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Counterfactual Impact Evaluation of Enterprise Support Programmes. Evidence from a Decade of Subsidies to Italian Firm*

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Abstract

Over the last decade public support to investment projects of private firms have maintained a very prominent role among regional cohesion policies, with billions of euro spent every year by EU Member States to subsidize these types of interventions. Also within the current economic scenario, EU policy makers have maintained a tight focus on enterprise support programmes, which are viewed as policy tools aimed to boost economic growth and employment. The purpose of this paper is to offer empirical evidence on the impact generated by investment subsidies awarded to industrial firms on employment, sales, investments and labor productivity. The analysis is based on unique firm-level administrative data provided by the Italian National Statistical Agency on the universe of both treated- and non-treated applicant firms. For employment and sales outcomes such data derive directly from the National Social Security Agency of Italy and from the Internal Revenue Service Agency. These data sources ensure to the analysis much lower measurement errors and much higher external validity compared to the data derived from firms' balance-sheet (i.e. the BVD Amadeus and Orbis databases) that are typically available for counterfactual impact evaluations of firm-level intervention. The paper focus on a decade (2000-2009) of subsidies awarded by a large-scale national Italian programme co-funded by the European Regional Development Fund and by the universe of smaller regional programmes available to all the SMEs of Northwestern Italian region (Piedmont). The analysis produces differential impacts based on different levels of the economic value of the incentives, different types of incentives (distinguishing between non-repayable grants, "soft-loans" and "interest rate grants"), different sizes and geographic location of the assisted firms. For the large scale national programme, the analysis exploit the existence of a natural experiment in the form of the existence of viable applicant firms that were denied the subsidy due to an exogenous, budget induced, cut-off point in the programme rankings of each wave of regional calls for applications. Impact estimates are then retrieved with a discontinuity designed within a difference in difference scheme that ensures exact matching of crucial firm characteristics. For the regional programmes, the analysis is implemented with a conditional difference in difference model that pre-processes the data based on a propensity score estimate to ensure common support between treated and non-treated firms. The results of our analysis show that: -Large non-repayable grants, particularly when given to large firms (and in underdeveloped regions), represent an ineffective way to stimulate additional private investment and to improve the performance of the subsidized firms; -Small grants given to small firms (not in the context of severely distressed socio-economic areas) have small impacts, but when all the dimensions are taken into account, they are more cost-effective; Non-repayable grants are outperformed by repayable soft loans and interest rate subsidies as most effective tools for assistance; -For SMEs, soft-loans and interest rate grants are the most cost-effective form of support.

JEL classification: O1; R5; C23

Keywords: Counterfactual impact evaluation, enterprise support, capital grants, soft loans, employment, sales, investments, labour productivity.

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1. Introduction

Over the last decade, billions of euro are spent every year in the European Union on enterprise support programmes, using ERDF funds and Member States own resources. The largest share of ERDF support has been used to support *investments in physical capital* such as acquisition of plants and equipment. About 60% of all support for enterprises in Objective 1 regions within the EU15, and 40% of all support in Objective 2 regions, went for this purpose during the 2000-06 cycle. These levels have been matched in Objective 1 regions within the EU10 since 2004. Between 6 and 8 billion have been spent every year to support investment in physical capital, mostly through non-repayable grants, but also other tools, such as soft loans.

Within the current economic crisis, EU policy makers have renewed a strong interest in enterprise support programmes as policy tools aimed at contrasting employment decline. The role of investment subsidies programmes as effective employment boosting policy tools, however, is not supported by any relevant body of rigorous empirical evidence. Despite the large sums disbursed and the recent increasing number of new policy proposals, indeed, there is surprisingly little rigorous counterfactual empirical evidence showing what difference investment subsidies make in term of employment outcomes. Figures from monitoring data are useful for tracking programme progress, but do not reveal much about the effectiveness of the support nor the reasons why the support is effective or not, which can only be explored by impact evaluations. Acknowledging this knowledge gap, the EU *Fifth Cohesion Policy Report* calls for a greater use of rigorous evaluation methods, including *counterfactual* impact evaluation.

The purpose of this study is to offer empirical evidence on the employment impact generated by investment subsidies awarded to industrial firms. We focus on a decade (2000-2009) of subsidies awarded by a large-scale national Italian programme co-funded by the European Regional Development Fund. The programme had an explicit employment-boosting objective and subsidized physical capital expenditures through generous non-repayable capital grants assigned by open regional competitions. Our impact identification strategy exploits the existence of viable applicant firms that were denied the subsidy due to an exogenous, budget induced, cut-off point in the programme regional rankings. We use firm-level administrative data provided by the Italian National Statistical Agency on the universe of both treated- and non-treated applicant firms to implement an exact matching estimator combined with a difference in difference scheme. Our results show that the programme generated on average about two additional jobs per subsidized firm, at a staggering cost of over 230,000 per job. Large non-repayable grants, on average, were decisively less effective than small grants, with negative employment impacts that occurred when large grants were awarded to large firms in underdeveloped regional economies. Small grants, predominantly awarded to small firms, produced the least disappoint results with an average estimated cost of about 80,000 per additional job.

2. Objectives

This paper has the well defined *objective* of applying existing quantitative methods – and exploring

variants of these methods – to identify and estimate the impact of investment subsidies on the employment performance of enterprises. The methods are applied to Italian firm-level data, drawing conclusions relevant to the Italian context and to some extent also to other ERDF beneficiary countries or regions.

The central methodological concern is *causal attribution*. To what extent the employment performance of the firms that receive public support is attributable to the support itself? To what extent is the support able to alter firms' hiring behaviour in the desired direction, compared to what would have happened in the absence of the programme intervention? To what extent are enterprises induced to carry-on the investment versus simply taking advantage of the subsidy for investments already under way?

The decision policy-makers make is more often on the intensive margin (“who gets how much of what type of subsidy”) than on the extensive margin (“do we maintain or cancel the subsidy?”). Thus, the main objective of this evaluation is estimating the impacts of different forms of enterprise support. The ability to differentiate the impact by policy tool and firm characteristics greatly increases the policy relevance of the study.

More specifically, separate effects are estimated for: (i) different levels of the economic value of the incentives; (ii) different sizes and (iii) industrial sectors of the assisted firms; (iv) different geographic areas where the programme is implemented (distinguishing between regions with higher socio-economic disadvantaged former Objective 1 areas in the 2000-06 period, and regions with better socio-economic conditions).

Estimating specific impacts for different ranges of the economic value of the incentives is of special interest to policy makers because one of the most useful pieces of empirical evidence (in order to redefine future policy interventions) is the cost per each additional unit of desirable outcome induced by the programme. Estimating separate impacts for different firm sizes and industrial sectors is also important. Smaller and larger firms may face different degrees of credit market imperfection (leading to different impacts of the intervention). Moreover, operating in different sectors (primarily distinguishing between manufacturing and service sectors) may lead to different employment outcomes if the propensities to use the subsidized investment for substituting labour with capital is differently distributed across the sectors. Finally, estimating separate impacts across regions with different socio-economic conditions is important because in areas with quite severe economic distress, on the one hand, non-repayable grants have a higher potential to spur additional investment activities (that would have not occurred in the absence of the incentives) than in areas with better economic conditions. On the other hand, grants may face greater challenges in distressed areas – for example the relative difficulty of attracting and sustaining economic activity there .

3. The main features of the policy being evaluated

Law 488 is the largest Italian enterprise support programme of the last 20 years, and it has been co-funded by the ERDF. The support provided by Law 488 takes the form of project-related non-repayable capital grants. The type of investment projects covered are start-ups, extension, restructuring, reconversion, reactivation and relocation. The location of the firms assisted by Law 488 encompasses both Southern Italy (which had the status of Objective 1 area in the 2000-2006 programming period) and Northern and Central Italy (in which a number of Objective 2 areas were located in 2000-2006). Such wide geographical coverage increases the external validity of the

results. On the basis of the data used for the analysis, between 2000 and 2006 Law 488 financed about 6,200 firms, at a cost of about 2.6 billion.

Law 488 support was assigned by competitive auctions repeated almost every year. These auctions were run separately in each of the 20 Italian Regions. In each auction, as a first step, each submitted application underwent a first quality check of all the required credentials, documentations and features of the proposed investment project. Then, all the applications that surpassed the first quality check were ranked based on the following five criteria, illustrated in Table 1:

Table 1. Admissibility criteria for 488 grants

Criterion	Purpose	Since
1. Proportion of own funds invested in the project	Minimize moral hazard and adverse selection	1992
2. Number of jobs to be created by the project	Foster employment	1992
3. Value of assistance sought as a proportion of the maximum award rate	Minimize moral hazard and adverse selection	1992
4. Priorities of the Regional government about location and sector	Support local strategies	1998
5. Environmental impact of the project	Minimize environment impact	1998

The five criteria carried equal weight: the sum of five standardized criteria determined the final application score and, accordingly, the position of each project in the regional ranking. Separately for each region, applicants were admitted to financing following their ranking, *until the available funds were exhausted*. The auctions considered in the analysis took place in 2000, 2001, 2002 and 2004¹.

Applications had to be submitted by a specific deadline; within four months of the deadline, the Ministry for Economic Development published the rankings. If the project was funded, the value of the support granted to the assisted firms was determined by applying the requested rate of assistance (criteria 3) to the size of the approved investment.

Law 488 archives maintain data for all applicants, included those that surpassed the first quality check but that were denied the assistance because their investment project fell below the budget induced cut-off point. These eligible-non-funded firms are almost three times as many as the funded ones. This programme feature allows us to use the data on the rejected applicants that surpassed the first quality check as one of the base for estimating the effects of the subsidy. This is because, as further explained in Section 3, the beneficiaries and the rejected applicants share the same desire to invest (a crucial, otherwise unobservable, firm characteristic to be controlled for in the analysis). Finally, firms applying to the incentives of Law 488 were barred from applying to other public programmes on the same investment project, a feature of Law 488 that eases the concern of not observing all of the concurring programme interventions that may affect the outcomes.

¹ One more auction was issued in 2006, offering both capital grants and soft loans. This auction was excluded from the analysis due to the small number of supported firms that completed the subsidized investment by the year 2008, the last year for which the available outcome data allow us to estimate the programme impacts.

4. The design of the impact evaluation

To identify the (causal) effect of the subsidy one must compare the changes *observed* among supported enterprises (changes in a given indicator over a given period), with the changes that “most plausibly” would have been observed in the *same time* period for the *same* firms, *had they not* received the support. This hypothetical change, not observable by definition, is named “counterfactual”. Thus the main strategy is to compare actual with counterfactual change. The counterfactual change must be recovered from data pertaining to other enterprises that, despite not receiving any subsidy, are similar enough to represent what would have happened to the subsidized firms in absence of the subsidy.

Parallelism. The approach is to make a *prima facie* reasonable assumption: without the subsidy, the supported firms would have followed a trajectory *parallel* to that of the non supported firms, and represented by the *dotted* segment in Figure 3. In year t+1 they have a value of 36 for the outcome, while if their trajectory would have been parallel to that of not supported firms, they would have scored 34. So the impact, under the assumption of parallelism, is equal to 2. However, beyond its *prima facie* plausibility, nothing guarantees such parallelism to be true. It is more plausible to assume that the counterfactual trend would have been parallel to that observed among the non-supported firms, than assuming that the all change is due to the intervention. Thus, the parallelism assumption is a step forward with respect to the assumption that all the observed change must be attributed to the subsidy. We can do even better if we have other data available, in particular on the characteristics of the enterprises and/or on the exact mechanism that separated recipients and non-recipients.

Matching. The fundamental objective is to *select a subset of non supported firms* that is able to come close to the ideal situation depicted above. There are two general ways of pursuing this goal. The first is based on the availability of *pre-intervention observable characteristics* for both the supported firms and all the other eligible ones that did not apply for support, whose number is typically many times larger than the number of supported firms. With the appropriate techniques, we can select firms that share the same pre-intervention characteristics but did not receive the support, giving more weight to those characteristics that are correlated with the participation in the programme. There are a number of techniques to implement this idea, such as matching (by “stratification and reweighting” or “propensity scores) and multiple regression. We use all three, as explained in detail in the Technical annex on Methods. The second strategy depends upon the presence of *rejected applicants*. The latter share with the beneficiaries the same desire to invest, which is an important proxy of unobservable such as business strategies and managerial abilities, as well as specific market trends to which the firms are exposed. However, due to the presence of excess demand of subsidies with respect the available resources, some rationing device is put in place in order to realign resources and expenditures. One of the most common rationing devices is to construct a ranking of applicants, on the basis of a set of pre-specified criteria. Some applicant firms do not receive funding because their proposed investment project scores below a cut-off point determined by the available budget

The final choice of methods used in the analysis depends on a) whether rejected applicants are used as a source of controls (when rationing exists) vs. using a sample of non-applicants; b) whether the matching is done using “stratification and reweighting” or “propensity score”; c) when rejected

applicants are used, whether the comparison between beneficiaries and non beneficiaries is further restricted around the cut-off point used to determine acceptance and rejection (a mild form of discontinuity design). Combining these different choices and criteria, we constructed five different estimation methods.. They are described in Table 2.

Table 2 Method used to estimate the impact of law 488

Type of method	Conditional difference in difference: control group selected by an exact matching approach
Source of control group	Rejected applicants
Intuitive description of the method	Supported firms are matched with non-supported firms in identical sector (2 digit), size class (micro, small, medium, large), geographic area (north/south Italy) in each cell an estimate of the impact is obtained by difference in difference: aggregate impacts are obtained by a weighted average of the cell-specific impacts, computed as differences in difference; the weight of each impact estimates depends on the proportion of treated in the cell
Differences between treated and non treated firms controlled for by this method	<ul style="list-style-type: none"> • sector-specific economic trends; • size effects (large and small firms may face different types of market failures); • geographic areas (proxy for possible socio-economic -institutional-transportation and labour cost-differences that may affect outcomes); • unobserved characteristics that may lead to the decision to apply for the subsidy; • remaining unobserved differences between treated and non-treated firms, as long as they do affect the outcomes in a constant-over-time manner

Choosing the appropriate dates to locate in time the completion of the interventions is also extremely important. Such choice can have major implications for the impact estimates. If a programme intervention is wrongly placed in a year *earlier* than the time in which the outcome of interest could be potentially affected by the investment, the outcomes of such year would be erroneously considered as exposed to the treatment. By contrast, if a programme intervention is wrongly placed in a year *later* than the time in which the outcome of interest could be potentially affected by the investment, the firm outcomes of such year would be erroneously considered as not-exposed to the treatment. In our study we choose the dates to locate in time the programme intervention using the following criteria. The public support received is located at a time closely after the date in which the supported investment/expenditure was inspected and was deemed to be ready to enter the production process. This is because in this period it is most likely that the assisted entrepreneurs decide to finalize the personnel hiring related to the new investment/expenditures and that the additional production activity spurred by the new investment would be exposed to the market.

In this way, the bulk of our analysis focuses mainly on the proximate programme effects, with a typical time span up to a maximum of two years after the time at which the programme-subsidized investments began operating². The reasons for this choice are twofold.

First, because using rigorous counterfactual evaluation designs to assess whether business incentives had impacts on the long term performances of the assisted firms is best to be avoided

² A maximum time span of two years after the completion of the investment occurs when the completion date happens early in the year t (e.g. first days of January).

when the evaluation is carried out with firm-level data. Assisted firms are economic units embedded in a network of economic transactions from one to the others. In the long-run, a possible positive programme shock on the performance of each single assisted firm is likely to have enough time to generate subsequent impacts (either negative or positive) also on non-assisted firms. Over time, the treatment leaks to the non-assisted group.

Second, because the ultimate objective of enterprise support policies is to boost the long-term performance of communities and not single firms. Positive collective outcomes could be clearly achieved even in the absence of long-term impacts detectable at the firm-level. This could be the case of long term positive spill-overs into non-supported firms. These spill-over, in the long term, could generate positive programme outcomes at the level of local/regional economies without necessarily generating any long-term competitive advantage for the single beneficiary firms compared to similar non-supported firms.

5. The data

The data used in the analysis come from different sources, playing different analytic roles. First, we used data on the beneficiaries and on the *treatment received* by beneficiaries. In the case of Law 488, we needed data for both supported and rejected applicants, because in that case applicants are a crucial source of information to recover the counterfactual.

The data on beneficiaries. The data archives of Law 488 contain a record for each project that was ever submitted by the firms applying for the grant, including the information on whether or not the submitted investment project passed the first quality check and the firm ranking in the competitive application process. The data was provided to us by extracting the relevant variables directly from the administrative system used to manage the application process and the payments.

The employment outcomes used in the analysis are based on Statistical Archives of Active Firms (ASIA) produced by ISTAT (the Italian National Statistical Agency). The ASIA database played a pivotal role for the analysis. Besides containing important outcome data, particularly employment and production, the demographic information for all of the active firms (of all types and size, including non-corporations) located in all Italian regions were crucial for the construction of the matched sample of non recipients. Due to their confidentiality, these data were processed by ISTAT staff.

6. The average impacts of the subsidies across all recipients

Table 3 summarizes the average impact estimates of Law 488. The results show an average increase of almost two jobs (1.82) per subsidized firm. Such average impact estimates implies that the over 6,000 projects used for the analysis generated about 12,000 new jobs. **This significant result was achieved at the aggregate cost of 2.6 billion, or 230,000 per job created.**

For Law 488, another useful comparison can be conducted between the number of jobs generated as resulting from the counterfactual impact evaluation analysis and the number of jobs *declared* in the 488 application forms. The latter tend to be large figures, because in the 488 procedure, the higher the employment/investment ratio declared in the application, the higher the score the project receives. If all of the jobs indicated in the subsidy applications were additional compared to the

number of jobs that would have been generated in the absence of the incentives, we would have had a total impact of the subsidies of 82,000 jobs, at a cost of about 31,700 per job, instead of the estimated 12,000 jobs at a cost of 230,000.

Table 3. Average impacts and cost-effectiveness of the subsidies

Average impact	1.82 ***
Cost per job created	231,207
No. of supported firms used in the analysis	6,189

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level

7. How impacts vary with the economic intensity of the subsidy

In order to empirically test the effectiveness of the programme at different economic values of the subsidies we divided the distribution of the size of the 488 grants in four groups defined by the thresholds of the quartiles of the distribution (such thresholds are close to 125,000, 250,00 and 500,000 as cut-offs³). Table 4 contains the results of the analysis, with the usual information, broken down by *size of the subsidy*. The results of the table show that the impact goes from less than one job when the grant is below 125,000, to about 2.7 when the grant is larger than half a million. These estimates, however, implies very differentiated cost per job created, which increases dramatically with the size of the grant. The small 488 grants created 1,500 jobs at the cost of about 79,500. At the opposite side of the spectrum, large grants (over half a million of euro) display a cost per additional job of about 488 million.

Table 4. The impact of law 488 grants by the economic value of the grant

	< 125,000	125,000 250,000	250,000 500,000	> 500,000
Average impact	0.91 ***	1.61 ***	2.38 ***	2.69 ***
Cost per job created	79,460	112,252	158,048	488,676
No. firms used in the analysis	1,702	1,637	1,534	1,222

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

To further assess the robustness of the findings, we explore whether the “grant-size effect” is due to the positive correlation between size of the grant and the size of the firms. To achieve this goal we cross tabulated the four grant intensity categories with four size classes to yield differential impacts controlling for firm size (Table 5)⁴. The employment impact estimates, summarized in Table 5,

³ The actual thresholds are €119,000, €255,000 and 537,000. For ease of readability, throughout the remainder of this report such thresholds will be rounded to €125,000, 250,000 and €500,000.

⁴ Due to the small sample of corporate SMEs available for the analysis, the model with the sixteen categorical impact estimates of Table 5 yields results that are not statistically significant for the investment outcomes. For the sake of brevity such results are omitted from the present report. Complete results are available upon request to the authors.

show that the cost per each additional job generated by the programme is higher the higher is the grant value for both micro and small firms. While the small grants (less than 125,000) yield a cost per additional job of about 74,500 and 61,200 for the micro and small firms, respectively, the large grants yield a cost per additional job of about 386,000 and 404,000. For medium firms and large firms, due to the small sample size, the empirical evidence that can be produced by the analysis is less conclusive since the impact estimates are statistically significant only for the grants of the largest economic values. However, for the medium firms, the largest grants (> 500,000) proved to be less cost-effective than the grant between 250,000 and 500,000,, and for the large firms the impact estimates are negative for the largest grants (> 500,000). Such negative result for the large firms benefitting from large grants, although based on a small sample (33 firms in all), is very robust since it is consistent throughout all the variations of the estimation model that we implemented for the sensitivity analysis.

Table 5. The impact of 488 grants by the value of the grant and by the size of the firms

	< 125,000		125,000 250,000		250,000 500,000		> 500,000	
MICRO FIRMS								
Average impact	0.93	***	1.24	***	2.16	***	3.82	***
Cost per job created	74,541		143,981		172,894		385,923	
No. of firms used in the analysis	984		899		715		437	
SMALL FIRMS								
Average impact	1.22	***	1.77	***	2.39	***	2.68	***
Cost per job created	61,191		103,195		158,519		403,778	
No. of firms used in the analysis	600		623		666		512	
MEDIUM FIRMS ^(a)								
Average impact	-0.91		3.88		3.58	**	2.68	***
Cost per job created	-		-		105,925		403,778	
No. of firms used in the analysis	118		112		150		512	
LARGE FIRMS ^(a)								
Average impact	-		-		-		-16.02	**
Cost per job created	-		-		-		-	
No. of firms used in the analysis	0		3		3		33	

(a) Cost-per-job figures not reported in case of negative coefficient estimates or results with no statistical significance at the level of 0.1.

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

8. How impacts vary with the size of the assisted firms

Estimating different impacts by size classes of the assisted firms is of great interest to refine future policy intervention. Large firms may not be subject to the same market imperfections that could prevent SMEs from implementing their investment projects. Moreover, in the case of capital grants, the more abundant staff and managerial resources of the large firms could make it easier for them to engage in “shopping for incentives” for investment projects that would have been implemented any way.

The results summarized in Table 6 highlight a limited and often non-significant difference between the impacts for micro, small and medium firms. Large firms, instead, despite the small sample size,

do display (consistently throughout the different model variations used as robustness check for the analysis) negative impact estimates.

Table 6. The impact of 488 grants by size of the assisted firms

	Micro firms 1-9 employees	Small firms 10-49 employees	Medium firms 50-249 employees	Large firms 250+ employees
Average impact	1.61 ***	1.89 ***	2.80 ***	-2.34 ***
Cost per job created ^(a)	230,700	211,098	235,590	-
No. of firms used in the analysis	3,049	2,419	670	51

(a) Cost-per-job figures not reported in case of negative coefficient estimates or results with no statistical significance at the level of 0.1.

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

Since large firms tend to be supported with grants of higher economic value, in order to capture correctly firm-size effect, ruling out possible composition effects, it is useful to compare the coefficient estimates and cost-effectiveness of the subsidies to large firms, versus SMEs, considering a same size class of economic values of the incentives. Due to sample size limitations, this can be done solely for the grants of the highest class (above 500,000, Table 7⁵).

Results from Table 7 follows a similar pattern of those of Table 6: while no statistical difference is detectable between the grants awarded to micro, small and medium firms, the programme impacts for the large firms is instead consistently negative.

Table 7. The impact of 488 grants by firm size for grants > 500,000⁶

	Micro firms 1-9 employees	Small firms 10-49 employees	Medium firms 50-249 employees	Large firms 250+ employees
Average impact	3.82 ***	2.68 ***	3.24 ***	-16.02 ***
Cost per job created ^(a)	385,923	403,778	450,679	-
No. of firms used in the analysis	437	512	240	33

(a) Figures not reported in case of negative coefficient estimates or results with no statistical significance at the level of 0.1.

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

9. How impacts vary between manufacturing and service sectors

Disentangling employment impacts between manufacturing and service firms could be important because assisted firms operating in the service sectors may have a propensity to use the subsidized investment for substituting labour with capital that is different from the manufacturing sectors. The

⁵ Table 7 contains the same information already reported in Table 5. For ease of readability, however we choose to replicate also in this section that information.

⁶ Due to sample size limitations, the results for investment do not reach statistical significance in any size class. For the sake of brevity they omitted from the present report.

results of the analysis, however, show that for the 488 grants, impacts do not vary much between the manufacturing and the service sectors (Table 8). Except for a slim advantage of the manufacturing sectors over the service sectors in terms of cost per job created by the incentives (228,674 versus 243,647) and except for a slim advantage of the service sectors over the manufacturing sectors in terms of cost of extra of sales and investment (2,46 versus 1,73; and 1,93 versus 1,52, respectively).

These same findings are confirmed also when holding constant the size of the firms (by cross-tabulating two size classes -micro-small / medium-large firms- with two the two sector coding - service/ manufacturing-) and the region where the assisted firms are located (distinguishing between Northern-Central Italy and Southern Italy –former Obj. 1 area)⁷.

Table 8. The impact of 488 grants by sector of the assisted firms

	Manufacturing sector	Service Sector
Average impact	1.91 ***	1.45 ***
Cost per job created	228,674	243,647
No. of firms used in the analysis	4,899	1,290

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

10. How impacts vary between former objective 1 areas and non-objective 1 areas

The data on the 488 grants are ideal to also empirically test whether or not a generous capital grant programme yields different impacts across areas of different degrees of socio-economic distress. The 488 incentives cover both Southern Italy (composed by the regions of Campania, Molise, Puglia, Calabria, Sicilia and Sardegna), which is a former Objective 1 area with quite severe socio-economic distress, and Northern-Central Italy which has a more developed economy.

The results of the analysis show that the average employment impact of the 488 grants are far worse in Southern Italy than in Northern-Central Italy: the cost per each additional job generated by the incentives is less than two thirds in Northern-Central Italy than in Southern Italy (164,872 versus 272,237).

Table 9. The impact of 488 grants by geographic location of the assisted firms

	Northern-Central Italy	Southern Italy (former Obj. 1 area)
Average impact	2.14 ***	1.66 ***
Cost per job created	164,872	272,237
No. of firms used in the analysis	2,008	4,181

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

⁷ For the sake of brevity, results from these specifications are not included in the report. Complete results are available upon request to the authors.

In order to draw definitive conclusions on the differential impacts of the incentives due to the geographic location of the assisted firms, however, we need to take into account the fact that the distribution of certain firm characteristics of the assisted firms is different across Northern-Central and Southern Italy. In particular: Medium and large enterprises are 10% of the assisted firms in Southern Italy, while they are 26% in Northern-Central Italy; firms in the manufacturing sector are 76% of the assisted firms in Southern Italy, while they are 91% in Northern-Central Italy; firms that received grants with an economic value above approximately 250,000 are 54% in Southern Italy, while they are 30% in Northern-Central Italy. All of these differences can produce composition effects and they need to be controlled for in the analysis.

This is done by replicating the analysis with three additional model specifications that hold constant size (Table 10), sector of the assisted firms (Table 11) and the economic value of the grants (Table 12).

Results from Table 10 highlight that the employment impact of the subsidies vary the most between Southern and Northern-Central Italy for medium and large firms. Consistently throughout all model specifications (as detailed in Technical appendix), the employment impact of the 488 grants is either negative or statistically not different from zero for firms above 50 employees.

Table 10. The impact of 488 grants by geographic location and by size of the assisted firms

	Micro & small firms		Medium & large firms	
	Northern-Central	Southern	Northern-Central	Southern
Average impact ^(a)	1.55 ***	1.80 ***	4.16 ** *	-0.45
Cost per job created	204,299	227,063	114,206	-
No. of firms used in the analysis	1,556	3,912	452	269

(a) Figures not reported in case of negative coefficient estimates or results with no statistical significance at the level of 0.1.

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

When holding constant the sector of the assisted firms (Table 11) or the economic value of the subsidies (Table 12), results are the following: the cost for each additional job generated by the incentive is higher in Southern than in Northern-Central Italy for both manufacturing and service firms (about 158,000 versus 277,000, and 218,000 versus 253,000, for manufacturing and service firms, respectively, Table 11). Also higher in Southern than in Northern-Central Italy is the cost of the incentives of both low and high economic values (about 71,000 versus 168,000, and 260,000 versus 304,000, for incentives below and above 250,000, respectively, Table 12).

Table 11. The impact of 488 grants by geographic location and by sector of the assisted firms

	Manufacturing firms		Service Firms	
	Northern-Central	Southern	Northern-Central	Southern
Average impact	2.18 ***	1.76 ***	1.89 **	1.34 ***

				*
Cost per job created	158,019	277,201	218,244	252,659
No. of firms used in the analysis	1,748	3,151	260	1,030

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

Table 12. The impact of 488 grants by geographic location and by economic value of the subsidies

	< 250,000		≥ 250,000	
	Northern-Central	Southern	Northern-Central	Southern
Average impact	1.52 ***	0.81 ***	3.66 ***	2.42 ***
Cost per job created	71,124	167,591	259,931	304,051
No. firms used in the analysis	1,425	1,983	583	2,198

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

11. The impacts on labour productivity and average payroll costs

In Italy, as in the vast majority of the other EU countries, social security (worker-level) databases are not readily available (or cannot be disclosed) so that they can be merged with the firm-level data used in the analysis. As a consequence no detailed information is available to reconstruct the profile (in terms of previous work-experience, age, education, job position and/or salary) of the workforce of the firms included in the analysis. Nevertheless, the important research questions concerning the quality of the jobs generated by the incentives can be partially addressed looking at the impacts on labour productivity and average payroll costs.

Focusing on average payroll costs can offer some evidence on the quality of the jobs generated by the incentives because a significant and positive impact on payroll costs, in conjunction with a positive impact on employment, can signal that the new jobs generated by the incentives are sufficiently qualified to raise the average salary paid to the workforce. Labour productivity can also offer some indirect evidence on the quality of the jobs generated by the incentives, because a significant and positive impact on labour productivity, in conjunction with a positive impact on employment, can signal that the new jobs generated by the incentives are sufficiently qualified to handle a shift toward a more capital intense production process. At the opposite, a negative and significant impact on productivity, in conjunction with a positive impact on employment, can signal a shift toward a more labour intense production process, with the new jobs generated by the incentives that are likely to require low human capital accumulation.

Table 13 summarizes the impact of the Law 488 incentives on the firms average (per-employee) yearly payroll costs. On average, the effect of the incentives on the payroll costs is not significantly different from zero. As highlighted in the table, the impact of the Law 488 grants on the average payroll costs is also estimated as not significantly different from zero across the different classes of the economic value of incentives and the size and sector of the assisted firms.

Table 13. The impact of 488 grants on average payroll costs

Impact on yearly payroll costs (per employee)					-136
No. of firms used in the analysis ^(a)					2,474
BY ECONOMIC VALUE OF THE GRANT	< 125,000	125,000 250,000	250,000 500,000	> 500,000	
Impact on yearly payroll costs (per employee)	633	-179	-137	-939	
No. of firms used in the analysis ^(a)	634	598	667	575	
BY SIZE OF THE FIRMS	Micro firms 1-9 employees	Small firms 10-49 employees	Medium firms 50-249 employees	Large firms 250+ employees	
Impact on payroll costs (per employee)	-783	45	79	133	
No. of firms used in the analysis ^(a)	564	1,384	506	20	
BY SECTOR	Manufacturing		Service		
Impact on payroll costs (per employee)	282		708		
No. of firms used in the analysis ^(a)	2,109		365		

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

(a) Corporate firms only.

For labour productivity, the results of the analysis show a negative, albeit not statistically significant (due to the high volatility of the sales figures reported in the ISTAT data), average effect of the Law 488 grants (Table 14). As highlighted, the average negative impact (with impact estimates that fail to reach statistical significant levels) on labour productivity of the Law 488 grants is quite stable across the different types of incentives and the size and sector of the assisted firms

Table 14. The impact of 488 grants on labour productivity

Avg. Impact on labour productivity [sales per employee]					- 9,046
No. of firms used in the analysis					5,847
BY ECONOMIC VALUE OF THE GRANT	< 125,000	125,000 250,000	250,000 500,000	> 500,000	
Impact on sales per employee	-14,291	4,266	-16,416	-26,721	
No. of firms used in the analysis	1,544	1,459	1,344	968	
BY SIZE OF THE FIRMS	Micro firms 1-9 employees	Small firms 10-49 employees	Medium firms 50-249 employees	Large firms 250+ employees	
Impact on sales per employee	-14,322	-4,041	-5,040	1,875	
No. of firms used in the analysis	2,802	2,386	630	29	
BY SECTOR	Manufacturing		Service		
Impact on sales / per employee	-9,058		-8,997		
No. of firms used in the analysis	6,659		1,188		

*** Statistical significance at the 0.01 level; ** 0.05 level; * 0.10 level.

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