Second-tier Government Banks and Firm Performance

Micro-Evidence from Colombia

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Abstract[*]

Despite the large potential gains from credit by second-tier development banks, little is known about the actual impact of these banks' lending activity. This study partially fills that gap by analyzing the impact of the lending activity of Bancoldex, the Colombian second-tier development bank, on firm performance. The evaluation uses data over a several-year period on loans granted to firms by Bancoldex and on performance for all manufacturing establishments with 10 or more employees. Using a combination of matching techniques and fixed effects panel regressions to deal with selection biases, we find significant positive effects on output (24 percent), employment (11 percent), investment (70 percent), and productivity (around 10 percent) over the four years that followed the first Bancoldex' loan. We also find positive effects on firms' numbers of exported products and on output share as a result of short-term loans (loans with terms of less than five years). Impacts on investment, output, and productivity, however, derive mainly from long-term Bancoldex loans.

Keywords: Second-tier development banks, access to credit, job creation, firm growth, productivity

JEL Classification: G28, H43, L25, O12, O54

1. Introduction

Government-owned development banks play the crucial role of channeling public funds to productive activities that, even if promising, may be rationed from credit access and may not flourish in the absence of such credit. Particularly interesting is the case of second-tier public banks. Rather than lending directly to firms, these banks lend resources to financial intermediaries (first-tier), which eventually lend the resources to firms. In this setting, second-tier banks not only expand credit supply by making more resources available, but may also provide resources at low costs and with flexible conditions that the intermediaries *may* then pass on to the final recipients of loans. Their activity is, therefore, expected to relax the constraints that prevent some firms from accessing credit, either because it is not available at all or because it is not available at costs that these firms can afford.

Such credit by second-tier development banks has potential advantages when compared with direct public lending and other forms of direct public support to business. First, second-tier credit is aimed at addressing market failures that limit access to credit, particularly for micro, small, and medium-sized enterprises (MSMEs). Second, because commercial banks and other private financial institutions eventually take on default risks, one could expect them to adequately evaluate the quality of different projects and to separate those that are potentially profitable from those that are not. Resources should thus be more likely assigned to better uses than when governments provide direct support to businesses, sometimes assigning it on the basis of lobbying by potential beneficiaries. In fact, studies have found no effects or even negative effects on economic performance when government-owned banks lend directly. Previous analyses also show evidence that such effects may relate to allocation of direct government loans according to political criteria.[1]

Despite the potential gains from credit by second-tier development banks, little is known about their actual impact. This study is aimed at partially filling that gap by analyzing the impacts of lending activity of Bancoldex, the Colombian second-tier development bank, on the performance of manufacturing firms over the last decade. A companion paper studies

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[1] This literature is discussed in greater detail in Section 3.

Bancoldex's impacts on the characteristics of credit used at the firm level (Eslava, Maffioli, and Meléndez, 2011).

First established in 1992 to promote exports, Bancoldex became the Colombia's development bank in 2003, taking over general development policy responsibilities that were previously held by the development agency IFI (now nonexistent). Bancoldex's activities concentrate on second-tier lending: all of its credit resources are channeled through other financial or nonfinancial intermediaries.

To explore the effects of loans funded by Bancoldex on firm performance, we use micro-level data for all manufacturing establishments with 10 or more employees from 1997 through 2007 matched with data on Bancoldex credit recipients from 2000 through 2007. This allows us to study the effects of different types of Bancoldex loans on different aspects of firm performance.

After correcting for selection biases, we find that using Bancoldex loans increases firms' output, employment, investment, and productivity. Moreover, these effects grow with increases in amounts borrowed. While loans intended for long-term purposes are found to have positive impacts on output, investment, and productivity, short-term loans help improve performance in other dimensions, particularly with respect to exports.

Our study is, to the extent of our knowledge, the first econometric assessment of the impact of credit from second-tier development banks on firm performance. Our findings contribute to the understanding of how different ways of channeling public resources to the business sector can have different effects. In contrast to the negative or inconclusive findings of previous studies on the impact of direct lending by the government, our results suggest that second-tier banking can foster productive activities, especially if resources are targeted to funding long-term projects that may otherwise be hard to finance in a tight financial market.

The paper is organized as follows. Section 2 describes Bancoldex and its financing activity. Section 3 reviews previous studies on the subject. Section 4 introduces the data used in our evaluation, and Section 5 discusses our empirical approach. Section 6 presents the results of our study, while Section 7 discusses those results in the light of the existing literature and concludes this paper.

2.   Background: Bancoldex and Its Credit Lines

Bancoldex started operating in 1992 with the initial purpose of fostering exports. In 2003, Bancoldex merged with the Instituto de Fomento Industrial (IFI), a government agency with the more general goal of promoting industrial development. Bancoldex's operations include second-tier banking activities, training, and advising.[2] Since Bancoldex does not provide direct loans to producers, all of its resources are channeled through other financial or nonfinancial intermediaries.[3] Bancoldex's loans represent close to 5 percent of the total credit intermediated by supervised financial institutions in the country and 12 percent of the total number of loans (Eslava, Maffioli, and Meléndez, 2011). Bancoldex participation is more important in the group of three-year-plus loans; in that group, Bancoldex loans represent over 5 percent of total amount lent. This suggests that credit market imperfections in Colombia affect more significantly the supply of credit for long-run projects, in which the risk to lenders is higher (Armendáriz de Aghion, 1999).

Bancoldex's credit lines can be categorized in several ways. Bancoldex distinguishes its own credit lines in two groups: traditional and special quotas (Figure 1). The former term refers to permanent credit lines that are fully funded with Bancoldex resources. The lines within this category are defined on the basis of specific uses they target: investment in fixed assets, capitalization, leasing, working capital, and debt restructuring. The loan term and interest rate of loans under these lines depend on those uses: in general, lines that seek to fund investment in fixed assets and business expansion are more flexible and less costly to the intermediary (and potentially to the final beneficiary) than lines used for working capital or debt restructuring. Loans from traditional lines are not usually targeted to any particular kind of beneficiary. Appendix A1 contains a detailed list of traditional credit lines and their characteristics.

The special quotas are lines not intended to be permanent, though some have been sustained for longer than initially planned. Their distinguishing feature is partial funding by an agency other than Bancoldex.[4] The contributing agency frequently establishes specific

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[2] The latter set of activities, however, focuses mainly on microenterprises, a range of businesses beyond the scope of the present study. This analysis thus focuses on the impact of Bancoldex's credit operations.

[3] Microcredit lines are channeled through financial institutions, but also through cooperatives and NGOs.

[4] These resources from contributors are specifically used to fund the differential between Bancoldex's standard interest rate (determined according to the corresponding credit line) and the (generally smaller) interest rate assigned to the special quota.

requirements for access to the line in terms of both borrowers' characteristics (size, location, sector) and possible uses of the funds.[5] Moreover, rediscount rates for the special quotas credit lines are generally lower than those for traditional credit lines. The lifespan of a given quota expires when the contributing agency funds are exhausted, unless new funds are provided by that agency or some other source. Special credit lines can be quite similar to some of Bancoldex's traditional credit lines and even partially substitute them.

Both traditional credit lines and the special quotas can also be classified according to whether their resources can be used for short-term purposes. In principle, lines restricted to long-term projects are more likely to impact certain dimensions of firms' performance, such as productivity and investment. Long-term lines have longer maximum loan terms. Additionally, some of them have ceiling rates and others specify minimum loan terms.

Given that differences across lines could plausibly affect their impact, we concentrate some of our exercises on examining differential impacts of loans from lines targeted to longer and shorter terms. However, we also consider specifications that treat all loans funded from Bancoldex's resources homogenously. It is not a priory clear that different lines indeed have differential impacts. First, one line may predate the others. For instance, in the absence of current special quotas for funding investments with long-term impacts, the beneficiaries could have used traditional Bancoldex long-term lines, many of which share most characteristics with the mentioned special quotas.[6] Therefore, trying to separate the effects of individual lines can be called into question.

Second, while one possible goal might be to separate the effects of lines intended for short- and long-term uses, the observed lifespan of long-term loans tends to be well below the

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[5] For instance, some local governments support special quotas targeted at firms in their respective localities. In other cases, governmental agencies other than Bancoldex support lines targeted to victims of events such as natural disasters or forced displacement.

[6] A salient example of a special quota intended to fund investment in fixed assets and similar activities is aProgresar. The line, launched in 2004, provides funding for modernization: purchase of fixed assets, international expansion, product diversification, acquisition of environmentally friendly technologies, and training. All microenterprises and SMEs can request credit from this line, up to a limit of COP 3,000 million (around USD 1.5 million) per firm. The timespan for loans under this line is a minimum of 18 months and a maximum of 12 years. Several characteristics of aProgresar make it particularly interesting. First, it is the only line for which loans with longer terms pay lower interest rates. Moreover, despite being formally a special quota, it resembles Bancoldex's traditional long-term credit lines (e.g., those for fixed assets and leasing) both in terms of the prescribed use of the funds and of the line's sustainability, thanks to additional injections of funds. Moreover, aProgresar has become a flag product of Bancoldex and represents an important chunk of the resources Bancoldex has lent over the last few years.

maximum allowed term; it averages only a bit above the typical length of supposedly short-term credits, leading to questions about whether long-term lines are indeed being used for longer-term purposes than their counterparts. For instance, aProgresar offers the longest term among Bancoldex credit lines, adding the requirement that loans cannot be paid off sooner than 18 months.[7] According to Bancoldex staff, it is the minimum-term requirement that has turned out to be binding, while the maximum term is rarely reached. It seems that the difference between long- and short-term credit is not as clear-cut as one could have expected. In sum, caution should be exercised when trying to interpret results separating lines that, in practice, may be quite similar from the point of view of the beneficiary.

How does Bancoldex compare to other development banks? How does it compare to other financial intermediaries in Colombia? In other words, why should one expect that benefiting from a Bancoldex loan would improve a firm's performance, especially considering that the few existing studies for other countries have not found many positive effects? In comparison with other development banks analyzed, Bancoldex is different in that all of its credit is assigned through the second-tier model, making political targeting less likely than the experience of first-tier banks. It remains an open question whether Bancoldex serves a market that would be somewhat underprovided by other financial institutions, because Bancoldex's traditional credit lines (the bulk of credit in our period of estimation) do not explicitly target specific types of beneficiaries, nor does Bancoldex aim at subsidizing interest rates. In this sense, it seems most likely that Bancoldex role is to increase the supply of funds, particularly for longer-term credits to small and medium-sized enterprises (SMEs), in markets where funds may be insufficient.

Much work is needed—of a different nature than that undertaken herein—to establish the role Bancoldex is actually playing relative to that of other financial institutions in the Colombian market. Eslava, Maffioli, and Meléndez (2011) take a first step in that direction. Results from that work do suggest that Bancoldex credit is granted for longer terms and at slightly lower interest rates than credit to similar beneficiaries from other sources. Moreover, Bancoldex credit is likely to constitute an entry point for accessing other sources of financing or for improving

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[7] The line aProgresar is explained in footnote 6.

types of loans that a firm can access from other sources (e.g., achieving lower interest rates or longer-term loans).

3.   Related Literature

The traditional argument to justify government intervention in the financing of businesses is that market failures can ration potentially profitable (in either a private or a social sense) producers out of credit (see e.g., IDB, 2005, or De Olloqui and Smallridge, 2011). In principle, government-financed banks could provide credit to financially constrained businesses To the extent that this credit is used to finance profitable projects that would otherwise not materialize, government lending should improve the performance of these businesses, and economic activity more generally understood.[8]

Armendáriz de Aghion (1999) enriches this vision in a formal model of development banking. Her model shows that development banks can play a particularly important role in funding long-term innovative projects with their large sunk costs, because credit rationing is particularly likely for such projects (Dewatripont and Maskin, 1995). The impact is magnified if development banks collaborate with private banks that would otherwise not fund long-term innovative projects: an initial joint funding of these activities increases the chances that the private banks involved will continue to provide independent funding. Armendáriz's model suggests that the impact of government-owned (or government-financed) banks on economic performance is linked to how they target and channel lending. Positive impacts are likely only to the extent that funding activities properly target credit-rationed uses, especially long-term projects. Therefore, these impacts are likely to be amplified by collaboration with the private financial sector.

Though the rationing of long-term funding may be particularly costly, costs also arise from restricted access to short-term loans. For instance, Eslava et al. (2010) find that credit-constrained firms in Colombia are more likely forced out of the market during recessions than unconstrained ones, even if highly productive. Minetti and Zhu (2011) show that credit-rationed

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[8] Development banks can also conduct countercyclical policy and play a regulatory role by introducing competition in a potentially concentrated financial market (De Olloqui and Smallridge, 2011.) The current study does not address the impact of Bancoldex in either area, among other reasons because they have not been among Bancoldex's objectives.

Italian firms are less likely to export than their counterparts with better access to credit. Both papers suggest that these findings may reflect the need to finance working capital to back the fixed costs of producing and/or exporting. In this context, even short-term public financing may have a positive impact on firm performance.

Perhaps because of perceived large potential gains from government ownership of banks, public participation in the financial sector is widespread, particularly in first-tier banks, where much existing research has focused. Using cross-country bank-level data, La Porta et al. (2002: 265) find that government ownership is "large and pervasive, and higher in countries with low per capita income, backward financial systems, interventionist and inefficient governments, and poor protection of property rights." Of 92 countries in their sample, fewer than 10 had no government ownership of banks in 1995. The authors also document the key role of government-owned banks in the financial sector: for the average country in their sample, close to 30 percent of assets owned by the top 10 banks was owned or controlled by the government.

Empirical investigations about the actual impact of direct public lending, however, are scarce and show mainly discouraging results. La Porta et al. (2002) find that higher government involvement is associated with slower subsequent financial development, lower economic growth, and lower productivity growth. Barth et al. (1999) and Beck and Levine (2002) report similar negative correlations between government ownership of banks and development indicators; Caprio and Peria (2000) report a link between government ownership of banks and a higher probability of a banking crisis. A related study by Galindo and Micco (2004) using industry-level data for 33 countries, concludes that in sectors that depend more on external finance, credit from government-owned banks does not contribute to growth, while private sector credit does.

The poor general impact of government-owned banks has been attributed to political influences on the allocation of government loans. Dinç (2005) shows that government-owned banks tend to increase their lending in election years. This result is robust to controlling for both bank-specific and country-specific macroeconomic and institutional factors. In a within-country study for electoral districts in India, Cole (2009) also shows election-year increases in lending by government-owned banks, in this case targeted at districts where electoral races are close. The author suggests that such targeting is costly in terms of both bank performance and the impact of

lending on output. This hypothesis seems supported by findings of Micco et al. (2007) that state-owned banks in developing countries show lower profitability than private counterparts, especially during election years. In a related paper addressing lending in Italy, Sapienza (2004) finds that government-owned banks charge lower interest than commercial banks, with the difference especially large in districts that are strongholds of the political party affiliated with the respective bank.

The aforementioned studies use data at some level of aggregation. 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. Results from these studies are somewhat more supportive of public lending, though with several qualifications. Hall and Maffioli (2008) review a series of evaluations of the impacts of Technology Development Funds (TDFs), including credit lines in Brazil and Argentina that specifically support research and development (R&D) investments. Results in these cases show clearly positive impacts of direct public lending on firms' R&D investments, ruling out the presence of any crowding-out effect of private resources. Other papers study the effect of credit lines of the Banco Nacional do Desenvolvimento (BNDES) on firm performance, reaching mixed conclusions. While Ottaviano and Sousa (2008) find a positive impact on productivity, De Negri et al. (2010) and Ribeiro and De Negri (2009) find no evidence of such effects, and De Negri et al. (2010) on the other hand, find positive effects on exports and employment. Carvalho (2010) concludes that BNDES loans are politically targeted: close to reelection years, employment expansion by firms eligible for BNDES lending occurs in regions where incumbents are allies of the central government.

The contribution of this paper to this empirical literature is twofold. First, the study uses detailed firm-level data on both firm performance and Bancoldex lending in order to analyze the effects of lending by a government-owned bank on various dimensions of firm-level performance, controlling for firm characteristics. It also explores to what extent the effects depend on the amount of credit obtained and the intended uses of the funds. A second contribution of this study is its focus on second-tier banking activities, a widely diffused approach in emerging economies that has been only marginally evaluated. As mentioned before, second-tier lending is less likely to be subject to political pressures because the intermediating commercial banks select the loan beneficiaries and ultimately take on risk of default. For the

same reason, it is likely that successful applicants are those whose projects show greater potential. Finally, the nature of second-tier activities creates the conditions for synergies between the development bank and private banks mentioned by Armendáriz de Aghion (1999). Thus, the effects of second-tier government banking are more likely to be positive than when government-owned banks engage in direct lending. This study is a first test of that hypothesis. Besides looking at the specific impact of one development bank on firm performance, which is important in itself, a comparison between results in this study and those in studies for direct government lending sheds light on the optimal way to channel public resources in cases of limited access to credit.

4.   Data

One fundamental contribution of this study is the use of detailed data for each credit recipient, as well as for counterpart nonrecipients, to evaluate the impacts of government-funded credit. With very few exceptions, previous studies have lacked access to this level of detail and have therefore used highly aggregated data to infer the impacts of government-owned banks.

Our analysis focuses on how obtaining credit from Bancoldex affects a firm's output, use of inputs (capital and labor), total factor productivity (TFP), and exports. To this end, we use information from two data sources. The first dataset lists each loan that Bancoldex granted to firms for the period 2000–2009.[9] Secondly, we use the Annual Manufacturing Survey (AMS) to flesh out information on firm characteristics and performance.

The first dataset provides the amount of each transaction, the Bancoldex credit line under which the loan was granted, the rediscount rate the financial intermediary pays Bancoldex, the interest rate the borrower pays the financial intermediary, the term length, the date of disbursement, and the use of collateral. This database also identifies each loan recipient, using an ID that later allows us merge this information with data on firm performance for both recipients and nonrecipients of Bancoldex credit in the manufacturing sector. Bancoldex loans are classified into credit lines that differ in terms of resource destination, rediscount interest rate,

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[9] Before 2003, these include only loans from Bancoldex's credit lines to exporters. From that year on, after taking over some of IFI's responsibilities, Bancoldex expands its activity to assume its fully-fledged role as a development bank.

minimum and maximum terms, and–in the case of loans under some special quotas–requirements that firms must satisfy to gain access to the line (e.g., size or location). Besides looking at Bancoldex credit in general, we look separately at the effects of being granted a loan intended to fund long-term projects versus a loan intended for shorter-term uses. By "long-term," we mean loans from lines that restrict resource use to investment in fixed assets (either through direct purchase or leasing), provided that the loans have terms equal to or greater than five years. By "short-term," we mean loans with terms shorter than five years coming from lines that are restricted to uses other than investment.[10]

The AMS database, developed and owned by the national statistical agency DANE (*Departamento Administrativo Nacional de Estadistica*), provides annual information on all manufacturing establishments with 10 or more employees, and allows tracking each establishment over time.[11] The kind of rich information the AMS provides for the manufacturing sector is not available for other sectors of the economy. Our study thus focuses on manufacturing. While this represents a limitation, there are reasons why the cost of this focus may not be major. First, a large chunk (about 25 percent) of the Bancoldex beneficiaries with 10 or more employees is covered by the survey between 2000 and 2007.[12] While businesses with fewer than 10 employees represent the most numerous share of Bancoldex beneficiaries, they receive only a small share of total credit value. On the contrary, firms with 10 or more employees account for over 80 percent of Bancoldex's credit disbursements during the observed period. Moreover, even with the limitation of focusing on just one major activity, the AMS is a particularly valuable source given its census-type coverage of establishments over nine employees: firm-level surveys in most other countries cover only samples of SMEs.

The AMS assigns establishments IDs that are stable over time, allowing the construction of a panel; the information we use for this evaluation covers 2000–2007. Moreover, the firm to

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[10] Loans for less than five years, but intended for investment in fixed assets, do not fall into either of these categories and are therefore excluded from our regressions for long- and short-term loans (though not from our evaluation of the general effects of Bancoldex). The same can be said for loans with terms over five years but intended for "short-run" purposes, such as working capital. We test the robustness of our results by using alternative definitions of long-term and short-term loans. We discuss the outcome of those robustness exercises in greater detail below.

[11] 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.

[12] The distribution of Bancoldex 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.

which each establishment belongs is also assigned a fixed ID, permitting aggregation of information to the firm level. This study focuses on firms that own a single establishment (i.e., more than 97 percent of the annually surveyed firms) because attempting to measure a firm's characteristics on the basis of establishment characteristics may not yield reliable results in the case of a multiestablishment firm.[13]

The AMS provides information on production; use of labor, capital, and materials; purchases of fixed assets;[14] interest payments; and details about location, sector of activity, and other firm characteristics. From these data it is possible to compute firm-level measurements of TFP. In particular, we compute TFP as residuals from a standard production function. For this purpose we use the factor elasticities estimated by Eslava et al. (2004) applying instrumental variables methods on AMS data from 1982–1998.[15] Moreover, we add firm-level information on exports in terms of both value and number of exported products by matching the AMS with customs records.

Using firm IDs available in both the Bancoldex dataset and the AMS, we merge information and create a firm-year dataset containing information on Bancoldex loans that each firm received during each year. The firm is flagged as a recipient of Bancoldex credit in general and a recipient of resources from respective credit lines. Data include total amount of resources received, average interest rate, rediscount rate, and loan term for the various loans obtained from the different Bancoldex lines.[16]

Ideally, we would combine information from Bancoldex and AMS in a single dataset that also contains any information about loans received by each firm from sources other than Bancoldex. We could then examine the impact of being a Bancoldex beneficiary on a firm's credit structure and the related effect of any reduction of credit constraints on firm performance. In other words, by having this information together, we could more precisely identify how much of Bancoldex's effect on firm performance could be attributed to relaxed credit constraints.

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[13] Most problematic is the assignment of sector and geographical location for multiestablishment firms. The aggregation of performance indicators to the firm level is also controversial for these firms.
[14] In what follows we use purchases of fixed assets, excluding terrains and buildings, as our definition of investment.
[15] Estimates of TFP using different sets of estimated factor elasticities are highly correlated with each other (e.g., Eslava et al., 2010).
[16] Given bank, commercial, and statistical reserve requirements in the Colombian legislation, all information was housed and used at DANE. DANE enforces strict data protection protocols to ensure compliance with the aforementioned legislation.

Although we do have access to information on all loans from financial intermediaries received by each firm, statistical and bank reserve requirements that protect the information from the different data sources make it impossible to bring this additional information into one database. Therefore, we use statistical techniques to compare Bancoldex beneficiaries to nonrecipients that are similar, to the degree possible, in terms of credit access. We leave a detailed examination of the impact of Bancoldex on a firm's credit structure for a separate paper (Eslava, Maffioli, and Meléndez, 2011).

The remainder of this section presents descriptive statistics to give an idea of both Bancoldex activity and firm characteristics. Table 1 shows the evolution of Bancoldex financing activity between 2000 and 2009, measured by the number of firms that obtained loans backed by Bancoldex's rediscount credit lines. As can be seen, the number of firms with access to this type of credit takes off over time. Not only is the change in scope from taking over another development agency's responsibilities in 2003 evident from these numbers, but also a policy change, making it a priority to extend credit to smaller firms, is apparent. The number of large firms with Bancoldex loans fell substantially between 2003 and 2006, but rose again in 2007 as a result of the role played by Bancoldex during a recent crisis with Venezuela; it involved a mandate to aid exporters—typically large firms—affected by the interruption of diplomatic relations with that country. Meanwhile, the number of firms of other sizes served by Bancoldex increased dramatically over the same period.[17] The contrasting trends between large firms and the rest can also be observed in Figure 2, which shows the evolution of Bancoldex's total credit value in USD by firm size during the same period.

In addition to reaching out to smaller firms, policy changes for Bancoldex since 2003 have also included notable decreases in average loan size granted and number of credit operations. Table 2 shows that, while the few Bancoldex loans to microfirms in 2002 averaged around USD 400 thousand, by 2009 that average loan was USD 1.6 thousand. This decrease partly reflects Bancoldex's change of focus from exporting firms to a wider range of beneficiaries, combined with a determination to target smaller firms via the supply of microcredit. The change is less marked for larger firms, but average loan sizes from 2002 to

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[17] We use the Colombian standard firm size categories whereby firms with 10 employees or less are microfirms; firms with more than 10 employees and up to 50 are small firms; firms with more than 50 employees and up to 200 are medium firms; and firms with more than 200 employees are large firms.

2009 decreased as follows: USD 81.4 thousand to USD 56.1 thousand for small firms; USD 237.0 thousand to USD 189.3 thousand for medium firms; and USD 2.6 million to USD 0.9 million for large firms. The average number of loans per firm went from 3.1 to 1.1 between 2000 and 2009. For large firms the corresponding numbers were 4.7 in 2000 and 1.8 in 2009. This category experienced the most notable change by this measure (see Table 3); it is also the only category where the decrease in loans per firm is not accompanied by a marked increase in the number of beneficiaries.

Table 4 shows the number of firms per year in the AMS database, the Bancoldex database, and the merged database. Manufacturing firms obtaining Bancoldex loans increase substantially over time as a share of all manufacturing firms, from 5.8 percent in 2000 to 16.7 percent in 2007. Tables 5 and 6 present the beneficiaries of loans from Bancoldex credit lines in AMS during 2000–2007 by type of credit line obtained. Table 5 categorizes loan beneficiaries using Bancoldex's standard categorization of credit lines: traditional credit lines, and special quotas. Although aProgresar belongs in the group of special quotas, we show aProgresar loan beneficiaries as a separate category because of this credit line's particular characteristics and the central role it plays in Bancoldex's services menu. The table shows expansion of activity through traditional credit lines through 2005 and a subsequent move toward credit from special quotas. It also shows that it is not uncommon for firms to obtain loans from two credit line types simultaneously. Finally, it shows that while aProgresar appears to have been rapidly penetrating the loan market in the manufacturing sector, the phenomenon is too recent to evaluate the impact of this line separately, especially given the common characteristics between aProgresar lines and other Bancoldex lines that firms may have already been using.

Table 6 shows loan beneficiaries categorized according to term length and use of loans they obtained during 2000–2007. As mentioned, long-term loans are those of more than five years, targeted to long-term uses. This categorization helps us evaluate the impact of characteristics that may be shared by different credit lines. Table 6 shows that most beneficiaries in the manufacturing sector are beneficiaries of short-term loans; that firms with long-term loans accounted for 13 percent of all beneficiaries in 2004, when their participation was the highest; and that about 1.6 percent of all beneficiaries during 2000–2007 obtained long-term and short-term loans from Bancoldex credit lines simultaneously.

Finally, Table 7 shows that manufacturing firms benefiting from Bancoldex credit lines in at least one year of the sample (2000-2007) were on average more than twice as large as nonbeneficiaries. This difference holds true in a number of dimensions, for example, output, sales, employment, exported output share, and labor productivity.

5.   Empirical Approach: Evaluating the Impact of Bancoldex on Firms' Performance

We expect Bancoldex's impact on firm performance to come from easing credit restrictions. Therefore, we attempt to identify whether firms that received credit from Bancoldex performed better than firms that arguably had similar access to credit but did not benefit from Bancoldex lines. Our baseline independent variable will simply be a dummy indicating whether the firm was or was not "treated," in the sense of having received credit from Bancoldex.[18] We create a control group by identifying firms with similar past performance, assuming that such firms have similar current access to credit; this is consistent with the literature that has identified size and other firm characteristics as highly correlated with credit access (Schiantarelli, 1996.) Our dataset brings together information from Bancoldex and the AMS, covering use of Bancoldex from 2000-2007 and firm characteristics from 1997–2007.

We estimate equations of the form:

$$y_{it} = \gamma_i + \gamma_t + \delta B_{it} + \omega_{it} \qquad (2)$$

where y_{it} is a measure of performance, B_{it} is a dummy indicating whether the firm had loans from Bancoldex credit lines, and we control for firm and year effects. Our set of dependent variables includes output, employment, capital stock, investment, total factor productivity (TFP), labor productivity, spending in research and development, exports, and number of exported products.

Since beneficiaries of Bancoldex credit are selected by banks seeking to guarantee that loans will be paid back, we may observe that superior performance by beneficiaries relates not to any positive impact of the loan on them, but rather to the selection criteria. In addition, firms

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[18] In some additional specifications, we use amount of resources received from Bancoldex as our measure of treatment.

may self-select into Bancoldex credit lines on the basis of characteristics that can be related to potential performance. An additional identification problem relates to the fact that nonrecipients may have received similar loans from non-Bancoldex sources. If Bancoldex benefits mostly firms that are relatively more credit-constrained than others, it is likely that less constrained nonrecipients actually receive much more credit than Bancoldex beneficiaries, and thus potentially perform better.

To control for these potential sources of bias, we use a combination of Difference-in-Difference (DID) and Propensity Score Matching (PSM) techniques. With DID, we exploit between- and within-firm variability. In fact, potential sources of selection bias associated to firm-specific unobserved characteristics can be mitigated using a fixed-effects model, as in Equation (2). In addition, to ensure that firms are similar at baseline, we restrict our sample to a common support of both beneficiaries and nonbeneficiary firms with similar ex-ante performance. The benefit of this approach is twofold. First, it reinforces the credibility of the basic identification assumption of the DID method. Secondly, it allows us to control for ex-ante access to credit, given that access to credit is highly correlated with size and other firm characteristics (Schiantarelli, 1996). Thus, although we cannot control for loans from sources other than Bancoldex, we can mitigate this concern by comparing recipients to nonrecipients likely to have similar access to financing.

We use PSM to indentify our common support. For each treated firm we include a control firm with the closest estimated probability of receiving credit from Bancoldex resources (the "nearest neighbor").[19] The probability of participation is modeled as a function of variables capturing pretreatment performance: output, employment, productivity, capital intensity, and exports in the year before treatment; the growth of output, of productivity, and of exports over the three years preceding treatment; and other characteristics such as location, sector, size in terms of assets (at the time of treatment), a dummy indicating whether the firm had debt in the year before treatment,[20] and type of organization. The propensity score is estimated using a logit

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[19] Below, we discuss further the robustness of our results to using other criteria, still within the Propensity Score Matching approach, to select the control group.

[20] We flag as indebted firms that report positive payments of interest in the year preceding treatment. Using the amount of interest payments as a proxy for the amount of debt the firm has been able to access, as opposed to simply identifying if the firm had debt or not, would be more controversial for two reasons. First and foremost, interest payments on a very large debt contract may be very small if the contract is nearing the end of its term. Second,

model. Note that we take advantage of pretreatment characteristics over a three-year period. We do this to address selection concerns as precisely as possible by providing evidence of the credibility of DID basic assumptions (e.g., equality of pretreatment trends for treated and control groups). Obviously, this implies that we are estimating effects only for firms that have been in the market for at least three years.

PSM techniques require that the criteria for selection into the program can be measured and incorporated into the propensity score. Bancoldex credit, especially from the traditional lines that prevailed in the period of estimation, is in principle available to all producers. However, since credit is granted or withheld from a particular applicant by financial intermediaries, it is likely not randomly assigned. Financial intermediaries are more likely to grant loans to applicants whose performance suggests an ability to repay the loan. This reason is the basis for modeling participation as a function of the comprehensive set of pretreatment characteristics given above. We assume that these characteristics properly approximate the observable features financial intermediaries take into account when making lending decisions. We do not expect that the limitations imposed by the criteria for inclusion into our dataset introduce further sources of selection bias that we cannot control for, since those criteria are independent of inclusion in the program and the data apply to plants with certain characteristics (manufacturing plants with 10 or more employees).

To implement our general estimation strategy, we have to make choices regarding Bancoldex credit lines to be evaluated, timing of treatment, and the time span over which effects are estimated. We begin by treating all Bancoldex loans equally–that is, a firm receiving credit from any Bancoldex credit line will be considered a treated firm in our first set of exercises. In subsequent estimations, we attempt to disentangle the effects of credit lines intended for long- and short-run purposes, as is explained in Section 7.

Regarding the timing of treatment, we restrict our attention to firms treated in one year of our sample period, 2004. Focusing on a single year has the advantage of allowing, in a single estimation, a clean definition of pre- and post-treatment periods. There are two reasons to take 2004 as our baseline. First, starting in that year, Bancoldex becomes a more important player: the amount and number of disbursed loans surge and the loans reach a much larger and more

interest payments may be related to trade credit or other forms of debt, which are inversely related to credit with the financial sector.

diversified group of firms (see Table 5). Secondly, we have data on firm performance up to 2007, leaving us a four-year window to examine the effect of loans disbursed in 2004. Since impacts on output, productivity, and other characteristics may take time to materialize, having a window beyond one or two years is desirable. We define treatment as having first received Bancoldex credit in 2004.[21] Firms in our control group are chosen among those not receiving Bancoldex credit in any year of our sample.

We allow the effects of having received treatment to take several years to materialize. To this end, we examine firm performance over the four years in our dataset that follow treatment: 2004–2007. This means our treatment dummy in Equation (2), B_{it}, takes a value 1 for treated firms since 2004 (and is equal to zero in preceding years). In subsequent exercises we split the treatment dummy into several, considering whether treatment was received in the current year or one year, two years, or three years before the current year.

6. Results: The General Effect of Using Bancoldex Credit
a. A Pure Panel Approximation

As a preliminary exercise, and to provide a benchmark, we begin by estimating Equation (2), using standard panel data techniques. Rather than restricting attention to a common support, we introduce control variables to compare across similar firms. In addition to time and firm effects, control variables include the lagged dependent variable and a dummy indicating whether the firm was indebted in the previous year. Lagged indicators of performance offer a parsimonious way of capturing unobserved sources of variability. The debt indicator is intended to capture past credit history. Though this approach probably does a poorer job of controlling for selection biases than more flexible matching methods, it has the advantage of not losing the large number of firms that the matching estimator eliminates when creating the common support.

The simultaneous presence of firm effects and the lagged dependent variable introduces well-known endogeneity biases in our panel estimation; we correct these biases using System-GMM techniques. We estimate endogenous variables with all the available lags, but collapse the

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[21] In alternative estimations, not reported here, we define treatment as having received Bancoldex credit only in 2004. Not surprisingly, we find weaker effects of Bancoldex for this definition of treatment. Not only did firms identified as treated under this definition received less intense "treatments," but this approach also implied losing information for firms that received loans from Bancoldex credit lines more than once during the period.

instrument matrix to reduce the number of instruments. The estimate is conducted over a dataset covering all firms that did not receive Bancoldex loans in any year of our sample and firms that received a Bancoldex loan in 2004 for the first time. Other Bancoldex beneficiaries are not considered. As explained above, the treatment dummy is marked as one for treated firms in 2004 and all subsequent years.

Results are presented in Table 8. Having used Bancoldex credit is found to improve firm performance in a number of dimensions: increases in output, employment, investment, and productivity. The effects are large, ranging from around 20 percent (rather, 20 log points) for employment and productivity, to around 30 percent for output. On the other hand, no robust effect is found in terms of exporting behavior: although there seems to be a positive effect on the number of exported products, the improvement is only marginally significant and is not reflected in an increase in the value of exports. In general, the estimated specifications are supported both by tests of serial correlation in the first-differenced residuals and by Hansen tests on the exogeneity of instruments.

b. Baseline Estimation: All Credit Lines

With this preliminary exercise as background, we move to PSM estimators. We first present the results of the participation model, summarized in Table 9 (Column 1). In this model, receiving Bancoldex credit in 2004 for the first time) is a function of the pretreatment characteristics mentioned above (see Section 5). Participation is positively correlated with output and export growth over the previous three years, as well as, weakly, with pretreatment use of credit. On the other hand, firm-level characteristics (output, employment, exports) are not found to have a significant effect on the probability of receiving a loan from Bancoldex in 2004.

These findings are consistent with second-tier nature of Bancóldex. The financial institutions passing along Bancoldex's funding assume the risk of borrower default, thus they have strong incentives to carefully screen applicants. Intermediaries seem to be selecting firms that have shown recent dynamic growth, even if they are not already large companies. It seems plausible that these firms show promise in terms of potential growth, and in this sense Bancoldex credit seems to be properly targeted at promising rather than powerful firms. Because previous debt (Dummy Debt t-1) is an indicator of some financial soundness, a positive coefficient of this indicator would also be consistent with the idea that financial intermediaries are properly

screening applicants and choosing beneficiaries that are unlikely to default. This screening would protect the public resources provided by Bancoldex, although it may seem at odds with the goal of targeting public credit to the most financially constrained firms. It remains to be seen whether government partial credit guarantees that are granted automatically to loans below particular size thresholds (through the National Guarantee Fund[22]) allow Bancoldex to fare well in both dimensions, that is, to target firms that are promising in terms of potential growth and are also credit constrained.

We explore this issue in more detail in the companion paper previously mentioned (Eslava, Maffioli, and Meléndez, 2011), where we evaluate Bancoldex's impact on access to credit. In the meantime, we underscore the fact that tension between these two targeting dimensions poses a difficult challenge to adequate policy design. Also, the model seems to be doing a good job at matching treated firms with similar untreated firms (Table 10, Column 1, and upper panel of Table 11 and in Figure 3). While the (unconditional) means of most firm characteristics included in the estimation are higher for treated firms in the overall sample, there is no statistically significant difference in the common support (see Table 10, Column 1). Moreover, the Kolmogorov-Smirnov test of equality of propensity score (p-score) distribution indicates that the hypothesis that treated and untreated 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 (see Table 11, upper panel). Figure 3 (upper panel) presents the distributions of p-scores for treated and untreated firms before the PSM, and for treatment and control groups in the common support. While the difference in p-scores between treated and untreated firms is wide for the overall sample, the distributions of p-scores are very similar in the common support.

Figure 4 shows evidence that treated and untreated firms in the common support (right-hand panels) behave similarly in terms of pretreatment trends for selected firm outcomes. Note that this similarity is not present when all never-treated firms are included (left-hand panels). This figure also shows interesting disparities in trends following the treatment year (2004, marked with a red line), even within the common support, which suggests a positive effect of the

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[22] The National Guarantee Fund is a government program that provides partial credit guarantees to microfirms and SMEs without collateral to facilitate their access to commercial banking loans (regardless of whether they come from Bancoldex rediscount credit lines or not). These partial guarantees are automatically approved for loans of less than a certain amount.

treatment. For the variables considered (output, employment, productivity), we observe higher growth starting in 2004 for the treated group. While this is a first indication that Bancoldex credit contributes to firm growth, over at least some dimensions, we conduct a more systematic analysis by estimating Equation (2) for firms in the common support.

Results of this estimation are presented in Table 13, while the first panel of Table 12 presents descriptive statistics for the common support, to aid in interpreting results. The upper panel presents results of estimating Equation (2) without restricting observations to firms in the common support, and the bottom panel restricts the estimation to the common support. We find that Bancoldex credit positively affects firm performance in terms of output, employment, investment, and productivity, even after restricting attention to the common support. The estimated effects are consistent with our results from the GMM estimation in terms of both sign and significance. On the other hand, the point estimates, though still large, are significantly lower than to those in Table 8, suggesting that the GMM estimation, as we specified it, is not fully dealing with issues of selection. It is worth pointing out important differences in estimates between the upper and lowers panels of Table 13. Again, this difference shows how important it is to carefully controlling for potential selection bias when evaluating the impact of Bancoldex.

We now move to our central set of results. Focusing on our preferred estimation (lower panel in Table 13), we find that Bancoldex's beneficiaries exhibit increases in output, employment, investment, and productivity over the four years that follow their first Bancoldex loan. The estimated effects are of 24 percent for output, 11 percent for employment, 70 percent in terms of investment, and around 12 percent in terms of labor productivity. Although there seems to be no impact in terms of how much firms export as a share of output, we do see a positive effect in the number of products firms export. This effect may reflect attempts to diversify exports with subsequent positive impacts on exported amounts, but such impacts are not picked up by our estimations covering the four years after initial treatment. The effect on export is also consistent with the hypothesis that Bancoldex helps to remove credit constraints, in light of Minetti and Zhu's finding that such constraints affect a firm's chances of exporting.

We also explore how impacts on firm performance of accessing credit from Bancoldex evolve over time. To do this, we divide our treatment dummy into four dummies representing firms receiving credit from Bancoldex in the current year; one year ago; two years ago; or three

years ago (Table 14). The estimations are implemented for using same common support shown in Table 13. Our findings indicate that a stronger positive impact of Bancoldex loans on firm performance over time. The exception is the effect on investment; it seems to have an immediate effect that does not persist over time. These results could indicate that some firms use Bancoldex loans to invest in additional capital and, furthermore, that the added production possibilities have a persistent effect on a firm's output, productivity, and demand for other complementary factors.

In summary, after controlling for selection biases, we find that Bancoldex has positive effects on output, employment, investment, productivity, and export diversification. While the impact on investment is immediate and short-lived, the consequent effects on other dimensions of firm performance continue over time. These findings dramatically contrast with negligible–even negative–effects on economic performance by government-owned banks that were identified in previous studies.

To complement this set of baseline results, we attempt to identify whether Bancoldex impacts result, in fact, from lifting credit constraints on firms. We examine differences between firms that are more financially constrained and less so, using the approach proposed by Hsieh and Parker, 2007, to separate firms according to the degree to which they face financial constraints. Investments by financially constrained firms depend on internal funding and, therefore they should be related to the firm cash flow. Hsieh and Parker suggest calculating the correlation between investment and cash flow for each firm, and then separating firms into more or less constrained based on the value of that correlation.[23] In particular, we create a "financially constrained" dummy equal to 1 for firms in the upper third of the distribution of said correlation coefficients. In calculating the investment-cash flow coefficients, we attempt to identify pretreatment financial constraints by focusing on the pre-2004 period.[24] Our cash flow measure

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[23] The insight that a tight relationship between cash flow and investment is indicative of financial constraints has a long tradition in the literature (Schiantarelli, 1996). However, this theory has also been the subject of hard criticism. Splitting the sample into portions of the distribution of the investment-cash flow correlation, rather than proxying the extent of constraints by the correlation coefficient itself, partly addresses some of these criticisms (see Eslava et al. 2010). For the purposes of the current study, however, the difficulties of assessing the degree to which a firm is constrained should be kept in mind when interpreting our results.

[24] We actually calculate the correlation between investment rates and cash flow rates (cash flow divided by capital stock).

is calculated directly from AMS information relating to a firm's operational profits.[25] When interpreting our results, it should be kept in mind that we are not using actual reports on benefits from financial statements, so our calculated correlations are noisier than those from other studies that take similar approaches.

We re-estimate Equation (2) adding our financially constrained dummy and an interaction between this dummy and the dummy that identifies a Bancoldex beneficiary (Table 15). Despite our noisy measure of financial constraints, we see a much stronger effect on the group of more constrained firms. The interaction between the treatment variable and the financially constrained dummy has positive effects on output, employment, and investment. In fact, the Bancoldex impacts on employment and investment seem to be solely driven by effects on firms that are more financially constrained: the coefficient on the interaction term is positive and significant, while the coefficient on the Bancoldex dummy becomes insignificant. We interpret these findings as strongly suggesting that, in fact, the positive impact on firm performance of having received a Bancoldex loan is driven by a lifting of credit constraints.

We also extend our evaluation to study how the intensity of treatment influences performance. To this end, we estimate Equation (2) redefining B_{it} as the amount of a Bancoldex loan in year t. The equation is estimated over the same common support used in Table 13. That is, we examine the effects of a loan of a given amount on the performance for firms first treated in 2004 and, by comparison, for firms first treated in 2004 receiving loans of different amounts; and also with firms receiving no Bancoldex resources. Results of this exercise are shown in Table 16.

Consistent with what we found in Table 13, the amount of the loan has positive effects on output, employment, and investment. Estimated coefficients indicate that an increase of 10 percentage points in loan value yields increases of approximately 0.1 percentage point percent for output, employment and exports, and 0.5 percent for investment. On the other hand, we find no significant effects of marginally increasing the loan amount on productivity.

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[25] We calculated operational profits as the difference between sales and expenses associated with the firm's activity. The latter includes labor costs, inputs, and other costs associated with the firm's production process, along with management and sales expenses reported.

c. Estimation by Category of Credit Lines

We now move to the results by category of credit lines. We ask whether loans designed to fund long-run investments have greater impact than short-term loans on outcomes related to purchase of fixed assets, output, and productivity. To answer this question, we follow similar steps as previously, but again redefining the treatment variable in terms of use of one of these types of lines.

We estimate separate participation models for long-term and short-term loans treatment variables, modeling first-time use of each type of Bancoldex credit in 2004 as a function of firm characteristics before treatment (Table 9, columns 2 and 3). In both cases, participation is again positively correlated with growth over the previous three years. In the case of short-term loans participation is also correlated with pretreatment use of credit and export growth, while in the case of long-term loan participation is negatively correlated with the share of exported output. As in the overall sample, the pretreatment levels of other outcomes (output, employment, and productivity) do not appear to have significantly influenced the likelihood of receiving a first Bancoldex loan of any type in 2004.

Both participation models seem effectively match treated firms with similar untreated firms (see balance tests in Table 10, columns 2 and 3). As shown in Table 11 (medium and bottom panels), Kolmogorov-Smirnov tests measuring equality of propensity score distribution (p-value of 0.52 for the short-term model and 0.51 for the long-term model) indicate that the hypothesis that treated and untreated firms have equal p-score distributions cannot be rejected after matching. Figure 3 (middle and lower panels) shows the distributions of propensity scores for treated and untreated firms before and after matching. Distributions become much more similar in the common support, compared with the overall sample. Although the equalization of distributions is not visually evident in Figure 3, the Kolmogorov-Smirnov test supports it.

For these exercises, treated firms are defined as those receiving credit solely from the category under analysis (long-term or short-term). A different strategy would not allow us to properly isolate the effect of a specific type of Bancoldex credit (as shown in Tables 5 and 6, some firms have loans from different lines simultaneously).[26] Likewise, control group firms

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[26] For instance, a firm "treated" with a long-term Bancoldex loan is one that received this type of loan for the first time in 2004, and did not receive other types of Bancoldex loans in any year of the sample.

continue to be those that did not receive any type of Bancoldex loan during the sample period. The timing of treatment once again includes firms that received credit for the first time in 2004.

The results of estimating Equation (2), restricting data to respective common supports, are presented in Table 17 (for long-term loans) and Table 18 (for short-term loans).[27] There are interesting differences in the respective effects: loans intended to fund long-term projects increase not only investment, but also output and productivity; but for short-term loans, no significant effect on investment or output is evident. The results show a marginally significant effect on TFP—smaller and less precisely estimated than for long-term lines. Interestingly, shorter-term lines do have significant positive impacts on exports and number of exported products, that is, measures of performance that can be linked to the purpose of these lines.

A word of caution is needed here. When focusing our attention on specific credit lines, we end up working with very small samples, in particular in the case of long-run loans that are less frequently used (Table 6). This reduced sample size makes inference difficult, and may partially explain our inability to find significant effects of Bancoldex credit on some dimensions of firm performance. On the positive end, despite the small number of observations, we are still finding effects on other dimensions and these effects not only are statistically significant, but also are plausibly different across categories of credit lines.

To complete this exercise, we check the robustness of our results with respect to using different criteria to define short- and long-term loans.[28] We first consider defining short- and long-term loans solely on the basis of their intended destination. In that case, loans intended to fund investment are considered "long-term" loans, while lines intended for purposes such as working capital and financing exports, among others, are classified as "short-term" loans. We continue to find that the longer-term loans influence output, productivity, and input use, while short-term loans have positive impacts on export diversification. Surprisingly, we are unable to pinpoint any effect of either type of loans on investment in this setting. We obtain similar results when the definition of a short-term loan is three years rather than five years, with no restriction imposed on the loan's stated destination. These results would suggest that the longer-term loans

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[27] The way in which we define short-term and long-term lines is explained in Section 3. It is worth reminding the reader, at this point, that these two categories of lines do not cover the full universe of Bancoldex credit lines, for reasons explained above.

[28] These results are only commented upon, not reported. They can be obtained from the authors upon request.

(in particular those longer than three years) are the ones that have an impact on investments. If we attempt to split loans into "very short-term," "medium-term," and "long-term" (respectively defined as 18 months, 18–36 months, and over 36 months), we find that effects on export diversification from short-term loans are due to the loans with terms under 18 months. This finding would suggest that entering the export market (or, more generally, starting to export one product) implies incurring sizable fixed costs that must be paid up front (see Melitz, 2003, and subsequent papers regarding selection into exporting markets).[29]

7. Conclusions and Policy Recommendations

Despite large potential gains resulting from credit given by second-tier development banks, little is known about the actual impact of such loans. This study partially fills this gap. We analyze the impact of the lending activity of Bancoldex, the Colombian second-tier development bank, on firm performance.

Our evaluation uses Bancoldex data on loans granted to firms during 2000–2009, along with Annual Manufacturing Survey data for all manufacturing establishments with 10 or more employees during 1997–2007. We analyze how obtaining credit from Bancoldex affects a firm's output, use of inputs (capital and labor), total factor productivity, and exporting activities.

Bancoldex credit lines differ in terms of the destination resources can target, rediscount interest rates, minimum and maximum terms, and, in some cases, requirements firms must satisfy to access the line (e.g., size, location). Besides looking at Bancoldex credit in general, we consider the effects of receiving a loan intended to fund long-term projects versus one intended for shorter-term uses. We use DID and PSM techniques to correct for selection biases in the estimation. Participation models estimated for this purpose indicate that use of Bancoldex loans is positively correlated with growth over the previous three years, as well as with use of credit prior to treatment. Other firm characteristics (output, employment, and exports) do not show a significant effect on the probability of receiving a loan from Bancoldex. Because Bancoldex funding is intermediated by financial institutions that take over the risk of default, these findings

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[29] Bancoldex offers loans in dollars for exporters. Exploring whether these loans have a different impact on firms' exports would help evaluate the nature of costs exporters have to face and types of intervention that have the strongest effects on exports. Unfortunately, our database contains too few observations of loans in dollars to conduct such an investigation.

suggest that such institutions indeed target firms that show promise for potential future growth, as well as firms that are financially sound rather than those that are powerful lobbyists. This finding contrasts with those of recent studies on other government-owned banks that grant loans directly rather than through intermediaries. On the other hand, these findings may raise the question of whether Bancoldex complements private credit or substitute it. We partially address that question in the companion paper (Eslava, Maffioli, and Meléndez, 2011).

To identify Bancoldex effects, we estimate a fixed effect model on the common support defined through PSM. We find that Bancoldex's beneficiaries show increases in output (24 percent), employment (11 percent), investment (70 percent), and productivity (about 10 percent) over four years following their first Bancoldex loan. Although there seems to be no impact on how much firms export, we find a positive effect on number of products exported. We also study how the intensity of treatment, beyond just having been treated, influences performance. Consistent with our previous results, we find that the amount of the loan positively affects output, employment, and investment.

In terms of how impacts vary for loans intended to fund long-term investment versus loans for shorter-run purposes, we find that over the four years following initial treatment, long-term loans increase not only investment, but also output and productivity. Short-term loans, by contrast, show no significant impact on investment or output, but do have significant positive effects on measures of performance plausibly linked to types of expenditure for which these lines are intended, such as increases in exports and the number of products exported.

Despite the small percentage of long-term loans in the total number of Bancoldex loans studied, we find that the overall impact of Bancoldex closely resembles that of long-term loans. We interpret this finding as evidence that this type of loan most intensely affects firm performance. An apparent implication is that greater emphasis should be placed on long-term loans with purposes other than export promotion, which can be effectively attended by short-term loans. It is certainly relevant to ask if the relatively small number of loans granted under long-term conditions reflects low demand for them, opportunity costs of intermediating institutions, or some other reasons. We leave this question for future research.

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Tables and Figures

Figure 1: Bancoldex Credit Lines
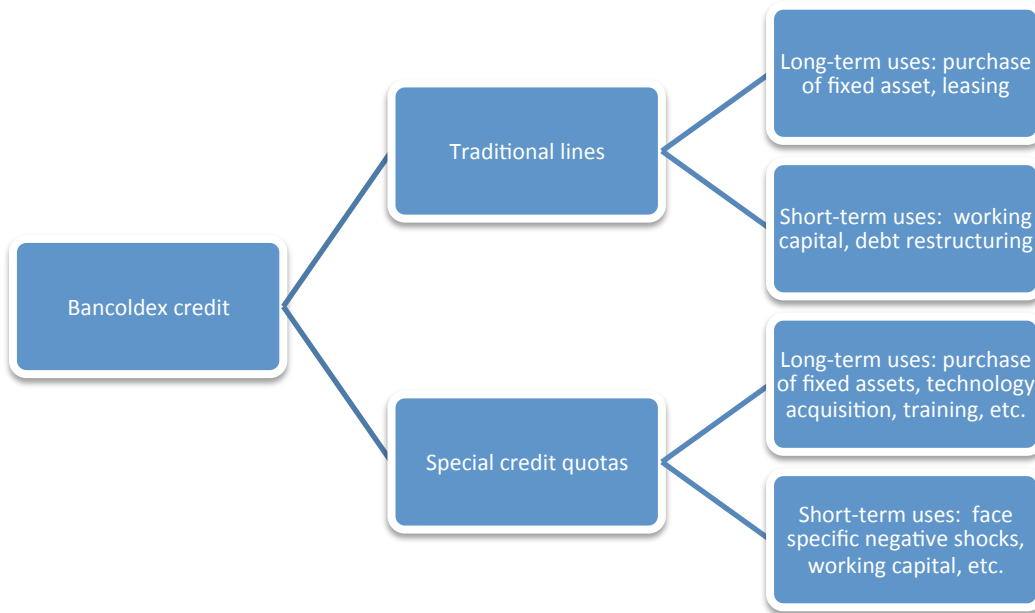
Table 1: Number of Beneficiary Firms

Year	Micro firms	Small firms	Medium firms	Large firms	Total
2000	13	150	359	309	831
2001	31	247	445	340	1,063
2002	36	300	534	404	1,274
2003	36,818	2,676	1,082	471	41,047
2004	58,769	4,286	1,350	442	64,847
2005	63,041	5,239	1,196	351	69,827
2006	107,416	5,430	1,058	190	114,094
2007	126,018	5,263	1,562	380	133,223
2008	109,943	5,370	1,886	528	117,727
2009	141,784	5,696	1,922	493	149,895

Source: Bancoldex and authors' calculations.

Figure 2: Total Loan Value by Firm Size (in USD million)
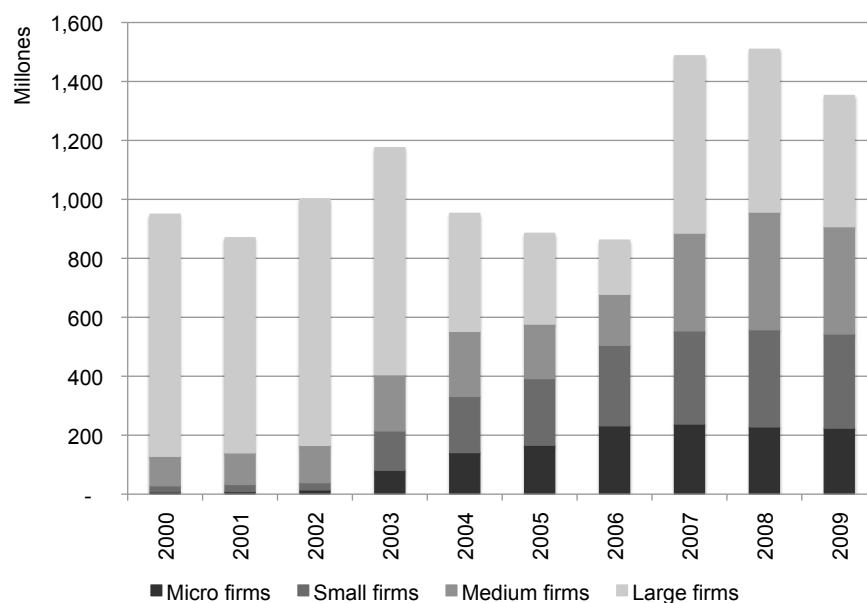
Source: Bancoldex and authors' calculations.

Table 2: Average Loan Size (in USD)

Year	Micro firms	Small firms	Medium firms	Large firms	Total
2000	573,007	139,661	278,577	2,657,428	**1,142,662**
2001	282,001	97,832	240,924	2,145,447	**818,033**
2002	399,793	81,447	237,002	2,069,129	**785,960**
2003	2,200	49,901	176,151	1,635,129	**28,633**
2004	2,401	44,450	163,391	905,595	**14,688**
2005	2,635	43,120	154,630	876,642	**12,669**
2006	2,158	50,303	163,605	966,439	**7,553**
2007	1,888	60,038	212,359	1,582,661	**11,162**
2008	2,075	61,409	211,563	1,045,795	**12,819**
2009	1,580	56,085	189,284	902,489	**9,021**

Monetary values converted to 2008 pesos using the CPI and to dollars at the December 2008 average peso/dollar exchange rate

Source: Bancoldex and authors' calculations.

Table 3: Average Number of Loans by Firm

Year	Micro firms	Small firms	Medium firms	Large firms	Total
2000	1.7	1.5	2.3	4.7	**3.1**
2001	1.3	1.5	2.5	4.3	**2.8**
2002	1.6	1.4	2.4	4.0	**2.7**
2003	1.1	1.2	2.0	3.3	**1.1**
2004	1.2	1.3	2.0	3.0	**1.3**
2005	1.1	1.2	1.9	2.5	**1.1**
2006	1.2	1.3	1.7	2.1	**1.2**
2007	1.1	1.2	1.8	2.3	**1.2**
2008	1.2	1.2	1.9	2.2	**1.2**
2009	1.1	1.3	1.9	1.8	**1.1**

Source: Bancoldex and authors' calculations.

Table 4: Number of Firms in AMS and Bancoldex, 2000–2007

Year	Firms in AMS dataset	SMEs and large firms in Bancóldex dataset	Firms in both	As % of firms in AMS	As % of firms in Bancóldex
2000	6,166	818	359	5.8	43.9
2001	5,944	1,032	455	7.7	44.1
2002	5,900	1,238	499	8.5	40.3
2003	6,034	4,229	806	13.4	19.1
2004	6,092	6,078	927	15.2	15.3
2005	6,358	6,786	867	13.6	12.8
2006	6,226	6,678	763	12.3	11.4
2007	5,874	7,205	979	16.7	13.6

Source: AMS, Bancoldex and authors' calculations

Table 5: Manufacturing Firms by Bancoldex Loan Type

Year	Any line	Traditional credit line	Special quota other than aProgresar	aProgresar	Traditional credit line and Special quota other than aProgresar	Traditional credit line and aProgresar	Special quota other than aProgresar and aProgresar
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2000	359	355	5	-	1	-	-
2001	455	443	17	-	5	-	-
2002	499	493	10	-	12	-	-
2003	806	759	110	-	63	-	-
2004	927	836	138	-	47	-	-
2005	867	657	264	24	65	10	6
2006	763	336	253	160	40	24	5
2007	979	186	707	236	60	13	2

Source: AMS, Bancoldex and authors' calculations.
Note: Columns 3–6 add up to the total number of type of line uses. Columns 6–8 are included to reflect simultaneous use of more than one credit type.

Table 6: Manufacturing Firms by Bancoldex Loan Type, Long-term versus Short-term

Year	Long-term credit line	Short-term credit line	Both	Total	Long-term as % of total	Short-term as % of total
2000	2	334	1	337	0.6	99.1
2001	4	399	3	406	1.0	98.3
2002	5	403	3	411	1.2	98.1
2003	71	581	23	675	10.5	86.1
2004	88	601	24	713	12.3	84.3
2005	62	565	10	637	9.7	88.7
2006	40	524	4	568	7.0	92.3
2007	14	886	5	905	1.5	97.9
Total over period	**286**	**4293**	**73**	**4652**	**6.1**	**92.3**

Source: AMS, Bancoldex and authors' calculations

Table 7: Summary Statistics

Manufacturing firms that used Bancoldex credit lines in at least one year of the sample 1995-2007 (24,102 observations)					
	Mean	**Median**	**Standard Deviation**	**Min**	**Max**
Output (in USD)	7,710	1,551	25,814	1	931,722
Sales in USD)	7,660	1,537	25,733	0	934,461
Employment	117	53	198	0	3,308
Number of exported products	3.9	0.0	10.0	0.0	217.0
Exports as a share of output (%)	9.6	0.0	20.5	0.0	495.4
Labor productivity (in USD)	49	29	93	0	5,329
Total Factor Productivity (in logs)	2.6	2.6	0.5	-3.8	8.1
Manufacturing firms that did not use Bancoldex credit lines over the sample period 1995-2007 (60,520 observations)					
	Mean	**Median**	**Standard Deviation**	**Min**	**Max**
Output (in USD)	2,940	369	18,869	0	1,790,374
Sales in USD)	2,908	369	18,687	0	1,794,278
Employment	50	19	120	0	3,390
Number of exported products	0.8	0.0	4.1	0.0	195.0
Exports as a share of output (%)	2.7	0.0	12.9	0.0	472.9
Labor productivity (in USD)	39	19	312	0	71,503
Total Factor Productivity (in logs)	2.5	2.5	0.6	-9.9	8.4
Monetary values converted to 2008 pesos using the CPI and to dollars at the December 2008 average peso/dollar exchange rate					

Source: AMS and authors' calculations.

Table 8: GMM Panel Regressions: Firm Performance as a Function of Being a Bancoldex Beneficiary

Firms that used Bancoldex lines first in 2004 and firms that did not use Bancoldex lines at all over the sample period

Dependent variable	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.344**	0.190**	0.0823	3.739**	0.167*	0.221**	-27.86	0.236+
	[0.0685]	[0.0469]	[0.0649]	[0.659]	[0.0661]	[0.0606]	[31.72]	[0.121]
Dependent variable (t-1)	0.895**	0.924**	0.944**	0.170**	0.627**	0.642**	1.846**	0.510**
	[0.0227]	[0.0190]	[0.0473]	[0.0114]	[0.0230]	[0.0241]	[0.191]	[0.0252]
Dummy debt=1 (t-1)	-0.859**	-0.418*	0.106	-5.643*	-0.358	-0.697**	-0.0910	-0.265
	[0.307]	[0.205]	[0.344]	[2.553]	[0.265]	[0.247]	[0.328]	[0.440]
Constant	1.997**	0.469**	0.785+	7.851**	4.340**	1.267**	27.89	0.309
	[0.266]	[0.111]	[0.436]	[1.511]	[0.237]	[0.156]	[31.69]	[0.251]
Observations	36,246	36,211	35,377	36,246	36,211	34,637	36,246	36,246
Number of firms	4,946	4,944	4,892	4,946	4,944	4,809	4,946	4,946
P-Value Hansen Stat	0.239	0.214	0.0633	0.508	0.250	0.699	0.202	0.311
P-Value AR1	0.000	0.000	0.000	0.000	0.000	0.000	0.407	0.000
P-Value AR2	0.675	0.167	0.229	0.162	0.0497	0.851	0.422	0.0291

System GMM estimation. Robust standard errors in brackets
All regressions include year dummies and firm-level fixed effects. Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Participation Models

Variable	Dummy =1 if participant treated first in t=2004	Dummy =1 if participant treated first by long-run lines in t=2004	Dummy =1 if participant treated first by short-run lines in t=2004
	(1)	(2)	(3)
Output (log) in t-1	-0.161	-2.66	-0.849
	[0.377]	[2.59]	[0.565]
Average output growth between t-1 and t-3	3.81**	18.41+	4.77**
	[0.904]	[10.25]	[1.36]
TFP (log) in t-1	0.183	3.97	0.751
	[0.539]	[3.97]	[0.786]
Average TFP growth between t-1 and t-3	-0.892	-17.55	-1.05
	[1.19]	[15.09]	[1.58]
Capital per worker (log) in t-1	-0.0943	1.5	-0.0126
	[0.227]	[1.62]	[0.333]
Employment (log) in t-1	0.441	1.48	0.776
	[0.447]	[2.36]	[0.686]
Exports as % of output	-0.562	-18.99*	0.544
	[0.626]	[9.68]	[0.746]
Average exports growth between t-1 and t-3	0.0972*	0.239	0.142*
	[0.0456]	[0.406]	[0.0672]
Dummy Debt=1 (t-1)	0.934+	-1.26	1.86+
	[0.484]	[1.74]	[1.01]
Constant	-3.21	-45.59	-9.23
	[2.72]		
Observations	859	176	587
Pseudo R2	0.1642	0.415	0.2126
Log Likelihood	-325.93	-19.01	-140.14
ISIC 4-digit sector dummies	Yes	Yes	Yes
Location dummies	Yes	Yes	Yes
Legal organization dummies	Yes	Yes	Yes
Size category dummies by employment	Yes	Yes	Yes
Age category dummies	Yes	Yes	Yes

Robust standar errors in brackets. ** p-value <1%, *p-value<5%, + p-value<10%.

Table 10:Balance Tests

Variable	Sample	Dummy =1 if participant first in t=2004	Dummy =1 if participant first (long-run) in t=2004	Dummy =1 if participant first (short-run) in t=2004
		(1)	(2)	(3)
Output (log)	All firms	2.98**	1.13	-0.18
	Common support	0.54	1.35	0.34
Employment (log)	All firms	3.46**	1.03	0.31
	Common support	0.77	1.01	0.82
TFP (log)	All firms	2.54*	0.68	1.23
	Common support	-0.21	-0.91	-0.48
Capital per worker (log)	All firms	-1.65+	-0.06	-2.12*
	Common support	-0.47	2.06+	-0.21
Exports as % of output	All firms	-0.89	-1.01	0.45
	Common support	0.79	0.96	0.03
Average output growth between t-1 and t-3	All firms	5.15**	1.25	3.1**
	Common support	-0.5	0.02	0.39
Average TFP growth between t-1 and t-3	All firms	2.08*	0.55	1.36
	Common support	-0.13	-0.11	-0.21
Average exports growth between t-1 and t-3	All firms	0.81	0.36	0.58
	Common support	-0.71	-1.25	-1.55
Dummy Debt	All firms	3.00**	0.05	1.98*
	Common support	-1.01	-1.00	-0.58

Statistics reported are t-statistics. ISIC 4-digit sector dummies, legal organization dummies, location dummies and size category dummies were included in estimation. They are not reported because they were already balanced before PSM. ** p-value <1%, *p-value<5%, + p-value<10%.

Table 11: Kolmogorov-Smirnov Test for Inequality of Distributions

	Smaller group	D	P-value	Corrected
Treated first in 2004	Untreated	0.081	0.438	
	Treated	-0.001	1	
	Combined K-S	0.081	0.804	0.761
	Smaller group	D	P-value	Corrected
Treated first by short-run lines in 2004	Untreated	0.170	0.267	
	Treated	-0.0019	1	
	Combined K-S	0.170	0.523	0.437
	Smaller group	D	P-value	Corrected
Treated first by long-run lines in 2004	Untreated	0.500	0.264	
	Treated	0	1	
	Combined K-S	0.500	0.518	0.397

Figure 3: Common Support Graphs

All firms   **Firms in the common support**

First Bancoldex loan in 2004

First Bancoldex long-run loan in 2004


First Bancoldex short-run loan in 2004
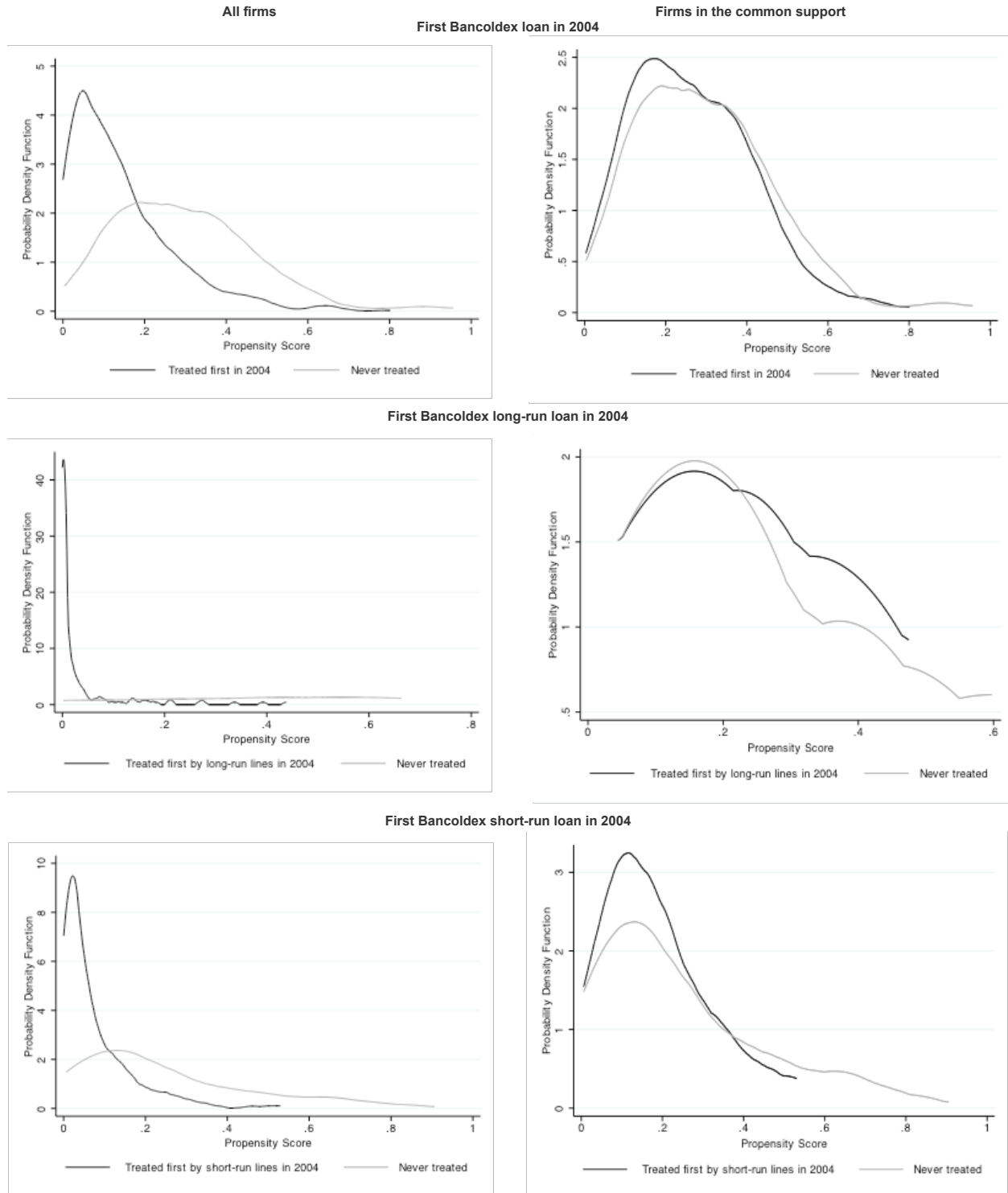
Figure 4: First Bancoldex Credit in 2004
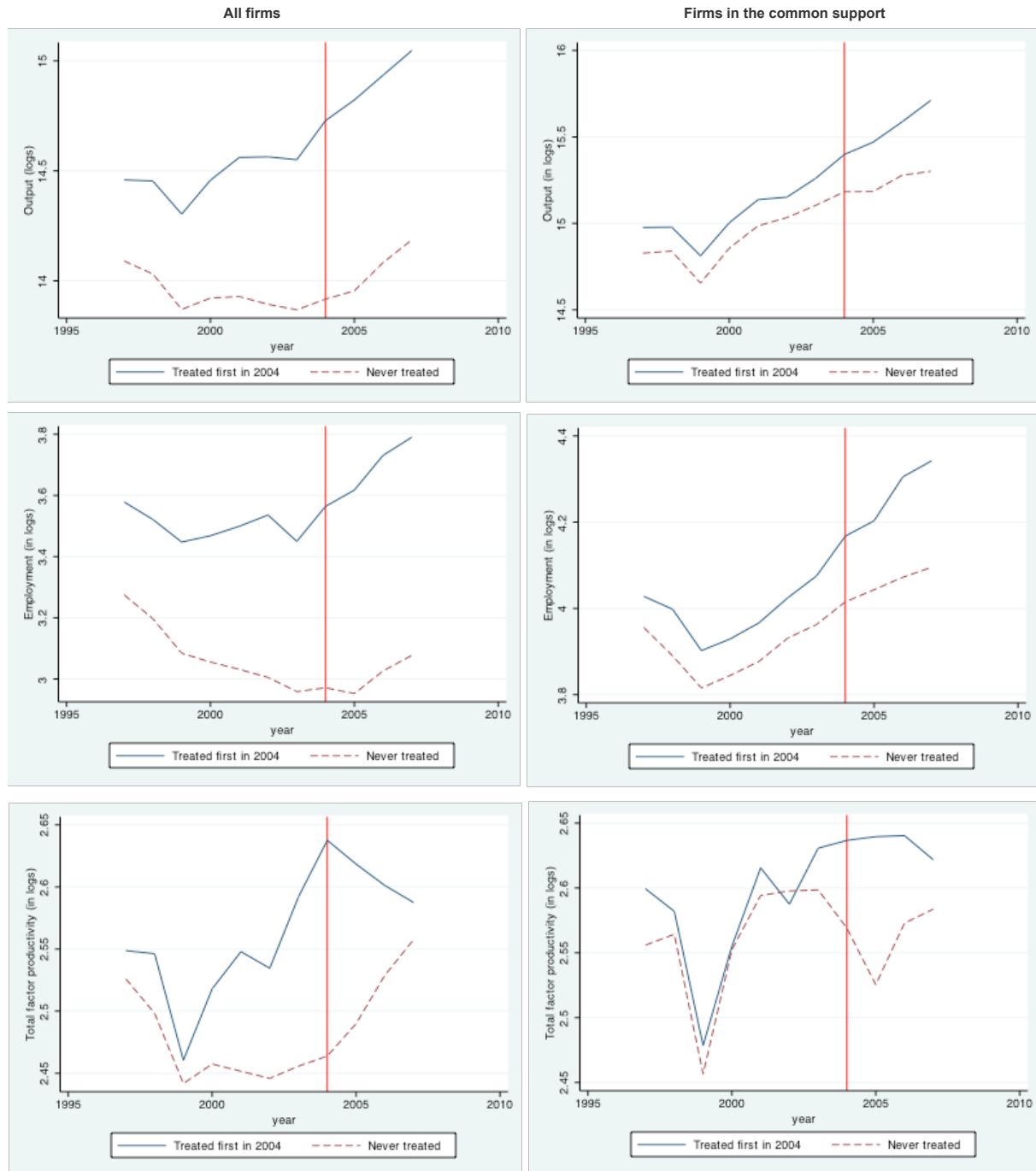
Table 12: Summary Statistics (treated firms)

Summary statistics (if Dummies Bancoldex=1)

Variable	First Bancoldex loan obtained in 2004					First Bancoldex long-term loan obtained in 2004					First Bancoldex short-term loan obtained in 2004				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Output (in logs)	1538	15.2	1.4	10.5	19.8	88	15.3	1.7	13.3	19.6	558	14.6	1.2	10.5	17.7
Employment (in logs)	1538	4.1	1.0	1.1	7.2	88	4.0	1.2	2.7	7.2	558	3.7	1.0	1.1	6.4
Number of exported products (in logs)	1538	1.1	1.0	0.0	4.7	88	0.8	0.8	0.0	2.4	558	1.0	0.9	0.0	3.9
Exports as % of output	1538	0.1	0.2	0.0	5.4	88	0.0	0.1	0.0	0.3	558	0.1	0.2	0.0	1.1
Fixed assets (in logs)	1532	13.5	1.6	8.3	18.2	88	13.3	1.6	10.0	18.2	554	12.8	1.3	8.3	15.8
Investment (in logs)	1538	9.3	4.3	0.0	16.7	88	8.6	5.1	0.0	16.3	558	8.1	4.6	0.0	15.5
Labor productivity (in logs)	1538	11.1	0.7	8.8	14.7	88	11.3	0.6	9.9	12.4	558	10.9	0.6	8.8	13.0
Total factor productivity (in logs)	1532	2.6	0.5	-0.2	4.4	88	2.7	0.3	1.9	3.6	554	2.6	0.5	0.0	4.0

Note: Titles over columns refer to the alternative treatment variables used in estimation.

Table 13: Fixed Effects Panel Regressions 1

Treatment variable: Dummy=1 if first Bancoldex loan obtained in 2004

Without common support

Dependent variable:	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Investment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.323**	0.283**	0.275**	0.487**	0.0393	0.0394+	-0.0621	0.191**
	[0.0315]	[0.0266]	[0.0351]	[0.176]	[0.0251]	[0.0217]	[0.0705]	[0.0311]
Constant	14.08**	3.228**	11.94**	6.460**	10.85**	2.591**	0.0190	0.252**
	[0.0102]	[0.00723]	[0.00885]	[0.0574]	[0.00792]	[0.00638]	[0.0287]	[0.00594]
Observations	49,906	49,850	48,959	49,906	49,850	48,119	49,906	49,906
Number of firms	7,652	7,649	7,580	7,652	7,649	7,506	7,652	7,652
Adjusted R-squared	0.064	0.073	0.124	0.012	0.024	0.030	0.000	0.020
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

With common support

Dependent variable:	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.240**	0.111*	0.128	0.703+	0.129*	0.0897+	-0.0107	0.277**
	[0.0693]	[0.0519]	[0.0809]	[0.375]	[0.0515]	[0.0479]	[0.0170]	[0.0752]
Constant	14.95**	3.992**	13.03**	8.890**	10.96**	2.599**	0.0532**	0.743**
	[0.0301]	[0.0248]	[0.0354]	[0.219]	[0.0229]	[0.0181]	[0.00624]	[0.0417]
Observations	2,673	2,673	2,665	2,673	2,673	2,665	2,673	2,673
Number of firms	258	258	258	258	258	258	258	258
Adjusted R-squared	0.217	0.110	0.194	0.007	0.094	0.016	0.014	0.117
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors. *p-value<5%, + p-value<10%.

Table 14: Fixed Effects Panel Regressions 2

Treatment variables: Dummies denoting years since treatment for firms that obtained first Bancoldex loan in 2004

Without common support (all firms treated first in 2004 and never treated)

Dependent variable	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1 (in t)	0.298**	0.237**	0.162**	0.858**	0.0603*	0.0760**	-0.0305	0.186**
	[0.0284]	[0.0243]	[0.0324]	[0.217]	[0.0252]	[0.0208]	[0.0306]	[0.0333]
Dummy Bancoldex=1 (in t-1)	0.342**	0.278**	0.268**	0.363	0.0631*	0.0585*	-0.0301	0.195**
	[0.0332]	[0.0272]	[0.0357]	[0.229]	[0.0273]	[0.0229]	[0.0364]	[0.0364]
Dummy Bancoldex=1 (in t-2)	0.321**	0.304**	0.319**	0.466*	0.0163	0.0200	-0.0680	0.189**
	[0.0363]	[0.0306]	[0.0390]	[0.224]	[0.0291]	[0.0255]	[0.0753]	[0.0364]
Dummy Bancoldex=1 (in t-3)	0.334**	0.321**	0.364**	0.224	0.0130	-0.00296	-0.128	0.195**
	[0.0396]	[0.0341]	[0.0450]	[0.256]	[0.0316]	[0.0260]	[0.150]	[0.0369]
Constant	14.08**	3.232**	11.95**	6.477**	10.85**	2.593**	0.0195	0.253**
	[0.0103]	[0.00728]	[0.00891]	[0.0578]	[0.00798]	[0.00643]	[0.0285]	[0.00598]
Observations	49,090	49,035	48,177	49,090	49,035	47,355	49,090	49,090
Number of firms	6,836	6,834	6,798	6,836	6,834	6,742	6,836	6,836
Adjusted R-squared	0.064	0.073	0.125	0.012	0.024	0.030	0.000	0.020
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

With common support (all firms treated first in 2004 and never treated)

Dependent variable	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1 (in t)	0.167**	0.0831+	0.0327	1.037*	0.0836+	0.0780+	-0.0151	0.237**
	[0.0554]	[0.0463]	[0.0662]	[0.468]	[0.0485]	[0.0404]	[0.0183]	[0.0820]
Dummy Bancoldex=1 (in t-1)	0.235**	0.0784	0.0688	0.484	0.156**	0.127*	-0.00748	0.276**
	[0.0770]	[0.0538]	[0.0678]	[0.530]	[0.0587]	[0.0522]	[0.0191]	[0.0880]
Dummy Bancoldex=1 (in t-2)	0.227*	0.130*	0.102	0.627	0.0972	0.0765	-0.0138	0.360**
	[0.0893]	[0.0614]	[0.0832]	[0.519]	[0.0668]	[0.0632]	[0.0209]	[0.0886]
Dummy Bancoldex=1 (in t-3)	0.342**	0.157*	0.326+	0.646	0.185**	0.0760	-0.00591	0.235*
	[0.0891]	[0.0666]	[0.193]	[0.579]	[0.0656]	[0.0738]	[0.0211]	[0.0970]
Constant	14.95**	3.992**	13.03**	8.890**	10.96**	2.599**	0.0532**	0.743**
	[0.0301]	[0.0248]	[0.0354]	[0.219]	[0.0229]	[0.0181]	[0.00624]	[0.0417]
Observations	2,673	2,673	2,665	2,673	2,673	2,665	2,673	2,673
Number of firms	258	258	258	258	258	258	258	258
Adjusted R-squared	0.218	0.110	0.197	0.006	0.094	0.015	0.013	0.117
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors. *p-value<5%, + p-value<10%.

Table 15: Fixed Effects Panel Regressions 3

Treatment variable: interaction of Dummy=1 if first Bancoldex loan obtained in 2004 and Dummy=1 if firm was financially constrained before treatment

Without common support (all firms treated first in 2004 and never treated)

Dependent variable	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.272**	0.218**	0.218**	0.498*	0.0530+	0.0389	-0.0719	0.179**
	[0.0361]	[0.0309]	[0.0414]	[0.208]	[0.0295]	[0.0250]	[0.0688]	[0.0379]
Dummy Financially constrained=1	0.00806	-0.0367	-0.00726	-0.123	0.0440	0.0264	0.0406	-0.0963*
	[0.0507]	[0.0413]	[0.0479]	[0.278]	[0.0389]	[0.0321]	[0.0477]	[0.0430]
Dummy Bancoldex*Financially constrained=1	0.158*	0.199**	0.172*	-0.0359	-0.0412	0.00188	0.0305	0.0358
	[0.0646]	[0.0540]	[0.0705]	[0.363]	[0.0515]	[0.0456]	[0.0216]	[0.0641]
Constant	14.08**	3.244**	11.95**	6.516**	10.84**	2.584**	0.00689	0.283**
	[0.0192]	[0.0148]	[0.0179]	[0.105]	[0.0148]	[0.0123]	[0.0432]	[0.0143]
Observations	49,090	49,035	48,177	49,090	49,035	47,355	49,090	49,090
Number of firms	6,836	6,834	6,798	6,836	6,834	6,742	6,836	6,836
Adjusted R-squared	0.064	0.074	0.125	0.012	0.024	0.030	0.000	0.020
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

With common support (all firms treated first in 2004 and never treated)

Dependent variable	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.185*	0.0221	0.0914	0.397	0.162**	0.0951+	-0.0163	0.282**
	[0.0772]	[0.0561]	[0.0882]	[0.402]	[0.0597]	[0.0543]	[0.0213]	[0.0878]
Dummy Financially constrained=1	-0.139	-0.294*	-0.152	0.149	0.155+	0.0366	-0.0128	-0.0903
	[0.172]	[0.127]	[0.155]	[0.519]	[0.0804]	[0.0745]	[0.0205]	[0.134]
Dummy Bancoldex*Financially constrained=1	0.174+	0.279**	0.116	0.949+	-0.105	-0.0173	0.0178	-0.0150
	[0.0931]	[0.0710]	[0.0932]	[0.533]	[0.0726]	[0.0636]	[0.0227]	[0.114]
Constant	15.00**	4.095**	13.09**	8.836**	10.90**	2.587**	0.0577**	0.775**
	[0.0665]	[0.0494]	[0.0665]	[0.280]	[0.0387]	[0.0338]	[0.00973]	[0.0667]
Observations	2,673	2,673	2,665	2,673	2,673	2,665	2,673	2,673
Number of firms	258	258	258	258	258	258	258	258
Adjusted R-squared	0.222	0.136	0.195	0.009	0.097	0.015	0.013	0.117
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors. *p-value<5%, + p-value<10%.

Table 16: Fixed Effects Panel Regressions 4
Treatment variable: Bancoldex loans in logs obtained in 2004 or after

Without common support

Dependent variable:	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Investment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Exports (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bancoldex loan (in logs)	0.0190**	0.0171**	0.0122**	0.0587**	0.00179	0.00341**	-0.00218	0.0141**
	[0.00185]	[0.00167]	[0.00217]	[0.0154]	[0.00159]	[0.00129]	[0.00215]	[0.00246]
Constant	14.08**	3.232**	11.95**	6.476**	10.85**	2.593**	0.0195	0.253**
	[0.0103]	[0.00732]	[0.00894]	[0.0578]	[0.00798]	[0.00643]	[0.0285]	[0.00599]
Observations	49,090	49,035	48,177	49,090	49,035	47,355	49,090	49,090
Number of firms	6,836	6,834	6,798	6,836	6,834	6,742	6,836	6,836
Adjusted R-squared	0.060	0.067	0.120	0.012	0.024	0.030	0.000	0.017
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

With common support

Dependent variable:	Output (in logs)	Employment (in logs)	Capital per worker (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Exports (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bancoldex loan (in logs)	0.0102**	0.00838**	0.00655+	0.0597*	0.00181	0.00196	-0.000280	0.0175**
	[0.00323]	[0.00282]	[0.00386]	[0.0276]	[0.00274]	[0.00239]	[0.00105]	[0.00488]
Constant	14.95**	3.992**	13.03**	8.887**	10.96**	2.599**	0.0532**	0.742**
	[0.0302]	[0.0248]	[0.0355]	[0.219]	[0.0230]	[0.0181]	[0.00624]	[0.0417]
Observations	2,673	2,673	2,665	2,673	2,673	2,665	2,673	2,673
Number of firms	258	258	258	258	258	258	258	258
Adjusted R-squared	0.205	0.109	0.192	0.007	0.086	0.011	0.013	0.111
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors. *p-value<5%, + p-value<10%.

Table 17: Fixed Effects Panel Regressions 5

Treatment variable: Dummy=1 if first Bancoldex long-term loan obtained in 2004

Without common support

Dependent variable:	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Investment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.501**	0.287**	0.214	0.458	0.214*	0.127*	-0.0861	0.196
	[0.0988]	[0.0951]	[0.135]	[0.604]	[0.0831]	[0.0565]	[0.0735]	[0.199]
Constant	14.05**	3.207**	11.91**	6.324**	10.84**	2.589**	0.0178	0.244**
	[0.0105]	[0.00745]	[0.00903]	[0.0590]	[0.00824]	[0.00664]	[0.0309]	[0.00591]
Observations	46,391	46,335	45,480	46,391	46,335	44,672	46,391	46,391
Number of firms	7,246	7,243	7,175	7,246	7,243	7,103	7,246	7,246
Adjusted R-squared	0.061	0.075	0.104	0.014	0.023	0.033	0.000	0.011
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

With common support

Dependent variable:	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.746**	0.101	-0.0274	1.636+	0.645**	0.413*	-0.112	0.0585
	[0.202]	[0.209]	[0.267]	[0.834]	[0.154]	[0.146]	[0.0968]	[0.530]
Constant	14.98**	3.883**	12.35**	8.112**	11.10**	2.917**	0.0383**	0.706**
	[0.114]	[0.123]	[0.152]	[0.911]	[0.0946]	[0.0556]	[0.00983]	[0.135]
Observations	127	127	127	127	127	127	127	127
Number of firms	12	12	12	12	12	12	12	12
Adjusted R-squared	0.454	0.086	0.439	-0.028	0.138	0.171	0.083	0.024
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors. *p-value<5%, + p-value<10%.

Table 18: Fixed Effects Panel Regressions 6

Treatment variable: Dummy=1 if first Bancoldex short-term loan obtained in 2004

Without common support

Dependent variable:	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Investment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.247**	0.211**	0.181**	0.266	0.0361	0.0539*	-0.0593	0.151**
	[0.0431]	[0.0400]	[0.0489]	[0.248]	[0.0311]	[0.0248]	[0.0682]	[0.0436]
Constant	14.04**	3.204**	11.91**	6.347**	10.84**	2.586**	0.0180	0.242**
	[0.0104]	[0.00740]	[0.00894]	[0.0586]	[0.00812]	[0.00654]	[0.0300]	[0.00591]
Observations	47,806	47,750	46,871	47,806	47,750	46,049	47,806	47,806
Number of firms	7,419	7,416	7,347	7,419	7,416	7,274	7,419	7,419
Adjusted R-squared	0.060	0.072	0.109	0.013	0.023	0.032	0.000	0.013
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

With common support

Dependent variable:	Output (in logs)	Employment (in logs)	Fixed assets (in logs)	Invesment (in logs)	Labor productivity (in logs)	Total factor productivity (in logs)	Exports as % of output	Number of exported products (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy Bancoldex=1	0.173	0.0488	-0.122	0.0112	0.124	0.110+	0.0518+	0.385**
	[0.109]	[0.0941]	[0.126]	[0.626]	[0.0747]	[0.0643]	[0.0300]	[0.124]
Constant	14.39**	3.602**	12.32**	7.820**	10.79**	2.602**	0.0704**	0.601**
	[0.0572]	[0.0463]	[0.0602]	[0.465]	[0.0375]	[0.0326]	[0.0146]	[0.0570]
Observations	962	962	956	962	962	956	962	962
Number of firms	93	93	93	93	93	93	93	93
Adjusted R-squared	0.189	0.034	0.252	0.004	0.130	0.028	0.036	0.119
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors. *p-value<5%, + p-value<10%.