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The findings and interpretations of the author do not necessarily represent the views of the Inter-American Development Bank. The usual disclaimer applies. Correspondence to: Yuri Soares, email: yuris@iadb.org Office of Evaluation and Oversight, Inter-American Development Bank, 1300 New York Ave. NW, Washington DC 20577

INTRODUCTION

This report contains an evaluation of the *Argentinean Technological Fund* (FONTAR), created in 1995 and whose main objective is to fund projects presented by private firms which aim at improving their competitive performance through technological innovation activities.

The main goal of this evaluation is to analyze the impact of FONTAR's programs on the innovation activities of granted firms. We also try to ascertain whether FONTAR contributed to improve supported firms' innovative outputs (i.e. if they accomplish more innovations as a result of the grant) and productive performance. The evaluation is undertaken for all FONTAR's programs and separately for the Non-Reimbursable Funds (ANR) program.

A counterfactual notion of causality would imply comparing the outputs of funded firms with those that the same firms would have obtained in case they had not been funded. In order to estimate this unobserved potential outcome, we count with data from a group of firms which did not receive the grants, either because they never applied for them or because they applied but did not accomplish the basic requirements for being granted.

In order to carry out the evaluation we have taken advantage of a series of econometric techniques that allow us to identify the impact of having received a credit or grant from the FONTAR on relevant outputs, distinguishing this impact from other factors that could also be affecting firms' performance. In other words, we aim at establishing a causal relationship between firm's reception of a credit or grant and its innovation activities, not a simple correlation between both phenomena.

The report is organized as follows. In section 2 the evolution of FONTAR and the main funding mechanisms that it offers are briefly outlined, with particular emphasis on the ANR. Section 3 includes a description of the methodology and data sources used to make the evaluation. Section 4 presents and discusses the main results. Finally, section 5 concludes.

FONTAR AND THE ANR PROGRAM

The Argentinean Technological Fund (FONTAR) is one of two funds[1] of the National Agency of Scientific and Technological Promotion.

Available funds come from the National Treasure, Loans of the Inter-American Development Bank (I.A.D.B.), the recovery of reimbursable funds and from cooperation agreements with national and international institutions. Public resources are partially granted to the Agency in the frame of the Law 23877 aimed at Technological Innovation Promotion. Between 1997 and 2007 the Agency subsidized almost 9000 projects for more than Argentine $ 1300 million (more than USD 400 million at the current exchange rate).

While FONTAR has been functioning since 1995, initially it only worked on the basis of soft credit lines that aimed directly at the financial constraint problem that usually hinders the ability of firms to undertake innovation activities. In 1998, funding in the form of fiscal credits applied to income taxes was introduced. But it was not until the year 2000 that the ANR program started to grant projects with non-reimbursable funds by means of a matching grant scheme.

Specifically, the ANR program finances up to 50% of the cost of technological innovative projects. The funds are only disbursed when FONTAR approves, technically and financially, the completion of the corresponding stage of the projects. That means, it only gives funds as a repayment of firm effective innovation investments.

The ANR program is mainly aimed at funding projects oriented to research and development, pilot scale technologies, applied knowledge generation, innovative products and process development, management improvements or human capital training (when these are related to product and/or process innovations) and to the creation of technology based start ups.

For these projects, an Ad-hoc Evaluation Committee analyzes: a) project's technical quality and feasibility (probability of technical success, rationality in projected stages, coherence of planned budget, etc.), b) firm's technical capacity (infrastructure and personnel related to the project, firm's antecedents, etc.), c) firm's economic and financial conditions (capacity to invest its corresponding 50% of the

[1] The other is the Fund for the Scientific and Technological Research (FONCyT). For its description and evaluation see Chudnovsky *et al*. (2006a).

project) and d) project's economic viability (projected impact, coherence of expected results).

Besides the ANR program, FONTAR currently counts with several lines of credits for firms and institutions with innovation projects, as well as with the fiscal credit scheme abovementioned. All of them are granted through public calls and on the basis of projects proposals.

Figures 1 and 2 show the evolution of the number of projects approved and the amount of money disbursed in concept of subsidies by FONTAR as a whole, and by the ANR program in particular, respectively, from 2003 to 2008[2].

Table 1 shows that almost 83 million pesos were compromised between 2001 and 2005 to fund ANR projects. That amount represents a 20% of the total budget devoted to FONTAR projects in that period. The average project signed a contract for $95.782. Due to the economic crisis, only 10% of the compromised budget was executed in 2001. In 2002 those projects approved in the previous year received the corresponding funds, and only 13 new projects were approved.

Table 2 gives an idea of the role of FONTAR, and ANR in particular, vis à vis Argentinean total expenditures on R&D. The significance of FONTAR increased between 2001 and 2004 when its approved projects represented almost a 10% of all Argentinean R&D investments. In particular, approved ANR projects also become more significant in the total from 2002 to 2004, although their participation in FONTAR sources of finance decreased. It is important to notice that FONTAR finances innovation activities and not only R&D investments; this would imply that the importance of ANR reflected in Table 1 is overrated, since only a fraction of its budget is devoted to finance R&D.

METHODOLOGY AND DATA

The main objective of this report is to estimate the effect of public grants to technological projects on investments in innovation by subsidized firms. The grants' impacts on innovative and productive performance are also of interest for our report.

[2] The period showed in figures 1 and 2 does not correspond to the period considered for this evaluation. However, the years in these figures overlap many years relevant to this evaluation, so that the figures are still useful for illustrating general tendencies.

In the case of innovation activities, we will measure the impact of interest by the total amount of money spent on those activities and by the amount of money spent net of the amount received. To state things formally, let y_{it}^1 be the innovation expenditures of subsidized firm i at time t in the actual setting where it receives the grant, and let y_{it}^0 be the innovation expenditures of participating firm i at time t in the counterfactual scenario where it does not receive the grant. The goal of this impact evaluation is to obtain a measure of the gains in outcomes for firm i at time t, $\Delta_{it} = y_{it}^1 - y_{it}^0$, that results from comparing the situation in which the beneficiary firm receives the grant with the unobservable situation in which the beneficiary firm does not receive the grant.

A few years ago, this measure would have been computed by means of a before-after analysis consisting in comparing each beneficiary firm before and after receiving the public support. Because the difference between pre-treatment and post-treatment outcomes may be biased by temporal effects confounding the treatment effect of actual interest, this practice was soon abandoned. In order to avoid time effects biasing the treatment effect, one should compare the impacts of beneficiary firms when they receive the grant to themselves when they do not receive the grant, but in the same moment. Therefore, in order to asses the impact evaluation of FONTAR it is required the construction of a counterfactual that properly estimates y_{it}^0.

In an experimental setting, where subsidies to innovation are randomly allocated to firms, both observed and unobserved characteristics would be balanced across subsidized and not subsidized firms. In such a case, one could simply estimate the impact effect of FONTAR and of the ANR line by comparing innovation expenditures between treated and not treated units, as any variation between groups could be attributed solely to the presence of the public grant program.

Nevertheless, the allocation of grants or credits to support research and development efforts is not random, but based on certain observed characteristics of those firms that apply for the grant/credit line, as explained above. This implies that funding is likely to be positively correlated with observed and unobserved characteristics such as motivation (it is sensible to assume that firms that decide to apply for the line are more motivated than those that do not apply). If this were the case, the mere comparison of impact variables would be positively

biased, as it would be capturing two effects: a direct effect of the grant or credit on innovation expenditures, and an indirect effect of the grant or credit through the endogenous variation imposed by (for instance) motivation.

In a non experimental setting, where selection of units into treatment is based on observables, the methodological challenge is to construct a control group as similar as possible to the group of beneficiary firms at least in those observable characteristics. The assumption behind this idea is that if, on average, observable characteristics do not differ across groups, unobservable characteristics will not differ either.

A usual approach to deal with non experimental data is to estimate a difference-in-differences model:

$$Y_{it} = \gamma T_{it} + \beta X_{it} + \alpha_i + \mu_t + \varepsilon_{it} \quad (1)$$

where Yit is any of the outcomes under study for the unit i at time t, Tit is a dummy variable that takes the value of one for treated units and zero otherwise, γ is the parameter of interest, and Xit is a matrix of units' characteristics. The unobservable determinants of units' output are reflected by the last three terms: α_i is a unit fixed effect that controls for all time-invariant characteristics; μ_t is a time-period effect common to all units; and ε_{it} is the error term, which is assumed to be uncorrelated with X and T. Estimation of (1) by fixed effects is standard in the related literature. The difference in differences estimator consists of the difference between the before-after difference in the outcomes of interest for treated and the before-after difference for non-treated units. The main advantage of the difference-in-differences approach is that there is no need to find observable correlates of the unobserved initial differences among units. The identifying assumption is that controls have evolved from a pre- to a post-project period in the same way treatments would have done had they not been treated; in other words, the change in the outcome for control units is an unbiased estimate of the counterfactual.

Formally, time differencing (1) for each group (treatment and control), then differencing between groups, and finally taking expectations conditional on observable characteristics and treatment status, we obtain:

$$E(\Delta Y_{it} / \Delta X_{it}; T_{it} = 1) - E(\Delta Y_{it} / \Delta X_{it}; T_{it} = 0) = \gamma + E(\Delta \varepsilon_{it} / \Delta X_{it}; T_{it} = 1) - E(\Delta \varepsilon_{it} / \Delta X_{it}; T_{it} = 0).$$

This precisely shows that the difference in differences method identifies the program effect, γ, whenever the identification assumption is met: $E(\Delta \varepsilon_{it} / \Delta X_{it}; T_{it} = 1) - E(\Delta \varepsilon_{it} / \Delta X_{it}; T_{it} = 0) = 0$.

A caveat to this approach is that it does not allow systematic differences between control and treatment groups to vary across time. Given that the identification assumption involves elements that are unobservable for the evaluation team, such hypothesis cannot be tested and its validity must be evaluated in the context of the specific case under study. As long as it is sensible to assume that the decision of a firm to apply for a public program supporting innovation activities and the selection into treatment criteria are based on relatively constant characteristics, the differences in differences estimator can be deemed acceptable for assessing the impact of FONTAR and of the ANR line on the outcomes of interest.

Our first exercise is to test the Additionality vs. Crowding Out hypothesis. That is, we will evaluate whether the presence of the public aid to innovation complements or crowds out subsidized firms' investments in innovation activities. In order to test this hypothesis, it is standard in the related literature[3],[4] to estimate equation (1) considering as the dependent variable annual expenditures in innovation and the natural logarithm of annual expenditures in innovation (which corrects for the asymmetry in expenditures distribution). Therefore, firstly we will evaluate the impact of all FONTAR's programs and of the ANR program on total and private innovation expenditures and their natural logarithms. Total innovation expenditures is a variable capturing the total amount of money spent in all innovation items: intramural and extramural R&D expenditures, purchase of software, hardware and capital goods, technology contracts, in house industrial design and management, and personnel training. We also consider private innovation expenditures, which nets out the amount received from total innovation expenditure. As we do not count with information on the annual funds received by each firm

[3] David, P. and Hall, B. (2000). "Heart of darkness, public–private interactions inside the R&D black box", *Research Policy*, 29 (9), 1165-1183.

[4] Lach, S. (2002). "Do R&D subsidies stimulate or displace private R&D? Evidence from Israel", *Journal of Industrial Economics* 50, 369-390.

from FONTAR yearly, we take the total sum and prorate it equally among the years that the funded project was in practice.[5]

In the second place, we evaluate the impact of FONTAR and the ANR line on the innovative performance of beneficiary firms. This is of interest because it has been widely argued that the fact that public subsidies to innovation complement innovation expenditures does not necessarily guarantee success in the achievement of innovations. [6] In the light of this, it is desirable to estimate model (1) taking innovation output as the dependent variable. As an innovation output we consider a dummy variable, did innovation, that takes the value of one if the firm accomplishes innovations in the year and zero otherwise. Each firm can accomplish innovations in products and/or in processes.

Finally, because innovation activities are not an end by itself, but a mean to accomplish economic development, we will evaluate productive performance at the firm level estimating model (1) for labor productivity (constructed as the ratio of total sales to total employees) and exports, which are modal in the related literature.[7] For this exercise we are particularly interested in evaluating the existence of long run effects as it has been suggested in previous work that the impact of public aid on productive performance may take some time to mature.[8]

The data base for running model (1) was constructed on the basis of information generated by the Survey on Innovation and Technological Behavior annually conducted by INDEC (National Institute of Census and Statistics) and of annual data constructed based on the Monthly Industrial Survey, also administered by INDEC. This evaluation counts with annual data from 1998 to 2005. The variables in our final

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[5] Because many beneficiary firms in our sample received several credit lines at different moments of time, we constructed the *amount* variable by firstly prorating the total amount of each line over the years that line was in force, and secondly adding up the prorated amount for each year.

[6] Hujer, R. and Radic, D. (2005). "Evaluating the impacts of subsidies on innovation activities in Germany", *Scottish Journal of Political Economy* 52 (4), 565-586.
Patel, P. and Pavitt, K. (1995). "Patterns of technological activity: their measurement and interpretation", in P. Stoneman (Ed.) Handbook of the Economics of Innovation and Technological Change, Oxford, Blackwell Publishers, 14–51.

[7] Klette, T., Møen, J., and Griliches, Z. (2000). "Do subsidies to commercial R&D reduce market failures? Micro econometric Evaluation Studies", *Research Policy* 29, 471-495.

[8] Chudnovsky, D.; López, A.; Rossi, M.; and Ubfal, D. "Evaluating a program of public funding of private innovation activities. An econometric study of FONTAR in Argentina"

panel are innovation expenditures, private innovation expenditures, "did innovation", domestic sales, exports, total sales, total number of employees, and number of employees by education level. Descriptive statistics are presented in Table 3.

This information was complemented with data about financed projects by FONTAR, provided by the Ministry of Science and Technology. The Ministry provided information of financed projects for the period 1992 to 2006. The treatment data set provided by the Ministry contains information about financed projects, such as the identification of firms carrying out such projects, and the date when those projects were approved to receive funds. In order to merge the treatment data set to the firm's technological data set, we reshaped information about projects and constructed a set of treatment data at the firm level. Therefore, many firms in our database show information of more than one line, as they were beneficiaries of many FONTAR programs. All the beneficiary firms that were included in both datasets participated in projects beginning in 1999 or later. Hence, this evaluation counts with 2185 firms that were not treated in 1998 or before, according to the Ministry records. However, it is necessary to count with information before and after treatment for a firm to be included in this study. Out of the 2185 firms available, there are 466 firms for which we have information for only one year, so they are excluded from this evaluation. The remaining panel is not balanced. We count on information for all years in the period considered for 1193 firms, while 170 enterprises answered the questionnaires only in 1998 and 2001-2004; 156 only in 1998 and 2005; and 200 firms responded to the surveys only in 2001-2004 and 2005.

To sum up, there are 1719 firms for which we have before-after information. Of them, 93 firms participated in at least one of the lines managed by FONTAR in the period 1999 to 2005.

One caveat to this impact evaluation is that we do not observe the exact length of the projects, nor the amount of money allocated to each firm by year of treatment. Therefore, we had to estimate these characteristics in order to construct the treatment dummy whose impact we are interested in reporting. We decided to consider as a year of treatment every year since the approval of the project to the end of the panel.[9]

[9] We performed all the exercises under different assumptions as for the length of treatment. All models are consistent with the ones showed in this report. These tables are available upon request.

A second caveat to this impact evaluation relates to the construction of the control group. Ideally, the control group would be composed by firms that applied for subsidies but resulted unsuccessful. If this were the case, it would be possible to guarantee that, on average, treatment and control groups would not differ in at least one unobservable pre-treatment characteristic: the motivations and incentives that make them reveal a preference for public funding.

Nevertheless, having applied or not to any of the FONTAR lines is not available. Therefore, we had to select a suitable control group from the universe of non treated firms reached by the surveys instrumented by INDEC. We did this by means of constructing the common support.

In order to construct the common support we first estimated a probit[10] model for the probability of being treated (the so called "propensity score"). In other words, we estimated a cross section model of treated (a dummy variable that takes value one if the firm is eventually treated and zero otherwise) on a set of pre-treatment characteristics measured in 1998. After that, we obtained the sub-sample of the common support by excluding observations from the control group with an estimated propensity score smaller than the minimum estimated for the treated firms, and observations from the treatment group with an estimated propensity score larger than the maximum estimated for the control firms. Because there are many valid candidate models for the propensity score, some standard rules were followed so as to choose among them. First, the models presented here satisfy the balancing property that ensures that pre-treatment characteristics are balanced within groups. Second, most variables in the models are significant to explain the probability of treatment status. Third, the set of variables chosen is jointly significant in the model for the propensity score. Fourth, the number of treated firms included in the common support is maximized. Finally, the models chosen are such that the estimated probability of being treated is higher for ex-post treated firms than for control ones. Table 4 shows the estimates of the propensity score using as independent variables pre-treatment values of did innovation, qualified labor share, investment, total sales, and innovation expenditures. Column (1) shows the results of the model for the probability of receiving aid through any of FONTAR's lines, and column (2) replicates this exercise for the probability of being beneficiary of ANR line. Complementing this, Figures 3 and 4 show

[10] We also estimated a logit model, arriving at similar results. The probit model was chosen given that the normality assumption is more standard in the literature.

the fitted values of the propensity score for treatment and control units estimated by means of the non parametric Kernel method. In each figure, the common support can be identified graphically as the group of firms in the intersection of the fitted probability distributions. All in all, there are 793 firms in the common support when treatment considered is any line by FONTAR (722 control and 71 treated), and 457 firms in the common support when the treatment considered is ANR line (434 control and 23 treated).

In addition to constructing the common support, a test of differences in pre-treatment characteristics was performed, in order to have a sense of how similar are treatment and control groups when neither enjoyed treatment. With the exception of did innovation, all outcomes are balanced between control and treatment groups in the whole sample and in the common support. The fact that did innovation is unbalanced between groups might confirm our concern about not having identified the group of unsuccessful applicant firms: apparently, the firms that are eventually supported for developing innovations are the ones that before treatment were more likely to perform innovations. This is not surprising, as it is sensible to think that innovative firms would be the ones most interested in applying for programs supporting innovation activities.

RESULTS

Additionality vs. crowding out

Tables 5 to 10 show the results of the tests of additionality vs. crowding out hypothesis for the sample restricted to the common support. Table 5 and 6 evaluate the impact of FONTAR and the ANR line, respectively, on total innovation expenditures. Columns (1) and (2) consider as the dependent variable the total amount spent on innovation activities, while columns (3) and (4) consider the natural logarithm of this measure. All the effects show the expected sign. When evaluating all FONTAR lines, only coefficients in the log-lin models of columns (3) and (4) are significant at the standard levels. These results suggest that the presence of FONTAR increments total innovation expenditures in 31% for subsidized firms. Moreover, one additional peso received in concept of public support increments total innovation expenditures but by an amount that cannot be considered economically relevant.

When we restrict the analysis to beneficiaries of ANR, results are consistent in terms of the direction of effects. However, only the amount coefficient for the lin-lin model results significant: one additional peso received increments expenditures on innovation activities by nearly four pesos.

In order to properly test the additionality hypothesis against the crowding out hypothesis, we would like to analyze if total innovation expenditures grow because firms are using the amount received to finance more innovation, or else because the presence of the FONTAR fosters firms to spend on innovation beyond what they have available in concept of public support. Table 7 and 8 evaluate the impact of FONTAR and the ANR line, respectively, on total innovation expenditures net of the amount received through the public programs. Results are consistent with what was reported in Tables 5 and 6. Firms financed by any of the FONTAR's lines increment their private innovation expenditures by 957.5 thousand pesos on average in relation to not subsidized firms. This result suggests that firms supported by FONTAR increment their expenditures for innovation purposes sourcing on funds other than the ones coming from public support. When the treatment group is composed by ANR beneficiaries, a unitary increment in the amount received increments private innovation expenditures in about 4.5 pesos. All other effects show the expected sign, but they do not result significant at the standard confidence levels.

Finally, as a robustness check, Tables 9 and 10 reproduce the models in logs but adding the unity to transformed monetary variables, in order to not loose observations with null values. Results are consistent with models in Tables 5 to 8.

Innovative output

As said, spending more on innovation activities does not imply that innovations are actually accomplished. Therefore, it is desirable to test whether the bigger amount of expenditures caused by the presence of public support is effective in driving beneficiary firms to accomplish innovations. Table 11 shows the results of this exercise. Columns (1) and (2) show the impact evaluation of FONTAR in the sample restricted to the common support. While column (1) evaluates the impact of having received any amount of money through any FONTAR credit line, column (2) considers the amount of the support received as the treatment variable of interest. Columns (3) and (4) replicate the analysis for the sub group of firms treated through ANR.

Results shown in Table 11 indicate that the subsidized firms make an efficient use of the greater funds spent on innovation activities. The presence of FONTAR increments the probability of making an innovation by 17.6%, and this effect is significant at the 5% level. When restricting the treatment group to the sub-sample of firms receiving ANR, the Table shows that beneficiaries of this credit line increment their probability of innovating by 19.3%, and that this effect is significant. Moreover, for the sub set of firms receiving ANR, an additional peso received also significantly increments the probability of making an innovation, although from an economic point of view, the effect is very small.

We also included dummies by year of treatment to evaluate if FONTAR and the ANR line have a long run effect on innovative output. Only the year when the project starts and the first year after that are significant, suggesting that public support causes immediate increments in innovative performance[11].

Productive performance

An additional exercise is presented in Table 12, which shows the results of the estimation of the models for the impact of FONTAR and the ANR line on the productive performance of firms, considering two impact variables: the value of exports and the ratio of sales to the

[11] These tables are available upon request.

number of employees. In order to capture a long run effect, we included as independent variables dummies by year of treatment (instead of a single dummy taking value one for all years of treatment). Results are not consistent with prior hypothesis of the existence of a long run effect of public funding programs on productive performance of subsidized firms.[12]

CONCLUSIONS

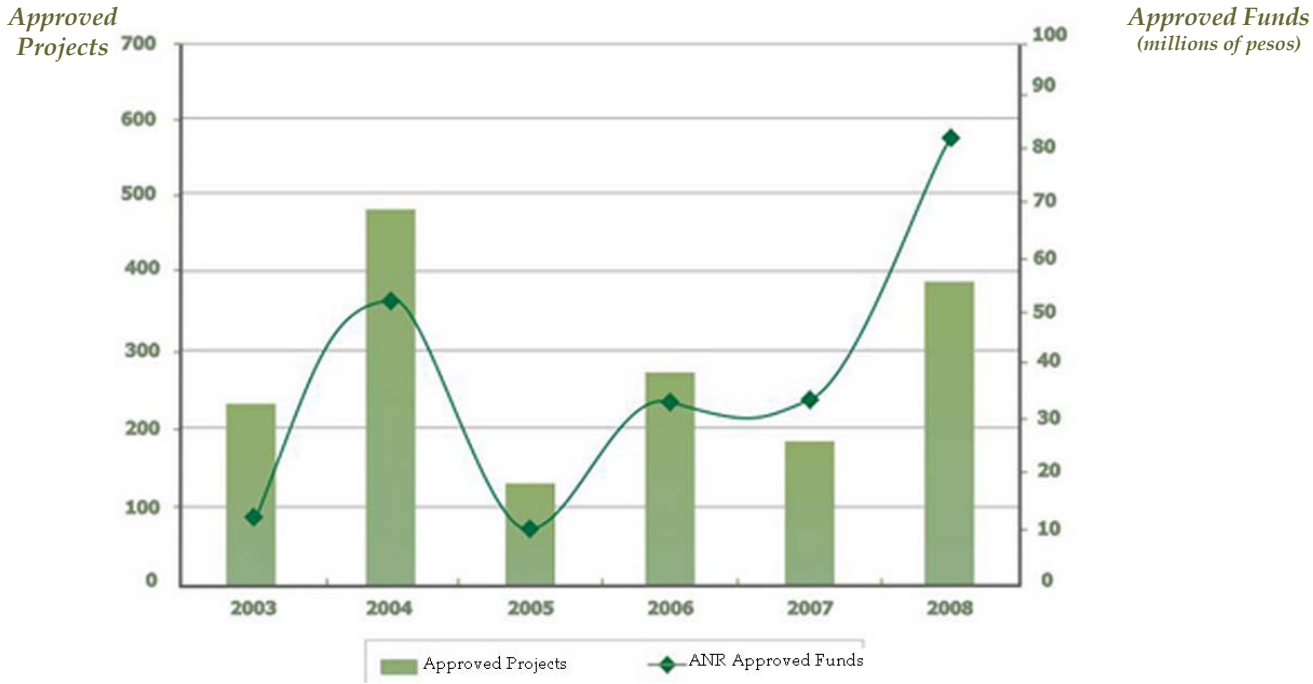
In the light of the empirical evidence presented here, the main finding of this impact evaluation is that beneficiary firms of FONTAR as a whole and of ANR in particular, spend more on innovation activities such as research and development and purchase of technology. Increments in innovation expenditures are found even when the amount received by the program is netted out from the total amount spent, indicating that beneficiary firms are caused to privately finance part of the increment on innovation expenditures. This would support the additionality hypothesis against the crowding out hypothesis.

What is more, empirical evidence suggests that funds spent on innovation activities are efficient in the sense that subsidized firm actually accomplish more innovations.

Long run effects on productive performance could not be detected.

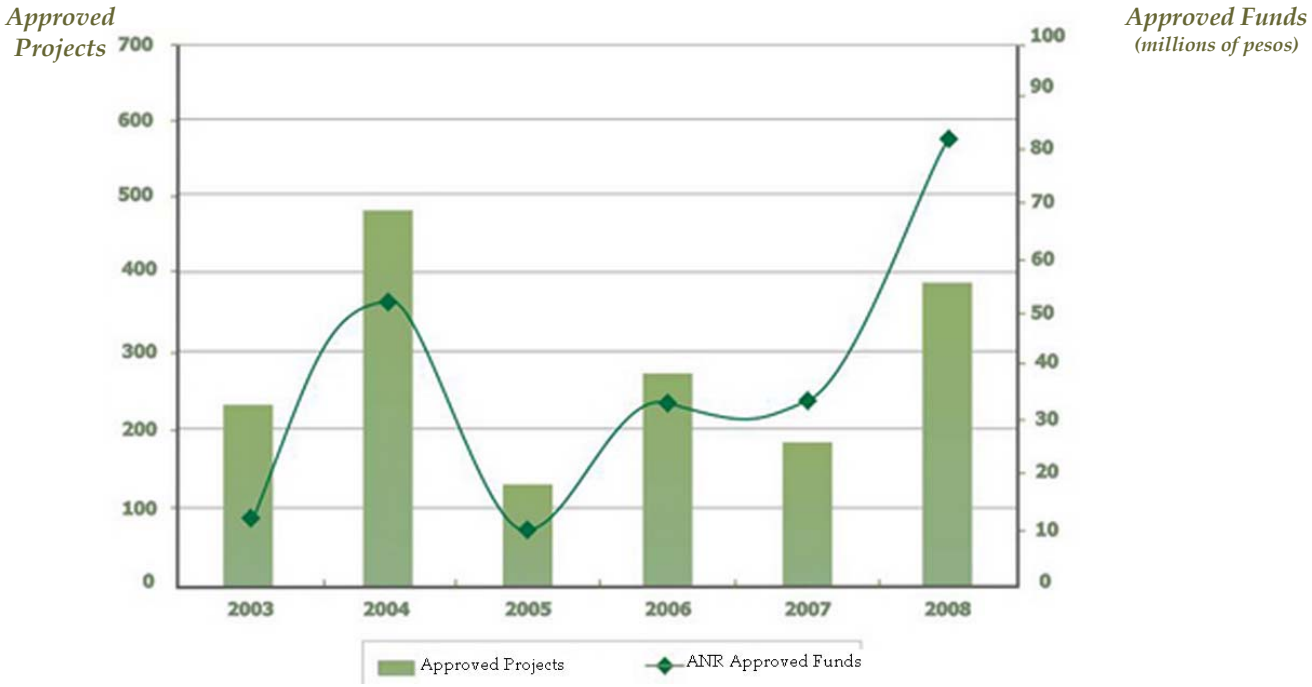
[12] As a robustness check, we replicated these exercises for the sub sample of treated firms with projects approved up until 2002 so that all treated firms could have sufficient time to vary their productive performance as a result of public support. Results are consistent with what table 12 shows. These tables are available upon request.

Figure 1
Amount of Projects and Funds Approved through ANR. 2003- 2008



Source: FONTAR (http://www.agencia.gov.ar)

Figure 2
Amount of Projects and Funds Approved by FONTAR. 2003- 2008



Source: FONTAR (http://www.agencia.gov.ar)

Table 1
Approved ANR Projects by Year (number and amounts)

Year	***APPROVED FONTAR PROJECTS(§)***	***TOTAL ANR WITH CONTRACT***			***TOTAL DISBURSED ANR***
	(in Arg $)	***($)***	***Number***	***$ per project***	***($)***
1998	35047269	-	-	-	-
1999	28481565	-	-	-	-
2000	27163916	-	-	-	-
2001	19127999	15662006	151	103722	1675773
2002	11239407	1015960	13	78151	9918559
2003	47457592	8804562	109	80776	3092187
2004	190537760	37084683	380	97591	7082130
2005	126044577	20380224	213	95682	16271700
TOTAL	485100085	82947435	866	95782	38040349

Notes: (***§***) It includes all the projects approved by FONTAR under its different programs.
Source: FONTAR.

Table 2
FONTAR and Argentinean R&D Investment

	2001		*2002*		*2003*		*2004*	
	millions of pesos	%	Millions of pesos	%	Millions of pesos	%	Millions of pesos	%
Total Investment in R&D	1140.9	100	1215.5	100	1541.7	100	1958.7	100
FONTAR (approved projects)	19.13	1.68	11.24	0.92	47.46	3.08	190.5	9.73
ANR (approved projects)	17.29	1.52	6.86	0.56	11.79	0.76	52.03	2.66

Source: FONTAR

Table 3
Descriptive Statistics

Variable	Obs.	Mean	Standard Deviation	Variable	Obs.	Mean	Standard Deviation
Innovation Expenditures 1998	1815	743856	4648911	Qualified Labor Share 1998	1658	0,35	0,38
Innovation Expenditures 1999	1815	884514	1,08E+07	Qualified Labor Share 2001	1717	0,36	0,29
Innovation Expenditures 2000	1815	771351	6634407	Qualified Labor Share 2004	1262	0,46	0,32
Innovation Expenditures 2001	1815	552290	4020046	Qualified Labor Share 2005	1189	0,48	0,30
Innovation Expenditures 2002	1616	404503	2400204	Labor Productivity 1998	1184	148317	408624
Innovation Expenditures 2003	1617	520181	2440796	Labor Productivity 2001	1618	119059	359237,8
Innovation Expenditures 2004	1617	718425	3130321	Labor Productivity 2004	1260	1502400	8759434
Innovation Expenditures 2005	1662	1121945	6020153	Labor Productivity 2005	1168	374282	1196836
Private Innovation Expenditures 1998	1815	743856	4648911	Domestic Sales 2001	2028	15455	482611,5
Private Innovation Expenditures 1999	1815	884088	1,08E+07	Domestic Sales 2002	2018	168726	1813091
Private Innovation Expenditures 2000	1815	770248	6634287	Domestic Sales 2003	1955	3,24E+07	1,76E+08
Private Innovation Expenditures 2001	1815	551075	4019936	Domestic Sales 2004	1973	4,77E+07	2,19E+08
Private Innovation Expenditures 2002	1616	403246	2399792	Domestic Sales 2005	1947	5,74E+07	2,73E+08
Private Innovation Expenditures 2003	1617	518109	2439997	Domestic Sales 2006	1931	7,08E+07	3,44E+08
Private Innovation Expenditures 2004	1617	714004	3129827	Domestic Sales 2007	1896	8,79E+07	4,15E+08
Private Innovation Expenditures 2005	1662	1112630	6018093	Domestic Sales 2008	1599	4,17E+07	9,13E+07
Did Innovation 1998	2195	0,49	0,50	Exports 2002	2018	79787	3104498
Did Innovation 2004	2195	0,37	0,48	Exports 2003	1955	1,62E+07	1,30E+08
Did Innovation 2005	2195	0,32	0,47	Exports 2004	1973	2,51E+07	1,83E+08
Number of employees 1998	1818	201,21	508,03	Exports 2005	1947	2,95E+07	2,16E+08
Number of employees 2001	1819	193,45	583,92				
Number of employees 2004	1290	174,89	373,18				
Number of employees 2005	1189	232,14	525,10				

Table 4
Estimation of the Propensity Score

	(1)	(2)
	Probability of receiving funds from any FONTAR credit line	Probability of receiving funds from ANR
Did innovation	0.525***	0.615**
	(0.164)	(0.277)
Qualified labor share	0.830***	0.498
	(0.249)	(0.401)
Investment	1.57e-09	-3.37e-07
	(1.01e-09)	(2.36e-07)
Total sales	-8.92e-10	-2.54e-08**
	(7.26e-10)	(1.19e-08)
Innovation expenditures		2.57e-07**
		(1.07e-07)
Employment		0.000598
		(0.000974)
Observations	963	764
Pseudo R2	0.0895	0.1897

Notes: this regression shows the estimation of a probit model for the probability of being treated as function of pre-treatment characteristics. The values of all variables included in the models correspond to 1998. Column (1) estimates a model considering as treated every firm receiving any credit line managed by FONTAR. Column (2) restricts the analysis to the treatment group composed by firms beneficiary of ANR program. Both models include industry dummies. ***Significant at the 1% level. ** Significant at the 5% level.

Figure 3
Fitted Probability of Receiving Funds from any FONTAR Credit Line

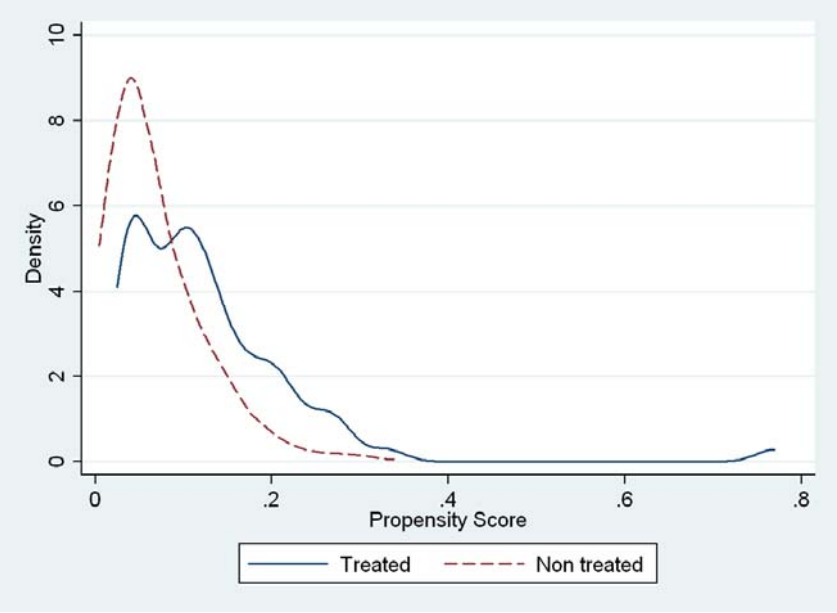


Figure 4
Fitted Probability of Receiving Funds from ANR

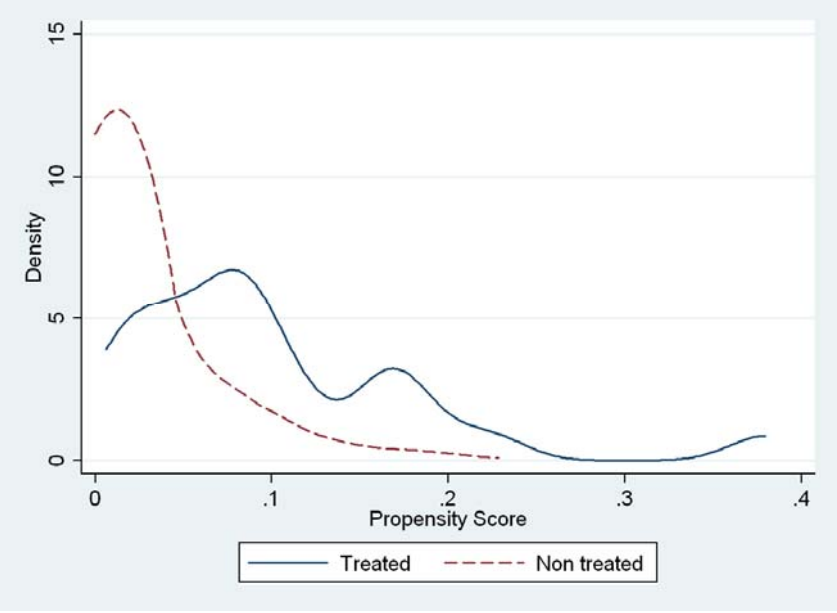


Table 5
Impact Evaluation of FONTAR on Total Innovation Expenditures

	(1)	(2)	(3)	(4)
	Innovation expenditures	Innovation expenditures	Natural log of innovation expenditures	Natural log of innovation expenditures
FONTAR	603114		0.310*	
	(375342)		(0.160)	
Amount		1.659		7.32e-07*
		(1.327)		(4.07e-07)
Observations	5742	5742	3525	3525
Firms	793	793	702	702
R2	0.4812	0.4811	0.7654	0.7652

Notes: FONTAR is a dummy variable that takes value one if firm *i* receives funds from any credit line administered by FONTAR at time *t* and all subsequent years, and zero otherwise. All the models shown in the table have been estimated by Ordinary Lest Squares. All the models have been estimated for the common support. All the models include firm and time dummies. Robust standard errors are shown in parentheses. * Significant at the 10% level.

Table 6
Impact Evaluation of ANR on Total Innovation Expenditures

	(1)	(2)	(3)	(4)
	Innovation expenditures	Innovation expenditures	Natural log of innovation expenditures	Natural log of innovation expenditures
ANR	120852		0.237	
	(103632)		(0.208)	
Amount		3.863*		4.83e-06
		(2.139)		(3.43e-06)
Observations	3343	3343	1886	1886
Firms	451	451	382	382
R2	0.9215	0.9215	0.7361	0.7361

Notes: ANR is a dummy variable that takes value one if firm *i* receives funds from ANR at time *t* and all subsequent years, and zero otherwise. All the models shown in the table have been estimated by Ordinary Lest Squares. All the models have been estimated for the common support. All the models include firm and time dummies. Robust standard errors are shown in parentheses. * Significant at the 10% level.

Table 7
Impact Evaluation of FONTAR on Private Innovation Expenditures

	(1)	(2)	(3)	(4)
	Private innovation expenditures	Private innovation expenditures	Natural log of Private innovation expenditures	Natural log of Private innovation expenditures
FONTAR	957528*		0.268	
	(498601)		(0.177)	
Amount		2.964		7.99e-09
		(2.339)		(4.65e-07)
Observations	5680	5680	3502	3502
Firms	793	793	701	701
R2	0.4841	0.4838	0.7657	0.7654

Notes: FONTAR is a dummy variable that takes value one if firm *i* receives funds from any credit line administered by FONTAR at time *t* and all subsequent years, and zero otherwise. All the models shown in the table have been estimated by Ordinary Lest Squares. All the models have been estimated for the common support. All the models include firm and time dummies. Robust standard errors are shown in parentheses. * Significant at the 10% level.

Table 8
Impact Evaluation of ANR on Private Innovation Expenditures

	(1)	(2)	(3)	(4)
	Private innovation expenditures	Private innovation expenditures	Natural log of Private innovation expenditures	Natural log of Private innovation expenditures
ANR	134941		0.163	
	(116,652)		(0.217)	
Amount		4.359*		4.57e-06
		(2.445)		(3.45e-06)
Observations	3335	3335	1884	1884
Firms	451	451	382	382
R2	0.9215	0.9215	0.7361	0.7361

Notes: ANR is a dummy variable that takes value one if firm *i* receives funds from ANR at time *t* and all subsequent years, and zero otherwise. All the models shown in the table have been estimated by Ordinary Lest Squares. All the models have been estimated for the common support. All the models include firm and time dummies. Robust standard errors are shown in parentheses. * Significant at the 10% level.

Table 9
Robustness check: Impact Evaluation of FONTAR on Innovation Expenditures and on Private Innovation Expenditures

	(1)	(2)	(3)	(4)	(5)	(6)
	Natural log of (innovation expenditures + 1)			Natural log of (private innovation expenditures +1)		
FONTAR	2.047***			3.145***		
	(0.481)			(0.506)		
Amount		1.99e-06*			1.92e-06	
		(1.21e-06)			(1.38e-06)	
Natural log of (amount + 1)			0.187***			0.279***
			(0.0434)			(0.0469)
Observations	5742	5742	5742	5680	5680	5680
Firms	793	793	793	793	793	793
R2	0.607	0.605	0.607	0.614	0.611	0.613

Notes: FONTAR is a dummy variable that takes value one if firm *i* receives funds from any credit line administered by FONTAR at time *t* and all subsequent years, and zero otherwise. All the models shown in the table have been estimated by Ordinary Lest Squares. All the models have been estimated for the common support. All the models include firm and time dummies. Robust standard errors are shown in parentheses. *** Significant at the 1% level. * Significant at the 10% level.

Table 10
Robustness check: Impact Evaluation of ANR on Innovation Expenditures and on Private Innovation Expenditures

	(1)	(2)	(3)	(4)	(5)	(6)
	Natural log of (Innovation expenditures +1)			Natural log of (private innovation expenditures +1)		
ANR	1.073			1.797***		
	(0.668)			(0.641)		
Amount		2.85e-05**			3.43e-05**	
		(1.36e-05)			(1.59e-05)	
Natural Log of (amount + 1)			0.109*			0.178**
			(0.0646)			(0.0629)
Observations	3343	3343	3343	3335	3335	3335
Firms	451	451	451	451	451	451
R-squared	0.603	0.603	0.603	0.605	0.605	0.605

Notes: ANR is a dummy variable that takes value one if firm *i* receives funds from ANR at time *t* and all subsequent years, and zero otherwise. All the models shown in the table have been estimated by Ordinary Lest Squares. All the models have been estimated for the common support. All the models include firm and time dummies. Robust standard errors are shown in parentheses. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 11
Impact Evaluation of FONTAR and ANR on Innovative Output

	(1)	(2)	(3)	(4)
	Did innovation			
FONTAR	0.176***			
	(0.0618)			
ANR			0.193*	
			(0.105)	
Amount		4.17e-08		4.28e-06**
		(1.59e-07)		(1.67e-06)
Observations	2379	2379	1371	1371
Firms	793	793	451	451
R2	0.5819	0.5797	0.5640	0.5644

Notes: FONTAR is a dummy variable that takes value one if firm *i* receives funds from any credit line administered by FONTAR at time *t* and all subsequent years, and zero otherwise. ANR is a dummy variable that takes value one if firm *i* receives funds from ANR at time *t* and all subsequent years, and zero otherwise. Did innovation is a dummy variable that takes the value of one if firm *i* accomplished innovations at time *t* and zero otherwise. All the models shown in the table have been estimated by Ordinary Lest Squares. All the models have been estimated for the common support. All the models include firm and time dummies. Robust standard errors are shown in parentheses. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

Table 12
Impact of FONTAR and ANR on Productive Performance

	(1)	(2)	(3)	(4)
	Exports	Labor productivity	Exports	Labor productivity
Treatment(t)	-1.677e+07***	107,494	843,482	55,197
	(2.431e+06)	(837,586)	(1.164e+06)	(808,857)
Treatment (t+1)	-2.029e+07***	-605,606	1.206e+06	-409,275
	(3.532e+06)	(1.684e+06)	(1.472e+06)	(264,560)
Treatment (t+2)	-2.281e+07***	-173,887	2.061e+06	167,836
	(4.837e+06)	(822,452)	(2.131e+06)	(138,687)
Treatment (t+3)		5.488e+06		364,700
		(5.970e+06)		(892,850)
Treatment (t+4)		1.322e+07		-319,924
		(1.222e+07)		(461,365)
Treatment (t+5)		-1.816e+06		
		(3.016e+06)		
Treatment (t+6)		-528,710		
		(1.161e+06)		
Observations	3691	2658	2211	1540
Firms	754	792	445	451
R2	0.5812	0.3254	0.5705	0.3131

Notes: *Treatment(t)* is a dummy that takes value one for beneficiary firms in the first year of treatment and zero otherwise. *Treatment(t+j), j=1,2,3,4,5,6* is a dummy that takes value one for beneficiary firms in the *jth* year of treatment and zero otherwise. Columns (1) and (2) estimate the model considering as treated every firm receiving any fund managed by FONTAR. Columns (3) and (4) restrict the analysis to the treatment group composed by firms beneficiary of ANR program. All the models shown in the table have been estimated by Ordinary Lest Squares. All the models have been estimated for the common support. All the models include firm and time dummies. Robust standard errors are shown in parentheses. ***Significant at the 1% level. ** Significant at the 5% level.