**Evaluaciones de Impacto de las Líneas de Financiamiento de Inversión de Bancóldex en Términos del Acceso al Crédito y del Desempeño de las Empresas Beneficiarias**

1. **Nivel del Acceso al Crédito[[1]](#footnote-1)**
2. El estudio encontró que menores tasas de interés, créditos más grandes y préstamos con plazos más largos caracterizan las relaciones de crédito que involucran a Bancóldex. Estas características se traducen en menores tasas de interés promedio y préstamos a mayores plazos para las empresas que utilizan el crédito de Bancóldex en comparación con aquellas que no. Tales efectos exhiben alguna persistencia en el tiempo. En cuanto a términos, los préstamos promedio de las empresas que usan recursos de Bancóldex también tienden a exhibir plazos más largos, aunque este efecto puede tomar dos años en materializarse. El número de intermediarios con los que la firma tiene relaciones de crédito también se expande después de haber tenido acceso a crédito Bancóldex.
3. Los hallazgos del estudio muestran que los beneficiarios disfrutan de mejores condiciones de crédito después de recibir crédito de Bancóldex, en comparación con las empresas que han obtenido acceso a crédito de otras fuentes. Es decir, Bancóldex ofrece alguna "adicionalidad", en lugar de simplemente sustituir crédito que fuentes privadas estarían dispuestas y capaces de ofrecer bajo condiciones similares. Esto sugiere un papel potencial para Bancóldex en facilitar el acceso al crédito. Dado que el imperfecto acceso al crédito, ampliamente entendido como imperfecta sustitución entre fuentes internas y externas de financiamiento, constituye una falla de mercado que potencialmente impide el crecimiento, estos resultados son consistentes con Bancóldex ayudando a fomentar el desarrollo productivo. En otro estudio relacionado (Eslava, Maffioli y Meléndez, 2012), resumido en más abajo, se encontró también un impacto positivo de recibir un préstamo con recursos de Bancóldex en el desempeño de las empresas, bajo la forma de aumentos en la producción, el empleo, la inversión y la productividad.
4. El hallazgo que Bancóldex ayuda a relajar las restricciones de crédito contrasta con anécdotas de empresarios quejándose que cualquier ventaja que el fondeo de Bancóldex puede ofrecer es totalmente apropiada por los intermediarios financieros. Los resultados del estudio sugieren que los menores costos y los mayores plazos ofrecidos por Bancóldex se transfieren al menos parcialmente a los destinatarios finales de los préstamos. Sin embargo, lo que sigue siendo una incógnita es por qué el financiamiento de Bancóldex ofrece esas mejores condiciones para comenzar. Los intermediarios financieros presumiblemente tienen acceso a fuentes de bajo costo de fondos, tales como cuentas corrientes. Que les restringe a ellos de prestar los fondos que ellos captan a las tasas de interés más bajas y a los plazos más largos que ellos están dispuestos a ofrecer cuando usan los recursos de Bancóldex no es del todo claro. Esto es particularmente interesante ya que no hay ningún intento declarado por Bancóldex para subsidiar las tasas de interés. Una posible respuesta es que las mejores condiciones de los créditos de Bancóldex viene del hecho de que Bancóldex tiene líneas específicamente dirigidas a usos de largo plazo – tales como inversiones en activos fijos y modernización – y que su línea de crédito de más rápido crecimiento tiene una curva invertida (es decir, menores tasas de interés para plazos más largos). Otra explicación, no necesariamente excluyente, es que los intermediarios financieros enfrentan una escasez de depósitos de bajo costo. Cualquiera de estas explicaciones es consistente con un Bancóldex que efectivamente juega su papel como banco de desarrollo – es decir el de ayudar a las empresas a superar las limitaciones impuestas por el limitado acceso al crédito.
5. Los hallazgos del estudio también arrojan luz sobre cómo los beneficiarios de Bancóldex difieren de los destinatarios de otras fuentes de crédito. Por un lado, las empresas que reciben crédito Bancóldex han estado pagando tasas de interés más altas, confrontado plazos de crédito más cortos, y usando garantías más frecuentemente que otras, sugiriendo que ellas han estado sujetas a condiciones de crédito más restrictivas y/o que ellas son percibidas como más riesgosas por los intermediarios financieros. Por otro lado, los beneficiarios de Bancóldex han estado utilizando crédito más intensamente que otras empresas, demostrando que ellos no están totalmente racionados en el mercado de crédito para comenzar. Hay dos lados de este último hallazgo. Primero, los intermediarios financieros parecen estar desempeñando adecuadamente su papel de asignar el crédito solo a firmas que razonablemente se puede esperar que repaguen el crédito que obtienen. Esta es una de las principales ventajas esperadas del diseño de segundo piso – los intermediarios privados toman el riesgo de no pago y por tanto tienen los incentivos de discriminar los proyectos financieramente viables de los que no lo son. Los fondos públicos están, por lo tanto, menos sujetos a una inadecuada focalización que termine por fomentar actividades no rentables. Por otro lado, también es cierto que estos fondos pueden ser más eficaces en la generación de un impacto positivo en el rendimiento cuando se dirijan a aquellas empresas que enfrentan las más severas dificultades para acceder a crédito.
6. **Nivel del Desempeño de las Empresas Beneficiarias[[2]](#footnote-2)**
7. Este estudio encuentra que los beneficiarios de créditos fondeados con recursos de Bancóldex registraron incrementos en la producción, el empleo, la inversión y la productividad en los cuatro años siguientes a su primer préstamo con recursos de la referida institución. Los efectos estimados son de 24 por ciento para la producción, 11 por ciento para el empleo, 70 por ciento en términos de inversión y alrededor de 10 por ciento en términos de productividad. Parece que no hay ningún impacto en términos de cuánto las empresas exportan. Curiosamente, sin embargo, se encontró un efecto positivo en el número de productos que las empresas exportan. El estudio también analizó cómo la intensidad del tratamiento, más allá del simple hecho de haber sido tratado, afecta el desempeño. Consistente con resultados anteriores, se encontró que el monto del préstamo tiene un efecto positivo sobre la producción, el empleo y la inversión.
8. En cuanto a cómo el impacto de las líneas de crédito destinadas a financiar proyectos de inversión a largo plazo difiere de aquellas destinadas a propósitos de corto plazo, el estudio encontró que las primeras incrementan no solo la inversión, sino también la producción y la productividad en los cuatro años que siguen al tratamiento inicial. Para préstamos de corto plazo, por el contrario, el estudio fue incapaz de identificar ningún efecto significativo en la inversión o la producción. Curiosamente, las líneas de crédito de más corto plazo tienen un impacto positivo significativo sobre medidas de rendimiento posiblemente vinculadas a los tipos de gastos para los que estas líneas estaban dirigidas. Este es el caso de las exportaciones y del número de productos de exportación.
9. Es interesante observar que, a pesar de la pequeña participación de préstamos a largo plazo en el número total de préstamos de Bancóldex, el impacto que encontró el estudio para uso general de Bancóldex más estrechamente se asemeja a la de los préstamos a largo plazo. El estudio interpreta esto como evidencia que es este tipo de préstamos los que afectan más intensamente el desempeño de una empresa. Una implicación aparente es que un mayor énfasis debería ser puesto en este tipo de créditos, más que en los de promoción de las exportaciones que puede ser atendida con préstamos a corto plazo. Cabe preguntar si el número relativamente pequeño de préstamos otorgados bajo estas condiciones reflejan una baja demanda de los beneficiarios finales por ellos, costos de oportunidad de las instituciones intermediarias, o el diseño de producto por parte de Bancóldex. Esta es una pregunta abierta para futuras investigaciones.

**A CONTINUACION REPORTE COMPLETO DE LAS ACTUALIZACIONES QUE SE REALIZARON A LA EVALUACION DE IMPACTO de las Líneas de Financiamiento de Inversión DE BANCOLDEX, CITADOS EN EL REPORTE PREVIO.**

**Report on update of the earlier impact assessment on the effectiveness of Bancoldex’ credit programs in fostering Colombian firms**

August, 2014

**Motivation**

The purpose of this report is to discuss the results of an update of the earlier impact assessment on the effectiveness of Bancoldex’ credit programs in fostering Colombian firms (IDBWP294 and IDBWP308 by Marcela Eslava, Alessandro Maffioli and Marcela Meléndez). The update uses new data and some methodological refinement of the earlier impact assessment approach. This report examines the updated results in the light of the previous, stressing how they complement each other. This discussion is based on estimations that, as before, use longitudinal firm-level datasets to evaluate the impact of Bancóldex’ credit lines on investments, employment generation, productivity, growth, exports, and credit characteristics. Unlike the previous impact assessment on Bancoldex’ credit lines, it is now possible to discuss the impact of credit line Aprogresar, funded by the IDB since 2008.

This report addresses the following research questions: (1) What is the impact of Bancoldex credit lines on firms’ output?; (2) What is the impact of Bancoldex credit lines on firms’ investments?; (3) What is the impact of Bancoldex credit lines on firms’ employment?; (4) What is the impact of Bancoldex credit lines on firms’ competitiveness?; and (5) What is the impact of Bancoldex credit lines on credit characteristics faced by the firms?

**Methodology**

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

(1)

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

Our baseline estimation of equation (1) is then extended to examine potential heterogeneous effects. In particular, we differentiate the effect of long- and short-run Bancóldex loans; and the effect of Bancóldex on larger vs. smaller establishments. We also examine alternative timings for the effect of Bancóldex credit.

As usual in the process of evaluating a program, the central problem in the estimation of equation (1) is whether, for instance, the finding that recipients have better performance reflects that performance improved thanks to the loan, or that better-performing firms are more likely to receive loans from Bancóldex. This is called the endogeneity problem, and we make use of econometric techniques to address it. Because there are no explicit rules about the types of firms that receive Bancóldex credit reasons we allow for two different possibilities: 1) credit is assigned to firms according to characteristics that the intermediary bank observes but we do not observe in the data, and that exhibit little variability over time (such as the identity of the owner of the firm, managerial practices, etc). 2) credit is assigned to firms according to recent characteristics that we observe in the data, such as past sales, or past exports. We deal with the former possibility by comparing each beneficiary firm to itself in times when it does not receive Bancóldex credit. Mechanically, this is done by introducing firm-level fixed effects in the estimations. We deal with the latter possibility by restricting the sample over which we run the estimations to the beneficiary firms and to non-beneficiaries that are similar to beneficiaries in terms of their pre-loan characteristics. Formally, we do this by using propensity score matching techniques to restrict the sample. In robustness regressions, we also attempt to control for pre-loan performance by introducing the lagged dependent variable.

To be more detailed, our first approach includes plant- or firm-level fixed effects (depending on the level of observation in the respective set of data).[[3]](#footnote-3) This approach has the advantage of controlling for unobservable characteristics, but the problem that assumes all those characteristics to be fixed over time for a particular firm. We then complement this estimation strategy with another that restricts the dataset to beneficiaries and their “nearest neighbors”, identified using propensity score techniques. The propensity score—predicted probability of receiving Bancóldex credit in a given year—is estimated on the basis of a set of characteristics in the previous year. Each beneficiary is then matched to a firm that did not receive Bancóldex credit over our whole period of observation, whose propensity score in the respective year was closest to that of the beneficiary among the group of non-beneficiaries.[[4]](#footnote-4) This generates a restricted dataset for each year, including that year’s beneficiaries and their nearest neighbors. A panel is finally constructed including the full history of each beneficiary and nearest neighbor. It is over this end panel that our estimations are conducted for our second estimation approach.

Propensity scores are established by estimating models where the probability of receiving Bancóldex in a given year is a function of the different characteristics lagged one period;[[5]](#footnote-5) the first lags of the control variables of the baseline regression (excluding, obviously, the time effects); and, in the performance estimations, fixed effects by four-digit sector, location, and type of legal organization. A separate participation model is estimated in each year, and a nearest neighbor is found for each Bancóldex beneficiary in that particular year. Equation (1) is then estimated over a set of data that pools across years and includes all firms that received Bancóldex in at least one year, and all firms that were identified as nearest neighbors to those beneficiaries.

Other controls are introduced in both specifications, the Fixed Effects estimation (FE) and the estimation with Fixed Effects and Propensity Score Matching (FE+PSM). For performance estimations, conducted using Manufacturing Survey data, we include year dummies; a dummy for establishments belonging to multi-establishment firms; age and age squared; and a dummy for whether the firm paid interest over financial liabilities in the previous year. The latter is intended to control for previous access to overall credit, very crudely given the impossibility to bring together the Manufacturing Survey data and the data on loans from the Financial Superintendency. In turn, in estimations for credit conditions, which use the Superintendency data, we include year dummies; controls for whether the firm had only commercial loans, or had at least one loan classified as micro-credit in the respective year; the percentage of loans to the firm on which a guarantee was required in that year; and the maximum number of loans that the firm received from a single bank in the period (in logs), to proxy for firm size. Robustness tests have been conducted including lagged dependent variables rather than fixed effects, and restricting the matching to firms that received Bancóldex in 2004 for the first time and their nearest neighbors in that year, rather than the full 2004-2009 database.

**Comparison with the methodology previously used in IDBWP294 and IDBWP308**

* In the previous versions we used the data that were available at the time. In IDBWP294, where we estimated the effect of Bancóldex loans on firm performance, our dataset covered the period 1997-2007 In the updated exercise we were able to extend the performance analysis to 2009, making use of more recently released data from the Manufacturing Survey. Taking advantage of this greater span of time, we also now drop observations pre-dating 2004, to restrict our analysis to the period in which Bancóldex had already taken its current form. The extended time span also allows us to asses the impact of Bancóldex’ credit line Aprogresar that we had not been able to include in the previous analysis due to its recent creation at the time.
* The current version includes analyses of heterogeneous effects that we did not undertake previously. In particular, we now estimate differential effects for small vs. large establishments receiving loans. We also estimate differential effects for Bancóldex loans in dollars, and for their loans under the line Aprogresar.
* In the previous versions we made methodological choices designed to achieve the cleanest identification possible when restricting the dataset to beneficiaries and their “nearest neighbors”. That cleanness came at the cost of losing important amounts of information. For instance, in the performance analysis we compared beneficiaries that received their first Bancóldex loan in a specific year (2004) to similar firms. This restriction to a single initial year was done to obtain a clear differentiation between the pre-treatment and the post-treatment periods, but it meant that we were losing the many recipients whose first relationship with Bancóldex occurred in other years. It may also raise a question about the external validity of our estimators to beneficiaries treated in other years, if 2004 was special for some reason. Finally, it also implied we were assessing Bancoldex’ impact over the three year period since treatment to the end of the period of observation (2007 in the case of the mentioned working paper). In discussions with fellow researchers and practitioners, it has become clear that most would prefer an approach that takes advantage of more data, even though the cost if that effects are not identified as cleanly. The current version thus makes full use of all the data available on all recipients and considers impact of Bancoldex over time regardless of the time of first treatment (allowing, for instance, for plants that benefit from Bancoldex’ credit lines more than once over our period of study). The analysis regarding credit conditions that we made in IDBWP308 also followed a similar approach of analyzing the effect of Bancóldex loans on beneficiaries who first received their loans in a given year, 2007 in that case. For the reasons just discussed, we also extended this analysis to include all recipients who benefitted from the beginning to the end of the sample in the treatment group.
* We now make less restrictive assumptions when constructing the common support, so that more information is used at this stage as well. In particular, in our previous participation model plants (or firms) were compared on the base of their characteristics in the three years prior to treatment, while under the new approach they are compared on their characteristics on the year prior to treatment. This increases the sample considered in the part of the analysis that follows a matching methodology (see section 2).

*In the results section below, comparisons between current results and those in the aforementioned working papers are presented in italics, so they can be quickly identified.*

**Results**

* 1. **Effect on performance: all establishments and all loans**

Results of estimating equation (1), using firm performance measures as dependent variables, are presented in Table 1. For each outcome under consideration, two adjacent columns present results using the two estimation strategies described: a FE estimation, and a FE estimation conducted over the dataset restricted to include only beneficiaries and their nearest neighbors in terms of the probability of receiving Bancóldex (marked as FE+PSM in our tables). (See section 2 for an explanation of the difference between these approaches) The different vertical panels present different specifications for the treatment variable: a one-year effect in Panel A and persistent effects in Panel B.

The use of Bancóldex is associated with an increase in the demand for inputs and a related increase in output (Panel A). Within plants, employment increases around 4% for Bancóldex beneficiaries in relation to non-beneficiaries, output increases a little below 5%, and investment grows markedly by about 20%. Investment comes in spikes (Haltiwanger and Cooper, 2006; Doms and Dunne, 1998), so that, contingent on part of the credit being used for purchases of fixed capital, large investment effects are not surprising. Exports are also positively affected by the Bancóldex loans (Table 1b): the (linear) probability of exporting increases by 1.7 pp; the value exported increases close to 20%; and the number of export destinations by a little over 1.5%.

Interestingly, results are very similar after restricting the database using propensity score matching. It is worth mentioning that the estimated effects grow in size, even to the point of doubling, in robustness exercises where selection biases are addressed by controlling for the lagged dependent variable rather than fixed effects (Table 4). The true effects are thus possibly bound between those shown in Table 1 and those of Table 4.

The positive effects of Bancóldex credit on employment and output exhibit persistence over time (Panel B). In fact, though the coefficient associated with the treatment variable decays over time, it does so at a very slow pace. By the third year, the effect over employment is still above 2.5%, and that over output remains in a similar neighborhood. Similar persistency is not found for the effect on investment. Though the coefficient for the current Bancóldex dummy is still positive and large (but imprecisely estimated), the one on the lagged treatment becomes negative. This is probably related to the well-known lumpy behavior of investment, which implies that a large investment episode today reduces the probability that the firm invests tomorrow. Export effects also lack persistence, suggesting that exporters use Bancóldex loans for transaction-specific purposes. Together, these results suggest that Bancóldex loans are at least partly used to undertake investments that have persistent effects on the operation of plants, but also to solve working-capital needs. The latter statement is also supported by our estimates of the effect of Bancóldex on purchases of variable inputs (not reported but available upon request), which show an immediate effect with only mild persistence.

*In comparison to our previous estimations (see IDBWP294), our new results confirm Bancoldex’ positive impact on output, investment, employment, productivity (with a lag), and exports. The new coefficients are smaller in magnitude. This change is related to the variations in the estimation strategy. They are most strongly related to the change in focus from those first treated in 2004 to those treated at any point in time, and to the elimination of pre-2004 observations from the control group.*

* 1. **Effects on performance: small vs large establishments, short- vs. long-run loans**

Table 2 shows the results of re-estimating equation (1) separately for small and large establishments (excluding medium establishments). Following Colombian legal definitions, small establishments are those with 50 or less employees, and large establishments those with 200 or more employees. Our conceptual framework suggests that large establishments should benefit less from public credit if, as is plausible, they have more internal financing and are less rationed with respect to external financing. Results in Table 2 are broadly consistent with this view. For employment, output, investment, and TFP the coefficients estimated for large establishments are about half the size of those for small establishments. They are also imprecisely estimated, though in some of our robustness proofs do turn out to be statistically significant. Interestingly, however, the effect of Bancóldex on exports and purchase of variable inputs (the latter not shown but available) is particularly large for large establishments. That is, small establishments seem to use Bancóldex funding relatively more intensely for solving credit rationing in productivity-enhancing investments, while large establishments seem to use it mainly for working capital, and especially at times of particularly large working capital needs.

Table 3 presents results of estimating separately the effect of long- and short-run Bancóldex loans. Long-run loans are defined as those with maturity of at least three years, short-run ones as those with maturity of up to eighteen months. Establishments that obtained other types of Bancóldex credit are left out, so that the control group corresponds to those that did not obtain Bancóldex loans (of any length). New participation models are estimated for the probability of receiving the respective type of loan. The restricted dataset used for columns marked FE+PSM in this case was constructed using a re-estimated matching exercise where inclusion in the restricted dataset is based on the probability of receiving a long-run Bancóldex loan in the upper panel, and the probability of receiving a short-run Bancóldex loan in the lower panel.

The sources from which Bancóldex obtains funding are more costly than the deposits from which financial intermediaries traditionally fund their loans. But deposits are volatile and thus banks may be unwilling to use them to fund long maturity loans. Firms are, therefore, more likely to face credit rationing from banks for long run projects.

Our results show that long-run Bancóldex loans have a large positive impact on investment and productivity that is not observed when focusing on short-run loans. Not only are the coefficients for short-run Bancóldex loans on investment and TFP statistically insignificant, but they are also much lower than those for long-run loans. The opposite is true regarding the effect of Bancóldex on exports and on materials purchases (the latter not shown but available); it is short run loans that impact these outcomes. Meanwhile, the effects on employment and output are not markedly different when considering long-run and short-run loans, though the coefficients are slightly smaller for long-run loans.

Table 4 complements these findings by estimating the heterogeneous effects of long- vs. short-run loans over time on materials, employment, and output. The effects on materials inputs do not exhibit persistence for either type of loan—while in these results the effect on materials continues to be particularly large for short-run loans. For employment and output, the effect of long-run loans exhibits persistence over time, while the effect of short-run loans does not. For TFP, they are strongest These findings suggest that: 1) Bancóldex short-run loans play an important role in the provision of working capital but apparently not in the financing of investment projects, while its long-run loans are comparatively indeed used to fund investments; and 2) at least part of the effect of long-run loans, initially reflected on investment, takes time to translate into complementary demand for labor and into greater output, but once it does that effect is more permanent in nature.

*In comparison to our previous estimations (see IDBWP294), the results presented in this section for small vs. large establishments are a new dimension to the analysis. Our current results regarding short- vs. long-term loans largely confirm the previous ones, but the new estimates are more precisely estimated and yield a starker message. For instance, in IDBWP294 we reported that long-run loans had an effect on TFP not replicated in short run, but the estimates themselves yielded little guidance as to the reasons why this may be the case. Our new estimates suggest that the reason is that long-run loans impact investment. The greater precision of new estimates is surely related to the sheer gain in numbers of observations that come with our new methodological strategy.*

* 1. **Effects on performance: robustness exercises**

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

Results in Table 4 are also consistent with our baseline specifications in terms of the heterogeneity of effects between small and large plants. In particular, the effects of Bancóldex loans on all outcomes but materials are stronger for small establishments than for large ones. In fact, for large establishments the only statistically significant effects are those on employment, exports and materials, the two latter with a particularly large associated coefficient. Finally, the results in Table 4 regarding long vs. short run loans are also consistent with the previous ones for output, materials purchases and employment as dependent variables. For investment, however, the specification including the lagged dependent variable does not identify any major difference between the two types of credit, for both of which a large and significant effect on investment is estimated. This comes in contrast with our baseline results, which suggest that short-run credit does not affect investment while long-run credit does. We therefore take our results regarding heterogeneous impacts by loan maturity as only suggestive.

* 1. **Bancóldex and credit conditions**

We now move to the estimations of the effect of Bancóldex on the credit conditions faced by firms. That is, we estimate equation (1) but now setting the dependent variable to be one of several characteristics of a firm’s basket of loans from supervised financial intermediaries. In particular, we consider the average interest rate over the loans obtained in the period; the average maturity specified for those loans; the number of intermediaries from which the firm obtained loans over the period; and the amount of credit granted to the firm. The results we report in this section exclude year 2009, given a stark increase in loans classified as microcredit that occurred that year. Such increase implies a change in the composition of Bancóldex loans likely to have changed the type of beneficiaries; these compositional effects may end up captured by the results. Alternative results including year 2009 were also produced. They are not reported here in the interest of succinctness, but they lead to similar qualitative conclusions, in general with smaller magnitudes but similar levels of statistical significance.

Because the set of data we use in this section is constructed from records on supervised credit operations, only firms receiving at least one loan from a supervised financial intermediaries over a given year are included in that particular year. This implies that in this section we only estimate the effect on credit conditions contingent on receiving at least one loan in the period. At the same time, recipient firms from all sectors are included. Even if we wanted to restrict the data to manufacturing firms for consistency with our results on performance, we would not be able to do so due to the lack of sector identifiers in the credit data. For all these reasons, results in this section cannot be put together with those in the previous one to identify, say, the average impact on performance of a given reduction in the average interest rate on loans associated with the use of Bancóldex credit. But, they are still a useful indication of the channels through which second-tier credit is having an impact on Colombian firms, and in turn of how second-tier credit could impact economic performance in other environments.

Table 5 shows results of estimating equation 1 for different dependent variables. Consistent with our findings of positive effects on firm performance, we find that Bancóldex beneficiaries see their total credit increased by almost 50%. They also see the average interest rates of their loans reduced, an indication that Bancóldex loans are making credit cheaper to the firm, and thus potentially displacing, at least partially, market credit. The degree to which Bancóldex is substituting market credit is important to understand the extent to which Bancóldex is easing credit constraints or credit rationing, rather than simply substituting credit that would be available though at a higher costs.

There are several indications that Bancóldex is indeed not simply substituting market credit. On the one hand, the magnitude of the effect on the interest rate is not particularly large: it represents a reduction of 2 pp, over an average level of over 21 pp. Notice also that the use of Bancóldex is also associated with an increase in the number of lenders from which the firm obtains loans of 0.4, which is more than half a standard deviation. Interestingly, the average maturity of loans also goes up by about 20%. Bancóldex seems to be providing a different type of credit that firms were not getting previously, and actually widening the access of firms to private lenders. This interpretation is also consistent with the fact that Bancóldex credit is not explicitly subsidized, and that the sources of funding that Bancóldex itself uses are not cheaper, probably even more expensive, than those of private banks, but mainly for short-run funds. In the absence of explicit subsidies, the fall in average interest rates associated with Bancóldex credit probably reflects a change in the composition of credit towards longer run loans, for which Bancóldex may indeed be particularly competitive in terms of the costs of funds.

Table 6 gets at the question of how Bancóldex affects market lending to firms from a different angle. It shows the results of estimating the effect of Bancóldex credit on the amount of credit from sources other than Bancóldex. That is, we calculate total credit and the number of lenders from which those loans come but excluding now all loans with Bancóldex funding. While a contraction in other sources of credit is indeed observed in the current year, its magnitude is far from implying a full substitution of market credit by Bancóldex. Moreover, such contraction lasts for a single period, and is then followed by an expansion in non-Bancóldex credit. These findings are at least suggestive that the persistent effects on performance found in the previous subsection are at least partly attributable to sustained credit that, despite being associated with having had a Bancódex loan, is not coming solely from Bancóldex.

Table 7, presents robustness exercises including the lagged dependent variable as a regressor in lieu of fixed effects. Results for the effect of Bancóldex credit on overall credit conditions are remarkably similar to those shown in Table 5 (the baseline specification), in terms of sign, magnitude and significance. For credit from non-Bancóldex sources, however, controlling for lagged credit from non-Bancóldex sources changes the sign of the estimated effect of Bancóldex, suggesting now that the use of Bancóldex credit does not displace but supplement market credit. The change of sign probably suggests that Bancóldex credit is going to firms previously rationed out of market credit, and that once this time-varying selection is accounted for, Bancóldex credit does not reduce the use of market credit, and may even increase it.

As is the case of our findings relating performance, results in this section are consistent with Bancóldex playing an important role to help firms overcome credit rationing. In particular, Bancóldex resources are not simply replacing banks’ own resources in terms of lending to firms. Bancóldex could conceivably play the sole role of providing cheaper resources that firms would anyway find elsewhere. In this case, credit would not be expanded: though firms would take-up Bancóldex-funded loans, they would use them to replace more costly loans from other sources. We do observe a reduction in the average interest rate faced by recipients of Bancóldex, but short lived and of a magnitude of less than a fifth of standard deviation. Meanwhile, firms do see their credit expanded after receiving Bancóldex, and interact with new intermediaries, and do not fully substitute market credit for Bancóldex credit. Positive effects on credit are long-lived despite the interest rate effect disappearing.

*Results in Table 6 largely reproduce those in IDBWP308. The exception is the effect on loan maturity that we now estimate more robustly and precisely. This is probably the result of a correction we introduced in the way in which we code loan duration. Results in Table 7 expand those in IDBWP308, where for the case of non-Bancóldex loans we only estimated the one-period lagged effect, while our current approach estimates a more flexible timing of effects. Results in Table 7 for the one-period lagged effect largely reproduce those in IDBWP308, again with the exception that we now get more precise and robust estimates of the effect on loan maturity.*

* 1. **Bancóldex effects by type of loan: Aprogresar and loans in dollars**

Aprogresar is a special credit line that Bancóldex offered for a few years. Its salient features were related to a specific aim to fund relatively long-run investment. The line provided funding for modernization: purchase of fixed assets, international expansion, product diversification, acquisition of environmentally friendly technologies, training. It was targeted at micro enterprises and SMEs. Aprogresar had a limit of COP 3,000 million (around USD1.5 million) per firm, and a minimum maturity of 18 months (up to 12 years). One particularly interesting feature of the line was that loans with larger maturities paid lower interest rates. Moreover, for several years Aprogresar represented a very important chunk of the resources Bancoldex lent.

Table 8 presents results of re-estimating equation (1) but including as treated only establishments that received Aprogresar loans. We estimate positive and meaningful effects of Aprogresar on employment, investment, output, and TFP. These results are consistent with those obtained when including all loans (Table 1), but a little larger in magnitude, suggesting some degree of benevolence of the conditions under which Aprogresar loans were offered. Interestingly, we see no effect of Aprogresar on exports. As we have seen above, the effects we identify on exports seem more consistent with resources being used to deal with short-run working-capital needs than with investing on exporting capabilities. The finding that Aprogresar does not have a similar impact is in fact consistent with resources from this line not being used to deal with working capital needs.

Another distinguishing feature of Bancóldex is that it also lends in dollars. This segment of the market is scarcely served by private lenders using other sources of funding (other than Bancóldex), so this is a natural focal point. We thus re-estimate equation (1) including as treated only establishments that received Bancóldex loans in dollars. We see very large positive effects on exporting, and associated expansions in output and employment.

*Results in Tables 8 and 9 add new dimensions to the analysis initially presented in IDBWP294.*

**Table 1a: Effect of Bancóldex on plant performance**



The table presents results from estimating equation 1. All regressions control for the establishment belonging to a multi-establishment firm, a dummy for making positive interest payments on financial obligations, age and age squared, as well as establishment-level fixed effects. For each outcome, the second column is obtained after restricting the dataset to beneficiaries and their nearest neighbors in terms of participation probability. Errors clustered at the plant level in parentheses. \*\* p<0.01, \* p<0.05, + p<0.1

**Table 1b: Effect of Bancóldex on plant performance**



The table presents results from estimating equation 1. All regressions control for the establishment belonging to a multi-establishment firm, a dummy for making positive interest payments on financial obligations, age and age squared, as well as establishment-level fixed effects. For each outcome, the second column is obtained after restricting the dataset to beneficiaries and their nearest neighbors in terms of participation probability. Errors clustered at the plant level in parentheses. \*\* p<0.01, \* p<0.05, + p<0.1

**Table 2a: Effect of Bancóldex on plant performance**

**Large vs. small establishments**



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

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

**Table 2b: Effect of Bancóldex on plant performance**

**Large vs. small establishments**



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

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

**Table 3a: Effect of Bancóldex on plant performance**

**Long vs. short-run Bancóldex loans**



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

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

**Table 3b: Effect of Bancóldex on plant performance**

**Long vs. short-run Bancóldex loans**



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

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

**Table 4a: Robustness exercises performance:**

**Regressions including lagged dependent variable instead of fixed effects or PSM**



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

**Table 4b: Robustness exercises performance:**

**Regressions including lagged dependent variable instead of fixed effects or PSM**



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

**Table 5 Effect of Bancóldex on credit conditions**



The table presents results from estimating equation 1. Column titles indicate the respective dependent variable. All regressions control for year effects; the maximum number of loans from a single Financial Intermediary to the firm in the respective year; the fraction of loans backed by a guarantee; and a dummy for at least one loan being calssified as micro-credit. Errors clustered at the firm level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6 Effect of Bancóldex on non-Bancóldex credit**



The table presents results from estimating equation 1. Column titles indicate the respective dependent variable. All regressions control for year effects; the maximum number of loans from a single Financial Intermediary to the firm in the respective year; the fraction of loans backed by a guarantee; and a dummy for at least one loan being calssified as micro-credit. Errors clustered at the firm level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 7 Robustness exercises credit conditions: regressions including lagged dependent variable instead of fixed effects or PSM**



The table presents results from estimating equation 1. Column titles indicate the respective dependent variable. All regressions include the lagged dependent variable as an additional regressor. In addition, they control for year effects; the maximum number of loans from a single Financial Intermediary to the firm in the respective year; the fraction of loans backed by a guarantee; and a dummy for at least one loan being calssified as micro-credit. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 8a: Effect of Bancóldex’ Aprogresar loans on plant performance**



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

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

**Table 8b: Effect of Bancóldex’ Aprogresar loans on plant performance**



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

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

**Table 9a: Effect of Bancóldex’ loans in dollars on plant performance**



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

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

**Table 9b: Effect of Bancóldex’ loans in dollars on plant performance**



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

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

1. Ver Marcela Eslava, Alessandro Maffioli y Marcela Melendez (2012) “Second-tier Government Banks and Access to Credit: Micro-evidence from Colombia”, IDB Working Paper Series No. IDB-WP-308 [↑](#footnote-ref-1)
2. Ver Marcela Eslava, Alessandro Maffioli y Marcela Melendez (2011) “Government-Owned Banks and Firm Performance: Micro Evidence from Colombia, “Working Paper, IDB. [↑](#footnote-ref-2)
3. The unit of observation in the Manufacturing Survey is the plant, while the unit of observation in the Financial Superintendency data is a firm. [↑](#footnote-ref-3)
4. We match to a single nearest neighbor although less strict matching algorithms are obviously available, because going to the finest matching strategy and contrasting it with simple (un-matched) fixed effect estimates, we are able to establish bounds for the effects. [↑](#footnote-ref-4)
5. The set of lagged characteristics included in the models covers output, TFP, exports, and investment for the performance analysis. The analogous set for the analysis of credit conditions includes the lags of the interest rate; loan maturity; number of financial intermediaries; and credit. [↑](#footnote-ref-5)