	0.390	0.270	0.196	0.380	0.387
Panel D: Dependent variable = log output					
Dummy Bancoldex=1	0.0527** [0.00694]	0.0606** [0.00994]	0.0285 [0.0194]	0.0583** [0.0123]	0.0501** [0.00833]
Observations	22,386	15,658	1,607	18,762	21,330
Adjusted R-squared	0.952	0.893	0.931	0.954	0.951

The table presents results from estimating equation 1, with the lagged dependent variable included as an additional regressor. All regressions control for the establishment belonging to a multiestablishment firm, a dummy for making positive interest payments on financial obligations, age and age squared. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Descriptive statistics for analysis of credit characteristics

	N	Mean	Std. Dev.
Dummy Bancoldex=1	477,543	0.06	0.23
Credit value	477,543	16.09	2.64
Average interest rate	473,510	0.22	0.08
Average maturity	477,210	6.37	0.91
Number of Lenders	477,543	1.34	0.86
Fraction of loans backed by a guarantee	477,543	0.68	0.42
At least one loan being is micro-credit	477,543	0.47	0.50
Log maximum number of loans from a single financial intermediary	477,543	0.05	0.18

Table 10. Effect of Bancóldex on credit conditions.

	Credit value		Number of Lenders		Average maturity		Average interest rate	
	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM	FE	FE+PSM
Panel A: Contemporaneous effect								
Dummy Bancoldex=1	0.466** [0.0107]	0.471** [0.0106]	0.426** [0.00949]	0.411** [0.00970]	0.214** [0.00664]	0.209** [0.00667]	-0.0220** [0.000488]	-0.0223** [0.000495]
Observations	477,543	102,602	477,543	102,602	477,060	102,491	469,683	101,155
Adjusted R-squared	0.065	0.103	0.052	0.074	0.073	0.081	0.306	0.354
Number of firms	301,097	46,044	301,097	46,044	300,953	46,030	298,370	45,815
Panel B: Effects over time								
Dummy Bancoldex=1	0.518** [0.0120]	0.534** [0.0122]	0.459** [0.0108]	0.445** [0.0112]	0.217** [0.00739]	0.219** [0.00761]	-0.0214** [0.000549]	-0.0218** [0.000559]
First Lag Dummy Bancoldex=1	0.117** [0.0148]	0.150** [0.0160]	0.0742** [0.0117]	0.0804** [0.0131]	0.00697 [0.00876]	0.0211* [0.00948]	0.00116* [0.000584]	0.000883 [0.000624]
Second Lag Dummy Bancolde	0.142** [0.0165]	0.159** [0.0184]	0.0908** [0.0128]	0.0859** [0.0149]	0.00387 [0.00978]	0.0302** [0.0110]	0.00172** [0.000607]	0.00133* [0.000664]
Observations	477,543	102,602	477,543	102,602	477,060	102,491	469,683	101,155
Adjusted R-squared	0.065	0.104	0.052	0.075	0.073	0.081	0.306	0.354
Number of firms	301,097	46,044	301,097	46,044	300,953	46,030	298,370	45,815

The table presents results from estimating equation 1. Column titles indicate the respective dependent variable. All regressions control for year effects; the maximum number of loans from a single Financial Intermediary to the firm in the respective year; the fraction of loans backed by a guarantee; and a dummy for at least one loan being classified as micro-credit.

Errors clustered at the firm level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 11. Effect of Bancóldex on non-Bancóldex credit

	Credit value		Number of Lenders	
	FE	FE+PSM	FE	FE+PSM
Dummy Bancoldex=1	-0.177** [0.0204]	-0.151** [0.0206]	-0.161** [0.0156]	-0.181** [0.0162]
First Lag Dummy Bancoldex=1	0.118** [0.0221]	0.144** [0.0234]	0.0990** [0.0177]	0.108** [0.0192]
Second Lag Dummy Bancoldex=1	0.0841** [0.0220]	0.104** [0.0244]	0.0957** [0.0171]	0.0963** [0.0195]
Observations	452,024	82,600	452,024	82,600
Adjusted R-squared	0.056	0.068	0.028	0.038
Number of firms	288,818	37,341	288,818	37,341

The table presents results from estimating equation 1. Column titles indicate the respective dependent variable. All regressions control for year effects; the maximum number of loans from a single Financial Intermediary to the firm in the respective year; the fraction of loans Errors clustered at the firm level in parentheses. *** $p < 0.01$, ** $p < 0.05$

Table 12. Robustness exercises credit conditions: regressions including lagged dependent variable instead of fixed effects or PSM

	Credit value	Number of Lenders	Average maturity	Average interest rate	Non-Bancóldex credit	Non-Bancóldex lenders
Dummy Bancoldex=1	0.471** [0.0106]	0.403** [0.00625]	0.196** [0.00388]	-0.0176** [0.000344]	0.154** [0.0158]	0.0161 [0.0103]
Observations	477,543	477,543	477,060	469,683	452,024	477,543
Adjusted R-squared	0.547	0.480	0.257	0.526	0.536	0.480

The table presents results from estimating equation 1. Column titles indicate the respective dependent variable. All regressions include the lagged dependent variable as an additional regressor. In addition, they control for year effects; the maximum number of loans from a single Financial Intermediary to the firm in the respective year; the fraction of loans backed by a guarantee; and a dummy for at least one loan being classified as micro-credit.

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A1. Balance tests for propensity score matching: performance analysis

	Mean treated	Mean control	%bias	t	p> t
Panel A: Full sample					
Lagged input consumption	7.8e+06	5.8e+06	8.2	4.09	0.000
Lagged employment	98.224	61.288	18.5	11.67	0.000
Lagged investment	7.9e+05	2.7e+05	5.6	5.18	0.000
Lagged output	1.6e+07	1.2e+07	8.5	4.19	0.000
Panel B. Restricted sample					
Lagged input consumption	7.8e+06	8.2e+06	-1.6	-0.59	0.557
Lagged employment	98.224	94.655	1.7	0.58	0.560
Lagged investment	7.9e+05	5.9e+05	1.9	0.66	0.510
Lagged output	1.6e+07	1.8e+07	-2.7	-0.97	0.331

Table A2. Balance tests for propensity score matching: analysis of credit conditions

	Mean treated	Mean control	%bias	t	p> t
Panel A: Full sample					
Credit value	17.254	15.822	60.4	54.56	0.000
Average interest rate	0.235	0.240	-7.0	-5.48	0.000
Average loan maturity	903.85	759.18	23.7	21.38	0.000
Number of intermediaries	18.045	12.834	45.5	53.31	0.000
Panel B. Restricted sample					
Credit value	17.254	17.11	5.7	3.45	0.001
Average interest rate	0.235	0.241	-9.7	-5.84	0.000
Average loan maturity	903.85	896.99	1.0	0.62	0.534
Number of intermediaries	18.045	17.464	4.2	2.54	0.011