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Ex-post evaluation of Territorial Integrated Projects in Italy: an empirical analysis at firm level

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Abstract:
This paper focuses on the evaluation of an incentive program for local development realized in southern Italy during the last decade. In the framework of the policy instruments aimed at reducing territorial disparities and at supporting local development, territorial integrated projects (TIPs) have been considered a peculiar operational mode to implement EU funded regional development programmes. A TIP is defined as a "set of inter-sectorial actions, closely consistent and linked among them, which converge towards a common objective of territorial development and justify a unitary implementation approach". The resources allocated for each TIP may be aimed at three types of interventions such as infrastructures, public actions and aid schemes. Through an empirical analysis on the resources allocated to aid schemes, this paper investigates, at firm level, the possible different performances of the beneficiaries of subsidies provided by TIPs, as compared to non-beneficiaries. In particular a subset of firms which received subsidies in the period 2002-2007 is considered, through the implementation of an empirical analysis which uses *propensity score matching* methods and a *difference-in-differences* approach jointly. Results show effectiveness of the program with reference to *employment* and *sales*, while we have mixed effects with respect to other outcome variables.

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1. Introduction

Economic development, over the decades, has presented a clear lack of uniformity among different areas, giving rise to several territorial disparities. For this reason, one of the main objectives of the public authority, over time, has been the implementation of policies to support the decrease of regional imbalances.

In Italy, the gap among southern regions and the most developed ones has always been one of the biggest problems to be faced. This problem, till now, has never found a definitive solution. For many decades Italian industrial policy consisted in the direct intervention of the government into the economy. Nevertheless, the results obtained have often been weak, raising the question on which could be the best role for the public authority into the economy. As a consequence, in the Nineties, the idea of a development on a local basis took shape. In this framework, only the coordination and cooperation among all social actors can support the recovery of less developed areas. Moreover, in such a context, the territory becomes one of the crucial elements to promote local development.

The importance of the integration among all actors aimed at converging to the common objective of local development is enshrined in the *2000-2006 Community Support Framework for Objective 1 Italian regions*, which defines the "Territorial Integrated Project" (TIP) as a peculiar operational mode for implementing the Regional Operational Programmes. In detail, a TIP is defined as a *"set of inter-sectorial actions, closely consistent and linked among them, which converge towards a common objective of territorial development and justify a unitary implementation approach"*. Since the institution of this instrument, in the six "Objective 1" Italian regions (Basilicata, Calabria, Campania, Puglia, Sardegna and Sicilia) a remarkable amount of TIPs has been activated, by affecting most of the territory.

TIPs represent an attempt to overcome the weaknesses revealed by previous programs for local development, implemented since the mid-nineties. In particular, they focus on a shared idea of development that arises from the knowledge of the territory, and that through the participation of the different actors involved, converges towards the common objective of local development (Garofoli, 2003).

About ten years after the establishment of this program, we decided to realize a first analysis of ex-post evaluation of the measure in order to compare its possible benefits with the amount of public money spent. The resources allocated for each TIP may be aimed at

three types of interventions such as infrastructures, public actions and aid schemes. As a result, it is possible to implement different types of analysis, depending on the objectives that the evaluation wants to achieve.

This paper focuses only on the resources allocated to aid schemes, by analyzing, at firm level, the possible different performance of the beneficiaries of the subsidies provided by aid schemes of TIPs, when compared to non-beneficiaries. In particular, the reference is to a subset of firms operating in Sicily, which received subsidies in the period 2003-2007, and the analysis is implemented through the joint use of the methods based on the *propensity score matching* and of the *difference-in-differences* approach.

The work is detailed as follows: in section 2 we present a brief review of the literature; in section 3 we explain the econometric methodologies used in the analysis; in section 4 we provide some details on the development program under scrutiny; in section 5 we implement the empirical analysis and in section 6 we present the results. The analysis shows that TIPs have been effective, at firm level, with reference to *employment* and *sales*. With regard to other outcome variables, however, the effects are less clear. Since our analysis focuses only on aid schemes, we cannot present definitive considerations on the effectiveness of TIPs. In order to give a final judgment, in fact, it would be necessary to realize a similar analysis with reference to the other types of intervention provided by TIPs, in order to be able to present more detailed conclusions regarding the effectiveness of the whole program.

2. Ex-post evaluation of incentive programs: the economic literature

According to our knowledge this is the first attempt to carry out a quantitative evaluation of the effects of the subsidies provided by TIPs. For this reason, in this section we refer to the literature which has implemented ex-post analyses on the effectiveness of public policies by using similar methodologies, but with respect to different programs. Our work has two main purposes. On the one hand, it aims at evaluating the effects of public incentives to firms with respect to a new instrument. On the other hand, it tries implicitly to analyse the role of aid schemes inside a more global intervention scheme for local development provided by TIPs. Consequently, the work must be placed in the broader framework of the analyses aiming at determining the effectiveness of the programs for local development that have been implemented in Italy in the last two decades.

In the context of the evaluation of the effects of public incentives to firms, the literature has tried to measure, through the implementation of different types of counterfactual analysis, the possible different performance between the recipients of public incentives and the firms which were not assisted. The analyses have focused firstly on potential additional investments undertaken by assisted firms. However, the conclusions which have been reached are still conflicting.

Cannari, D'Aurizio and De Blasio (2006), through a survey analysis, focus on the effects of public subsidies on the investment decisions of firms, by finding evidence of poor effectiveness. With reference to a sample of Italian manufacturing firms, they conclude that about 74% of subsidized firms would have made the same amount of investment even without subsidy; moreover 17% of firms, in absence of the subsidy, would have only postponed the investment to a future date. A similar result was found by Bronzini and De Blasio (2006).

Pellegrini and Centra (2006), instead, carry out an empirical analysis based on a nonparametric approach and show a positive and significant impact of the subsidies granted by Italian law 448/92[1] on the amount of investment made by the beneficiaries. Further analyses showing a positive effect on investment of firms which received subsidies according to law 488/92 were realized by Adorno, Bernini and Pellegrini (2007), Bernini and Pellegrini (2011) and Cerqua and Pellegrini (2011).

D'Aurizio and De Blasio (2008) show that investments made according to law 488/92 are subject to an inter-temporal substitution effect. The empirical evidence, in fact, shows that the increase of investment made by recipients in the period in which they receive the subsidies is offset by a decrease of investment made by subsidized firms in the subsequent periods. The results are more encouraging with reference to the analysis of the effects of law 388/2000, since the empirical evidence shows the existence of additional investment made by beneficiaries. The use of tax credit, however, creates several problems: primarily because it uses an amount of public resources which is difficult to be quantified ex-ante

Another issue faced by the literature is the impact of public subsidies on employment: a positive effect of Italian law 488/92 on employment is found by Carlucci and Pellegrini (2004), Pellegrini and Centra (2006), Adorno, Bernini and Pellegrini (2007) and Bernini and Pellegrini (2011).

[1] Law 488/1992 and law 388/2000 represent two important instruments used in Italy to stimulate investment of firms in the less developed areas.

Further studies focus on the impact of subsidies on firm productivity. Bergstrom (1998) measures the impact on total factor productivity (TFP) of public capital subsidies granted in Sweden to a set of manufacturing firms in the period 1987 - 1993. He shows that, during the first year after obtaining subsidies, firms appear more productive; however, the situation is reversed from the second year, as the productivity growth becomes lower than that of non-subsidized firms. A similar conclusion is reached by Bernini and Pellegrini (2011): with reference to the subsidies granted through law 488/92, they provide empirical evidence of the negative impact of subsidization on total factor productivity.

A work by De Castris and Pellegrini (2006) aims at identifying the existence of spillover effects on neighboring territories created by firms that received subsidies according to law 488/92. The outcome variable used in the analysis, conducted on southern Italian local labor markets, was the variation of the number of workers in the period 1996-2001. Results show that incentives have spatial effects on the areas close to the localization of subsidized firms: in particular the authors provide empirical evidence of a positive diffusion effect and of a negative reception effect.

With respect to the programs for local development implemented in Italy during the last two decades, an instrument which shares many similarities to TIP though with some important differences, is the Territorial Pact. It is defined by Italian law 662/1996 as an "agreement, proposed by local authorities, social institutions, or other public or private entities, concerning the realisation of a program of interventions characterized by specific objectives of promotion of local development". Accetturo and De Blasio (2011), through an empirical analysis conducted at a territorial level on the effects of Territorial Pacts in the period 1996-2004, provide evidence of scarce effectiveness with respect to the employment and to the number of plants. Rizzi and Dallara (2011), instead, try to identify the effects of the subsidies granted through the Territorial Pacts at a firm level. They provide positive statistical evidence of the effectiveness of the program with referring to investment, employment, profitability and productivity of recipient firms considered.

By summarising, the literature shows conflicting results with regard to the effectiveness of public incentives on investment and productivity of recipient firms, while the conclusions seem to be in agreement with respect to the positive impact of incentives on employment, at least at a firm level.

3. Ex-post evaluation of incentive programs: the methodology

3.1 The use of Propensity Score Matching methods

As other studies, we would like to compare the performance of a firm subject to a public policy with the performance that the same firm would have showed in absence of the policy. In detail we can define with $Y_i(1)$ the value assumed by the outcome variable of *firm i* if it received the subsidy and with $Y_i(0)$ the same quantity if *firm i* did not receive the subsidy. We are therefore interested in the following *treatment effect:*

[1] $$\tau_i = Y_i(1) - Y_i(0)$$

The problem is that we are not able to observe a firm in both situations, the one in which it receives the subsidy, and the other one in which it does not receive the subsidy: either we observe $Y_i(1)$ or we observe $Y_i(0)$. We are therefore facing a *missing counterfactual* problem. According to Caliendo and Kopeinig (2005), instead of looking at the single *firm i* we focus on the aggregate dimension and we define the *average treatment effect on the treated (ATT)* as follows:

[2] $$ATT = E[Y_i(1)|D_i = 1] - E[Y_i(0)|D_i = 1]$$

where D_i is a dummy variable which assumes value equal to 1 if *firm i* received the treatment and 0 otherwise. While we can estimate $E[Y_i(1)|D_i = 1]$, the term $E[Y_i(0)|D_i = 1]$ is unobservable, as it represents, on average, the value assumed by the outcome variable of treated firms, if they had not been treated. A biased estimation of [2] is given by:

[3] $$\widehat{ATT} = E[Y_i(1)|D_i = 1] - E[Y_i(0)|D_i = 0]$$

where the selection bias (SB) is given by:

[4] $$SB = E[Y_i(0)|D_i = 1] - E[Y_i(0)|D_i = 0]$$

The only case in which SB=0 is if the assignment to treatment is random. In this case we have:

[5] $$Y_i(1), Y_i(0) \perp D_i \Rightarrow E[Y_i(0)|D_i = 1] = E[Y_i(0)|D_i = 0] = E[Y_i|D_i = 0]$$

But randomization is rare in public subsidies programs. On the one hand, in fact, the public authority decides how to assign public subsidies according to its objectives. On the other, hand the firms can self-select into the treatment if they decide to participate to a public call. In order to compensate for the lack of randomization, we consider the vector of covariates X_i representing the pre-treatment characteristics of *firm i.* Following Becker and Ichino (2002)

and Caliendo and Kopeinig (2005), if for each firm we can observe X_i, and if we can assume[2]:

[A1] $$Y_i(1),\ Y_i(0) \perp D_i | X_i\ ,\ \forall_i$$

then we can estimate the average treatment effect on the treated (ATT) by running the *exact matching* on X_i as follows:

[6] $$\widehat{ATT} = E_{X_i|D_i=1}\{E[Y_i(1)|D_i = 1, X_i = x] - E[Y_i(0)|D_i = 0, X_i = x]\}$$

According to Dehejia and Wahba (2002), "*comparing two individuals with the same observable characteristics, one of whom was treated and one of whom was not, is like comparing those two individuals in a randomized experiment*".

Assumption [A1] cannot be tested, and the choice of which variables should be included into the vector X_i is based on previous literature and on experience.

The main problem of the exact matching based on [6] is the dimensionality. In principle, the more we add variables to the vector X_i , the more we improve the quality of the matching. Conversely, the more we add variables to the vector X_i , the more difficult is to find a counterfactual having the same value of the variables considered. In order to solve the problem of dimensionality, Rosenbaum and Rubin (1983) propose the use of the *propensity score*, defined as the probability of being treated, given the pre-treatment characteristics:

[7] $$p(X_i) \equiv Pr(D_i = 1|X_i) = E(D_i|X_i)$$

Note that [A1] holds even with the introduction of the propensity score:

[A2] $$Y_i(1),\ Y_i(0) \perp D_i|X_i \ \Rightarrow\ Y_i(1),\ Y_i(0) \perp D_i|\ p(X_i)$$[3]

With assumption [A2] we can estimate the value of *ATT* as follows:

[8] $$\widehat{ATT} = E_{p(X_i)|D_i=1}\{E[Y_i(1)|D_i = 1, p(X_i)] - E[Y_i(0)|D_i = 0, p(X_i)]\}$$

Propensity score matching is implemented in two stages. Following Gabriele (2008), in the first stage we compute for each firm the value of the propensity score, by using a standard probability model like a *probit* or a *logit* model. In the second stage we match every treated firm with one or more control firms according to the value of propensity score, and we compute the value of *ATT*.

It must be stressed that the *p*-score is a probability measure; as a consequence it is a continuous variable that can assume all the values between zero and one. Therefore it is almost impossible to observe two firms having exactly the same value of the *p*-score. For this

[2] This assumption is called *Unconfoundedness* or *Conditional Independence Assumption* (CIA).
[3] This assumption is called *Unconfoundedness* given the Propensity Score or *CIA* given the Propensity Score.

reason, there are different *PSM methods* that aim at deciding how we can match optimally treated and control units. In this work we use the following:

- *nearest-neighbor matching*, in which we match each treated firm with the *k* control firms having the closest values of the *p*-score.
- *kernel matching*, in which we match each treated firm with all control firms, by assigning to each comparison a weight that is inversely proportional to the difference in terms of *p*-scores among treated and control units.
- *stratification matching*, in which we divide treated and control units in subsets according to the value of the estimated *p*-score and we compute the ATT within each subset. Therefore we compute the total ATT as a weighted average among the ATTs calculated in each block.

3.2 Use of difference-in-differences method

In this work the *difference-in-differences* approach is used jointly with PSM methods in order to identify the effects of the policy. This method requires the availability of at least two observations in different times for each treated firm and for each control. Suppose that we split the firms into two groups, one with the treated and the other with the control firms, and that we can find, for each firm, at least two observations for the outcome variable, the first before the firm receives the treatment, and the second after the firm receives the treatment. Suppose we define two dummy variables:

- $DT = 1$ if firm is treated, 0 otherwise.
- $Dt = 1$ if we refer to post-treatment period, 0 otherwise.

Our equation of interest is the following:

[9] $$y = \beta_0 + \delta_0 Dt + \beta_1 DT + \delta_1 (DtDT) + \varepsilon$$

where δ_1 represents the effect of the policy. Therefore we define $\hat{\delta}_1$ as our *difference in differences* estimator:

[10] $$\hat{\delta}_1 = (\bar{y}_{11} - \bar{y}_{10}) - (\bar{y}_{01} - \bar{y}_{00})$$

where the first subscript indicates the treatment status (treated or control firm) and the second subscript indicates the time period (pre-treatment or post-treatment period). The equation above can also be written as:

[11] $$\hat{\delta}_1 = (\bar{y}_{11} - \bar{y}_{01}) - (\bar{y}_{10} - \bar{y}_{00})$$

where the first difference refers to the different performance with respect to the outcome variable between treated and control firms in the post-treatment period and the second

difference refers to the different performance with respect to the outcome variable between treated and control firms in the pre-treatment period. The main difference (the *difference-in-differences*) captures the effect of the policy.

4. Territorial Integrated Projects: the program

The Community Support Framework (CSF) 2000-2006 for "Objective 1" Italian regions defined the Territorial Integrated Projects (TIPs) as a peculiar operational mode to realise the Regional Operational Programmes. In detail, a TIP was defined as a *"set of inter-sectorial actions, closely consistent and linked among them, which converge towards a common objective of territorial development and justify a unitary implementation approach"*. (European Union, 2000).

The CSF highlighted two main characteristics of Territorial Integrated Planning:

- the importance of project integration;
- the role of territory considered not only as a recipient of initiatives and actions for development, but as a framework in which we want to activate and develop the unexpressed assets of its population-

The peculiar contents of a TIP are defined as follows:

- definition of an idea of development and determination of the objectives and strategies for the implementation of the project;
- identification of a target area;
- identification of an institution responsible for the entire life of the project;
- identification of procedures for the management and monitoring of the project.

TIPs constituted an operational mode to implement the regional policy, chosen to link a set of actions aimed at the common objective of local development. In Sicily, for instance, they were considered the best way of implementing the bottom-up development strategy that the regional government wanted to diffuse (Regione Siciliana, 2000). However, TIPs should have been implemented only when they had shown comparative advantages with respect to the ordinary modes of implementation of the regional policy (Mazzola, 2003).

The expectations created by TIPs were numerous. It was expected them to "produce more investment projects in the areas considered the crucial ones for development, by increasing the probability of obtaining substantial effects" (Regione Siciliana, 2001). In particular, a thorough analysis of the local context was considered an essential condition for the detection of resources and potentialities of an area and for the subsequent identification of an idea of development that had to be fully shared by the different actors involved in the TIP. This was considered a necessary condition to overcome the difficulties and the weaknesses shown by previous policies for local development, since the lack of a clear definition of the common objective, had often resulted in the lack of a real cooperation and coordination among the different agents involved (Garofoli, 2003).

In Sicily, the set of TIPs to be financed was selected through a public call. In detail, "each TIP had to be promoted by at least two local authorities located in the same provincial area and contiguous, except for the municipalities of Palermo, Catania and Messina, which could have submitted proposals for a TIP with reference to a single urban context. The provincial government could have also proposed a TIP with the participation of the municipalities where the planned interventions were located" (Regione Siciliana, 2001).

After an evaluation procedure, carried out in different steps, 27 TIPs were activated[4]. Each TIP involved an average of 11 municipalities with a minimum of one municipality for the TIP "*Palermo capitale dell'Euromediterraneo*" and a maximum of 28 municipalities for the TIP "*Etna*". The distribution of provided resources showed a predominance of infrastructural interventions (51.3%), followed by aid schemes (38.7%) and public actions (10%)[5]. This distribution was reflecting the guidelines diffused by the regional government which stated that TIPs had to integrate interventions for infrastructures, public actions and aid schemes by allocating at least 35% of resources to aid schemes and not more than 60% to infrastructure.

However, the subsequent realizations of TIPs showed that a significant part of the resources that had been assigned, was not actually spent. In detail, only 58.6% of the planned resources were spent. Also, the distribution of resources has changed, with the share of money spent for infrastructural interventions rising to 58.5% and the amount of money spent for aid schemes falling to 27.6%; the remaining 13.9% of resources was spent to finance the so called "public actions" (Regione Siciliana, 2011).

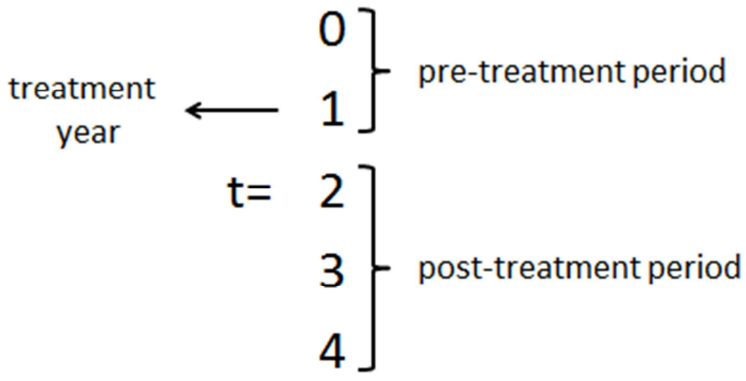
[4] Afterward, the total number of TIPs in Sicily increased up to 32,as some of them were activated at a later date.
[5] Data refer to the total of TIPs activated in Sicily, except for TIP "Isole minori".

5. Data and empirical analysis

Data on firms receiving subsidies were obtained from MONIT, which is the official database containing all the detailed information on Territorial Integrated Projects. In our analysis we considered a sample of 1238 firms operating in Sicily; among them, 83 firms received subsidies according to TIP program, while the remaining 1155 firms might be considered for the potential counterfactual. Accounting and financial information on firms were extracted from AIDA database for the period 2002-2010. When necessary, the missing data for treated firms have been integrated through direct information given by the Chambers of Commerce.

The empirical analysis uses *propensity score matching* methods for the identification of the correct counterfactual and a *difference-in-differences* approach to evaluate the effectiveness of the policy. Treated firms received subsidies in the period 2003-2007. For this reason a new temporal structure was defined: with *t=1* we indicate the year of treatment, with t=0 we indicate the pre-treatment year while with *t=2,3,4* we indicate, respectively, one year, two years and three years after the firm received the treatment. According to the prevailing literature, the effects of a policy are reflected in the balance sheets of the firms after some years. For this reason in our analysis we do not consider a single year, but we refer to the average between *t=0* and *t=1* as *pre-treatment* period and to the average among *t=2*, *t=3* and *t=4* as *post-treatment* period, as showed below:

Figure 1: Temporal structure defined in the empirical analysis



The first step of our analysis consisted in the identification of the correct counterfactual through the computation of the *propensity score*. Therefore, we selected the variables which should better represent the pre-treatment characteristics of firms: according to the literature we chose some measures of profitability such as *ROS* (return on sales) and *ROE* (return on

equity) and some indicators of financial health of firms such as *debts/equity* and *long term debts*. In order to control for firm dimension we also included *sales*. In the computation of propensity score we considered all the variables above in periods t=0 and t=1.

After calculating the *propensity score*, the second step of our analysis consisted in the computation of the average treatment effect on the treated *(ATT)*. The effects of the policy have primarily been analysed with reference to *employment*. Afterwards we selected some outcome variables reflecting the profitability and the productivity of firms: we looked at the effect of the program on *sales*; moreover we considered *EBITDA (Earnings before Interest, Taxes, Depreciation and Amortization),* which represents the gross profit of firms and *EBITDA/sales*; finally we looked at *ROI* (Return on Investment) and at *value added per employee*.

As we used a *difference-in-differences* approach, our outcome variables present the following structure:

[12] $Diff(Outcome\ var) = Outcome\ var(post) - Outcome\ var(pre)$

where $Outcome\ var(post)$ is the average for the outcome variable in post-treatment period (t=2,3,4), $Outcome\ var(pre)$ is the average for the outcome variable in pre-treatment period (t=0,1) and $Diff(Outcome\ var)$ is the difference, for the selected outcome variable, between post-treatment and pre-treatment periods.

The ATT represents the difference, for the variable $Diff(Outcome\ var)$, between treated group and control group[6]:

[13] $$ATT = Diff(Outcome\ var)_{treat} - Diff(Outcome\ var)_{control}$$

or in terms of [12]:

[14] $$ATT = (Outcome\ var\ (post)_{treat} - Outcome\ var\ (pre)_{treat}) - (Outcome\ var\ (post)_{control} - Outcome\ var\ (pre)_{control})$$

In order to identify the correct counterfactual, and to check for robustness, we used several methodologies: we applied the *Nearest Neighbor method*, by using, respectively, 1, 5 and 10 neighbors; subsequently we implemented the *Kernel method*, by using both *Gaussian* and *Epanechnikov kernel*; finally we used the *Stratification method*. We tried all the specifications with the *common support* option and without it. If our analysis is implemented in the proper way we should observe similar results by applying different methods.

[6] Note that equations [13] and [14] represent the general structure of ATT in the empirical analysis. The ATT has been computed according to the different methodologies detailed above and in Section 3.

6. Results

In this section we present the results of our empirical analysis. In the following tables we show, in the first column, the estimated value of the average treatment effect on the treated *(ATT)*, in the second column the value of the associated *t*-statistic, and in the third column the methodology used. In detail, with NN we indicate the *Nearest Neighbor method* (in parentheses we specify the number of neighbors used); with K(E) and with K(G), we indicate, respectively, the *Kernel method* with *Epanechnokov kernel* and *Gaussian kernel*; finally, with S we indicate the *Stratification method*. In all specifications we indicate, with c.s., the common support option. The first outcome variable we consider in the empirical analysis is the *employment*, measured in terms of number of employees (*num.emp*). In particular, after computing $num.emp(post)$ and $num.emp(pre)$ as specified above, we consider the logarithm of the variable, in order to deal with growth rates. In detail equations [12] and [13] become:

[12a] $$Diff(num.emp) = Log[num.emp(post)] - Log[num.emp(pre)]$$

[13a] $$ATT = Diff(num.emp)_{treat} - Diff(num.emp)_{control}$$

The table shows a clear effect of the program on *employment*. The calculated average treatment effect on the treated *(ATT)* appears robust to all the methodologies and to the different specifications used; *t*-statistics show that our results are always statistically significant at 5% and in some cases at 1%.

Table 1: Average Treatment Effect on the Treated (ATT) with different methodologies (outcome variable: logarithm of number of employees)

ATT	t-stat	Methodology	ATT	t-stat	Methodology
0.42*** (0.14)	2.90	NN(1)	0.29** (0.12)	2.30	K(E)
0.42*** (0.14)	2.90	NN(1) c.s.	0.29** (0.12)	2.30	K(E) c.s.
0.4*** (0.13)	3.07	NN(5)	0.29** (0.12)	2.31	K(G)
0.4*** (0.13)	3.07	NN(5) c.s.	0.29** (0.12)	2.31	K(G) c.s.
0.37*** (0.12)	2.98	NN(10)	0.32** (0.12)	2.60	S
0.37*** (0.12)	2.98	NN(10) c.s.	0.32** (0.12)	2.64	S

Notes: (***) and (**) indicate statistical significance at 1% and 5% respectively. Number of treated firms = 38. Standard error in parentheses.

We repeated the analysis by taking *sales* as outcome variable. As it was for *employment*, our outcome variable is the logarithm of *sales*, and the empirical analysis is implemented according to [12] and [13]:

Table 2: Average Treatment Effect on the Treated (ATT) with different methodologies (outcome variable: logarithm of sales)

ATT	t-stat	Methodology	ATT	t-stat	Methodology
0.29** (0.12)	2.36	NN(1)	0.17** (0.07)	2.51	K(E)
0.29** (0.12)	2.34	NN(1) c.s.	0.17** (0.07)	2.51	K(E) c.s.
0.21*** (0.08)	2.63	NN(5)	0.17** (0.07)	2.49	K(G)
0.22*** (0.08)	2.61	NN(5) c.s.	0.17** (0.07)	2.46	K(G) c.s.
0.17** (0.07)	2.31	NN(10)	0.18** (0.07)	2.55	S
0.17** (0.07)	2.27	NN(10) c.s.	0.18*** (0.07)	2.73	S

Notes: (***) and (**) indicate statistical significance at 1% and 5% respectively. Number of treated firms =83. Standard error in parentheses.

Results show again a positive effect of the program on the selected outcome variable. As before, the level of statistical significance varies between 1% and 5% in all specifications. The analysis was then carried out with respect to other outcome variables. Because the

selected outcome variables can assume negative values, we took into consideration the levels of the variables.

With reference to *EBITDA* (table 3) results show positive effects of the policy on treated firms but they are never statistically significant.

Table 3: Average Treatment Effect on the Treated (ATT) with different methodologies (outcome variable: EBITDA)

ATT	t-stat	Methodology	ATT	t-stat	Methodology
121943.45 (115931.77)	1.05	NN(1)	94270.92 (115046.54)	0.82	K(E)
126649.06 (117288.21)	1.08	NN(1) c.s.	94270.92 (115046.54)	0.82	K(E) c.s.
107193.71 (114279.28)	0.94	NN(5)	90382.98 (113664.00)	0.80	K(G)
103059.01 (115642.37)	0.89	NN(5) c.s.	90734.61 (115045.19)	0.79	K(G) c.s.
97655.07 (113964.66)	0.86	NN(10)	99597.96 (110000.00)	0.90	S
94179.64 (115353.33)	0.82	NN(10) c.s.	99630.97 (110000.00)	0.90	S

Notes: Number of treated firms = 82. Standard error in parentheses.

When we consider as outcome variables *EBITDA/sales* (table 4) and *added value per employee* (table 5), we do not find empirical evidence of any effect of the policy.

Table 4: Average Treatment Effect on the Treated (ATT) with different methodologies (outcome variable: EBITDA/Sales)

ATT	t-stat	Methodology	ATT	t-stat	Methodology
0.15 (0.11)	1.35	NN(1)	-4.22 (3.07)	-1.38	K(E)
0.15 (0.11)	1.35	NN(1) c.s.	-4.22 (3.07)	-1.38	K(E) c.s.
-3.70 (4.26)	-0.87	NN(5)	-4.29 (3.49)	-1.23	K(G)
-3.76 (4.35)	-0.87	NN(5) c.s.	-4.37 (2.89)	-1.51	K(G) c.s.
-3.91 (3.39)	-1.15	NN(10)	-4.15 (2.73)	-1.52	S
-3.98 (3.41)	-1.17	NN(10) c.s.	-3.22 (2.66)	-1.21	S

Notes: Number of treated firms = 56. Standard error in parentheses.

Table 5: Average Treatment Effect on the Treated (ATT) with different methodologies (outcome variable: added value per employee)

ATT	t-stat	Methodology	ATT	t-stat	Methodology
-1.24 (7.94)	-0.16	NN(1)	0.61 (6.87)	0.09	K(E)
-1.24 (7.94)	-0.16	NN(1) c.s.	0.61 (6.87)	0.09	K(E) c.s.
0.03 (6.93)	0.00	NN(5)	0.77 (6.77)	0.11	K(G)
0.03 (6.93)	0.00	NN(5) c.s.	0.77 (6.77)	0.11	K(G) c.s.
-0.29 (6.96)	-0.04	NN(10)	-0.39 (6.70)	-0.06	S
-0.29 (6.96)	-0.04	NN(10) c.s.	-0.49 (6.65)	-0.07	S

Notes: Number of treated firms = 38. Standard error in parentheses.

Finally we consider *ROI* (Return on Investment) as outcome variable (table 6):

Table 6: Average Treatment Effect on the Treated (ATT) with different methodologies (outcome variable: ROI)

ATT	t-stat	Methodology	ATT	t-stat	Methodology
-3.49^{o} (2.26)	-1.54	NN(1)	-1.45 (1.55)	-0.94	K(E)
-3.42^{o} (2.33)	-1.47	NN(1) c.s.	-1.45 (1.55)	-0.94	K(E) c.s.
-2.55^{o} (1.66)	-1.53	NN(5)	-1.17 (1.52)	-0.77	K(G)
-2.48^{o} (1.70)	-1.46	NN(5) c.s.	-1.06 (1.54)	-0.69	K(G) c.s.
-1.69 (1.59)	-1.06	NN(10)	-1.60 (1.56)	-1.03	S
-1.50 (1.63)	-0.92	NN(10) c.s.	-1.70 (1.56)	-1.09	S

Notes: (^{0}) indicate statistical significance at 20%. Number of treated firms = 37. Standard error in parentheses.

The results with respect to *ROI* appear particularly interesting. Although with a low degree of statistical significance, we find, with some specification, a negative impact of the program. This would mean that the participation to the program might have been harmful in terms of profitability or at least of that part of it which is captured by *ROI*. A possible explanation could be that treated firms have less liquidity constraints than untreated ones. Therefore these firms could have undertaken investment projects presenting a lower expected return or more risky. As an effect, the average *ROI* for treated firms could have fallen.

7. Conclusions

This paper aimed at evaluating the effectiveness of resources allocated according to aid schemes of TIPs. The analysis has been carried out at a firm level by considering a subsample of firms operating in Sicily and through the implementation of an empirical analysis that used *propensity score matching* methods and a *difference-in-differences* approach jointly. The investigation has taken into consideration several indicators of firm performance; moreover, in order to check for robustness, different methodologies have been implemented. According to our results, the program has been effective with reference to *employment* and *sales*. Therefore treated firms show a better *employment* and *sales* performance with respect to untreated firms, and these results are confirmed in all specifications and with all methodologies. With respect to other outcome variables instead, we do not find statistical evidence of any effect of the program. In particular, if we look at *EBITDA*, our estimated *ATT* presents the expected sign, but it is never statistically significant. With refer to *EBITDA/Sales* and *value added per employee* instead, also the sign of estimated *ATT* varies according to the specification used. An interesting and unexpected result is found with respect to *ROI* (Return on Investment). The estimated *ATT* is always negative, and with some specifications we reach a statistical significance of 20%. As the number of treated firms for which we can calculate *ROI* is quite low (we have only 37 treated firms for which we know the value of *ROI*), we may expect a different statistical significance by adding more firms to the sample. If this were the case, we might conclude for a negative effect of TIPs on profitability of firms in terms of *ROI*.

According to our, still preliminary, results, the effectiveness of the policy seems to be partially positive, at least with respect to the part of the program regarding aid schemes. In particular, the positive and significant effect of the program on *employment*, which has also been found in other studies, is particularly important since the improvement in the labour market mechanism is probably the first dimension on which the policies for local development in depressed areas aim at intervening. We still have to investigate more deeply on the reasons behind the negative impact of the program on *ROI*, found in some specifications.

Moreover, the work must be improved along three main directions. First, we have to enlarge the sample size of the treated firms, in order to improve the quality of the estimations,

especially with reference to the outcome variables for which the empirical analysis presents results that are below the statistical significance.

Second, the sample size increase must be done by adding a subset of firms that in a first phase of the program were included as beneficiaries of aid schemes, but that subsequently were not financed. Through the inclusion of these firms, we will be able to check if the selection on observables, made according to PSM methods, has been implemented in the correct way.

Finally, we must emphasize that the analysis considers only aid schemes. Therefore we cannot make any inference on the effectiveness of the program as a whole, before implementing a similar analysis on the effects of the other types of interventions provided by TIPs. By extending the analysis to infrastructure and to more horizontal (so called "public action") projects we hope to capture a more comprehensive view of the effectiveness of the program for local development in southern Italy.

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