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

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Motivations and Objectives

- Despite the EU spending billions € on business investment policies aimed at fostering regional economic development and social cohesion (27.2- billion € for the 2007-2013 period) *there are very few rigorous evaluations assessing the impact of these programmes*

- This study was commissioned by the EC to conduct an impact evaluation of the entire spectrum of grants and loans co-financed by the EU

- Various counterfactual econometrics methods are applied to estimate the programme impact on employment creation, growth in sales, level of investment and changes in labour productivity and average payroll costs

Existing Empirical Evidence

- Few studies have analyzed enterprise support policies with Counterfactual Impact Evaluation approaches based on micro-data

  Existing studies are mostly "single-program" analyses

- Limitations of "single-program" studies with binary treatment (T) variables:

  -Cannot distinguish among types of subsidies

  -Cannot comment on incentive intensity

  -Often suffers from measurement error bias if comparison firms have access to other incentives

Key Contributions

- Thanks to a comprehensive database (firm-level data + comprehensive program activity archives on the universe of available programmes -26-) the study is capable of providing empirical evidence on the differential impacts of different policy features and different types of subsidized firms

- Policy relevant results are obtained by estimating separate impacts for:
  - different levels of the economic value of the incentives
  -different types of incentives (distinguishing between “soft-loans”, grants and “interest rate grants”)
  - different sizes and geographic location of the assisted firms

- Methodological innovations:
  Statistical/econometric techniques for counterfactual impact evaluations are not developed in the context of business incentive programs. New solutions must be implemented when units of observations are firms instead of individuals and in the presence of multiple categorical treatments and repeated cross sectional cohorts of beneficiaries

The Policies Analyzed

Law 488

- At the *national level* we focus on "**Law 488/92**", a large-scale programme targeting industrial firms: it supported investments in physical capital through generous non-repayable grants assigned through open competitions implemented on a regional basis. We examine the impact of the assisted investments completed between 2000 and 2008

- Firms assisted by **Law 488** are located both in Southern Italy and Northern and Central Italy. Such wide geographical coverage increases the external validity of the results. On the basis of the data used for the analysis, Law 488 financed about **6,200 firms**, at a cost of about **€ 2.6 billion**

- Law 488 support was assigned by competitive regional auctions repeated almost every year. Applicants were admitted to the subsidies following their ranking based on an application score, with a non foreseeable budget induced cut-off point

- Law 488 awarded grants worth on average over *€400,000*

Multiple Support to SMEs in Piemonte

- At the regional level we focus on a single Italian region, Piemonte for which we were able to build a unique database on the entire spectrum of 25 different investment support measures available to SMEs (introduced by separate regional and national laws). The investments were subsidized between 2005 and 2009.

- The set of subsidies to SME in Piemonte excluded large firms and were predominantly tied to repayable subsidies (in the form of soft loans and "interest rate subsidies").

- Over **10,000** SMEs receive one or more form of assistance with an average economic value of the support to a single SME in the order of **€10,000** GGE and a total GGE expenditure of **114 million** €

- The different programmes are quite heterogeneous and with a large number of assisted SMEs. This enables the analysis to yield evidence on the differential impact for different types of subsidies, monetary values of the incentives and characteristics of the assisted SMEs

Data

Type of data	Archive	Source of the data
Data on beneficiaries	Beneficiaries administrative archives	Ministry of Economic Development; Mediocredito Centrale; Regione Piemonte; Finpiemonte; Sviluppo Italia
Data on applicants	Law 488 applicants and beneficiaries administrative archive	Ministry for Economic Development
Demographic data for the universe of active firms	Firm-level Statistical Archive of Active Firms (ASIA)	Italian National Statistical Institute (ISTAT)
Data on outcomes	Statistical Archive of Active Firms (ASIA) for **employment** and production (**sales**) outcomes	Italian National Statistical Institute (ISTAT)
	Archives on balance-sheet information for all Italian corporations for investment outcomes and payroll costs	ISTAT

Outcomes Variables

- Employment
- Sales
- Investments
- Labour productivity
- Average (per employee) yearly payroll costs

- To control for fixed effects, the focus is on pre- post-intervention changes of Y

$$\frac{Y_{i,post} - Y_{i,pre}}{Y_{i,pre}} \qquad Ln\left(\frac{Y_{i,post}}{Y_{i,pre}}\right)$$

are often wrong choices, with heavy (overlooked) consequences on the impact estimates (results are entirely driven by micro/small firms)

Often small firms (or start-ups) are also recipients of generous assistance. How relevant is a change in Y should not be judged by comparison of previous levels of Y for the same firm, but as a % of the economic value of the incentives

- Solution: absolute ΔY, controlling for size. Final impact estimates expressed in terms of cost per additional unit of ΔY

Threats to the Validity of the Analysis

- Ideally one would like to be able to compare changes from firms randomly selected into the different treatment groups and one non-treatment group, with no systematic differences between the firm characteristics of the different groups.

- All firms should than be exposed to the same socio-economic and/or institutional-changes in the years in which the incentive programs are active

- Two potential sources of bias in estimating the net impact of the incentives:

  - pre-intervention differences between firm characteristics (across the different groups) that would lead to different employment outcomes even in the absence of the incentives

  - differences in the socio-economic (and/or institutional) changes to which the different groups are exposed in the before after treatment period

Methods

Name	Description	Controls for possible (treated –non treated) heterogeneity due to different:
A) Exact matching/DD /Discontin. Design **(control group: Rejected applicants)**	Treated firms are matched with the non-treated firms with identical: • sector (2 digit) • size class • geographic area (northern-central Italy vs Southern Italy) • desire to invest	• sector-specific economic trends; • size effects (larger vs small firms may face different challenges/achieve different economies of scales) • geographic areas (proxy for possible cultural-socio –economic -institutional-transportation & labor cost-differences that may affect outcomes) • unobserved characteristics (e.g. brand value, market position, managerial abilities) that lead to the decision to apply for the subsidy • remaining unobserved differences between the treated and the non-treated firms (as long as they do affect the outcomes in a constant-over-time manner or as long as they are captured by the same desire to invest)

Name	Description	Controls for possible (treated –non treated) heterogeneity due to different:
B) Three stage CDD **(control group: non-assisted firms)**	Treated and non-treated firms are included in the analysis only if they share (on aggregate) similar characteristics (as indicated by their Propensity score). Specific remaining difference between treated and non-treated are then controlled for with a regression difference in difference design	• sector-specific economic trends • size effects • geographic location (at the Province level) • pre-intervention trends (as a proxy for same need/desire to invest) • unobserved differences between the treated and the non-treated firms (as long as they do affect the outcomes in a constant-over-time manner)

Additional Estimation Models (Sensitivity Analysis)

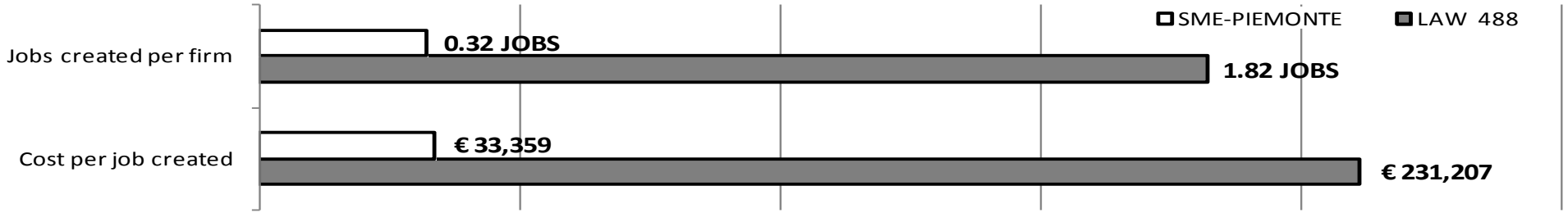
Name	Description:	Controls for possible (treated –non treated) heterogeneity due to different:
C) Propensity Score Matching **(control group: non-assisted firms)**	Treated firms are matched with groups of rejected applicants who have similar: sector; size class; pre-intervention trends & province location	• sector-specific economic trends; • size effects; • geographic location (at the Province level); • pre-intervention trends (as a proxy for same need/desire to invest); • unobserved differences between the treated and the non-treated firms (as long as they do affect the outcomes in a constant-over-time manner)
D) Discont. design on ranking of applicants	Treated firms are compared solely to rejected applicants who applied to the same auction & have same size & similar application scores (+- 1 std. dev from the threshold)	• size effects; • geographic location (at the regional level); • similar quality of the proposed investment projects (same application scores) • time un-varying unobserved differences between the treated and the non-treated firms;

Results/I: Average Impacts and Cost-Effectiveness Across all Recipients

Employment

- *Law 488 created almost 2 jobs per subsidized firm, while the Piemonte Programmes only 1/3 of a job per subsidized firm.*
- It costs on average about € 33,000 to create a job with the mix of measures activated in Piemonte, while it takes on average over € 230,000 to do so with the non-repayable grants of Law 488.

Figure 1. 488/92 and SMEs Piemonte Impacts on employment and related cost-effectiveness



- **Comparison with monitoring data:** jobs indicated in grant application = 82,000 new jobs, instead we estimate that only about 12,000 jobs were created.

Sales

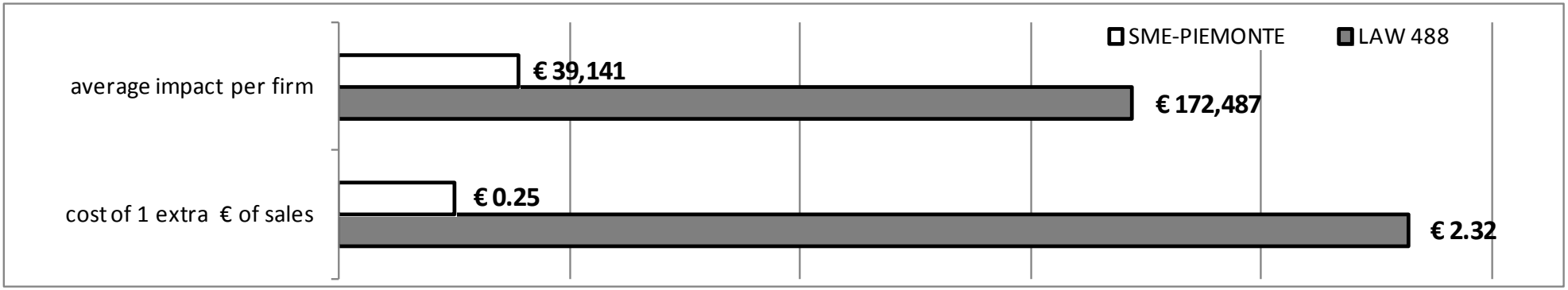
- Average impacts:
  €40,000 extra sales (per-firm) for SME Piemonte, €170,000 extra sales (per-firm) for Law 488 subsidies

- **Cost of 1 extra € of sales:**

  25 cents for SME Piemonte

  2 euro for Law 488 subsidies

Figure 2. Impacts on sales and related cost-effectiveness



Investments

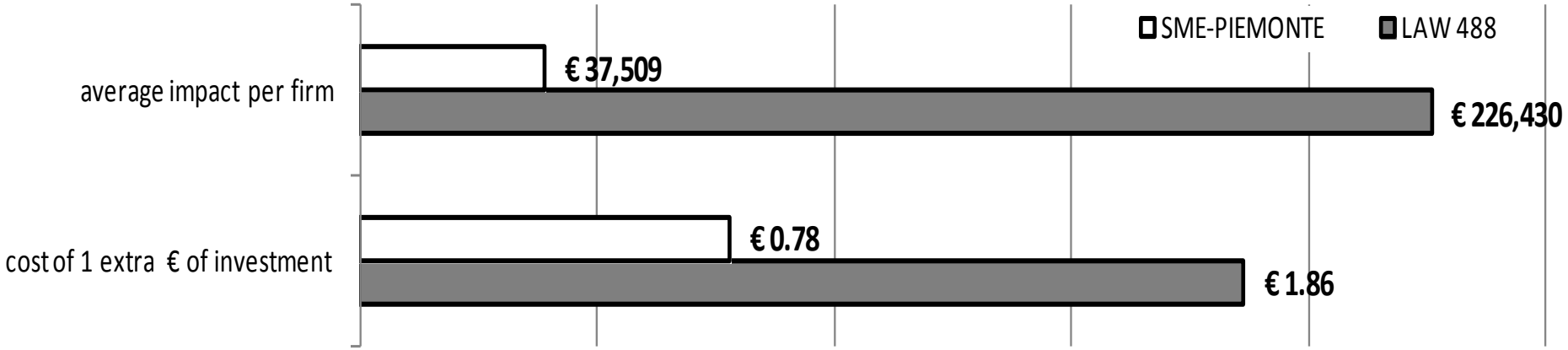
- The average impact per firm is much larger for 488 grants (226,400€) than for the mix of support for the SMEs in Piemonte (37,600€).

- Considering costs reverses the inequality. **Cost of 1 extra € of investment:**

  78 cents for SME Piemonte

  1.86 euro for Law 488 subsidies

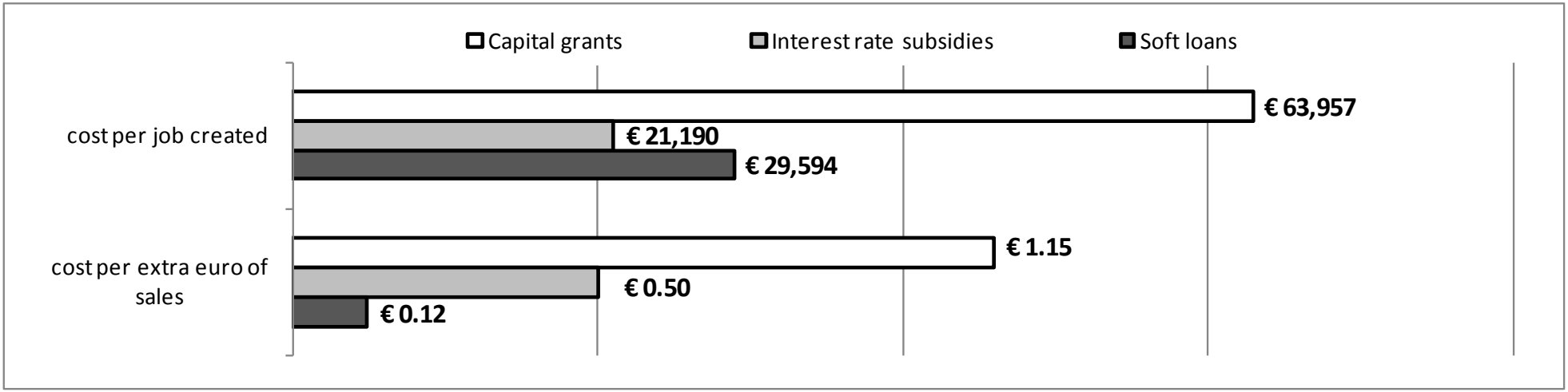
Figure 3. Impacts on investment and related cost-effectiveness



Results/II: How Impacts Vary by Policy Instruments

- In order to properly address the issue it is important to take into account the actual cost to the public of the different instruments and to "hold constant" the economic value of the subsidy.
- This is done by computing the Gross Grant Equivalent (GGE) subsidy and by focusing on the differential impacts of the subsidies given to the SMEs in Piemonte.

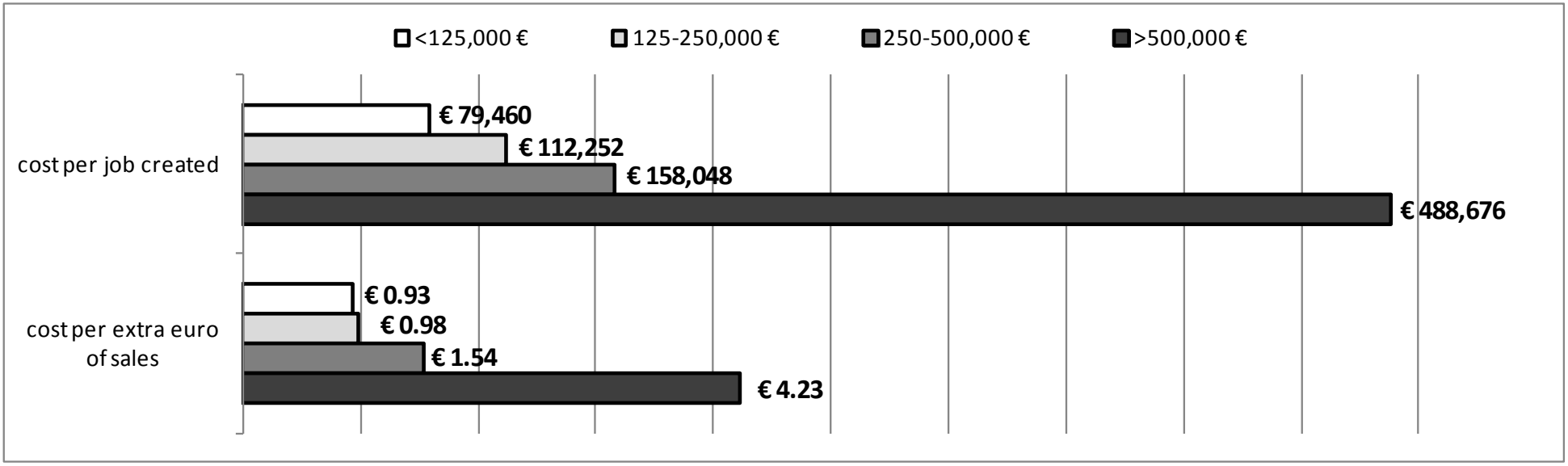
Figure 4. The impact of different types of subsidies for SME-Piemonte



Results/III: How Impacts Vary by the Economic Value of the Grant

- Research question relevant mostly for Law 488, because of its generosity and the great variability of the grants awarded.

Figure 5. The impact of Law 488 grants, by the economic value of the grant



Results/III: How Impacts Vary by Firm Size

- Large firms, display either negative impact estimates or impacts that are not statistically different from zero.
- These findings lend support to the contention that public money should be spent on supporting enterprises that face difficulties in getting access to credit.

Table 1. The impact on employment 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	
EMPLOYMENT								
Average impact	1.61	***	1.89	***	2.80	***	-2.34	***
Cost per job created	€ 230,700		€ 211,098		€ 235,590		-	
No. of firms used in the analysis	3,049		2,419		670		51	
SALES								
Average impact	€ 94,346	**	€ 266,299		€ 162,913	**	€ 211,292	**
Cost per extra euro of sales	€ 3.64		€ 1.48		€ 3.81		€ 4.00	
No. of firms used in the analysis	2,788		2,373		603		26	
INVESTMENT								
Average impact	€ 219,809	**	€ 221,004	**	€ 374,243	*	€ -2,950,862	
Cost per extra euro of investment	€ 1.60		€ 1.78		€ 1.47		-	
No. of firms used in the analysis	564		1384		506		20	

Table 2. The impact of 488 grants by firm size for grants >€ 500,000

	Micro firms 1-9 employees		Small firms 10-49 employees		Medium firms 50-249 employees		Large firms 250+ employees	
EMPLOYMENT [(a)]								
Average impact	3.82	***	2.68	***	3.24	***	-16.02	***
Cost per job created	€ 385,923		€ 403,778		€ 450,679		-	
No. of firms used in the analysis	437		512		240		33	
SALES [(a)]								
Average impact	€ 409,840		€ 534,018	**	€ -300,723		€ -3,593,431	
Cost per extra euro of sales	-		€ 2.01		-		-	
No. of firms used in the analysis	370		498		208		10	

Results/IV: How Impacts Vary by Degrees of Economic Development of the Targeted Areas

- The data on the 488 grants are ideal to empirically test whether or not a generous capital grant programme yields different impacts across areas of different degrees of economic development
- The results of the analysis show that for micro and small firms employment impacts are not statistically different between industrial regions (Northern-Central Italy) and underdeveloped areas (Southern Italy)
- For medium and large firms, instead, employment impacts are either negative or not statistically different from zero in Southern Italy, while they are positive in Northern-Central Italy
- For sales, the cost of generating each additional euro of sales is 2.5 and 4.5 times higher in Southern Italy than in Northern-Central Italy for all sizes of the assisted firms
- For investment outcomes, finally, the differential cost of generating each additional euro of investment between Northern-Central and Southern Italy is either not statistically different or slightly higher in Northern-Central Italy.

Results/V: Indirect Evidence on the Quality of the Jobs Created

- In Italy, as well as in most EU Member States, it is yet not possible to work with social security worker-level data merged with firm-level data.

- Lacking such data, some indirect evidence can be gathered by estimating the programme impacts on average payroll costs and labour productivity observed at firm level

- The analysis shows that the average effect of the subsidies on the firms average (per-employee) yearly payroll costs as well as on labour productivity is not significantly different from zero.

- However, the soft loans and interest rate subsidies part of the SME-Piemonte measures have a modest positive impact on productivity.

Conclusions

- Comprehensive database (on multiple sources of support) do enable the analysis to produce empirical evidence on the differential impact of the different types of subsidies, monetary values of the incentives and characteristics of the assisted firms. These types of findings have far greater policy relevance than average impacts across all recipients
- 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.
- For SMEs soft-loans and interest rate grants were the most cost-effective form of support. The effectiveness of int. rate grants is likely due to the signal it sends to the private banks regarding the reliability of the project and the credit-worthiness of the firm

Proximate Effects vs. Long Term Effects

- The analysis focuses on proximate effects, with a typical time span up to a maximum of two years after the time at which the subsidized investments began operating .
- The reasons for this choice are twofold:

  I) Using CIEs attempting to estimate long-term impacts is best to be avoided with firm-level data. In the long-run, a possible positive programme shock on the performance of the assisted firms 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-treated group.

  II) The ultimate objective of the policies is to boost the long-term performance of communities and not single firms. Positive collective outcomes could be achieved even with estimated long-term firm-level impacts close to zero. This would be possible with long term positive spill-overs into non-supported firms that would generate positive programme outcomes for the targeted local/regional economies without necessarily generating any long-term competitive advantage for the beneficiary firms compared to similar non-supported firms.

Computation of Gross Grant Equivalent (GGE) Figures

- The GGE values are computed as the net present values of the gross grant equivalent subsidy paid to the assisted firms

- Data on the soft loans programmes are transformed into the net present value of the difference between the flow of interest payments made by the assisted firms at the below-market-rate and the flow of interest payments that the assisted firms would have made at market rates

Operationalizing the Timing of the Treatment

- Administrative databases on program incentives contain many possible "treatment dates":

  e.g.

  -dates on when the application was approved
  -dates on incentive payments (instalment 1 , instalment 2…..)

- Choosing the wrong dates will have very negative consequences on the impact estimates

- For employment, sales, labour productivity and payroll costs, 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

- For investment outcomes, the public support received is instead located in a time frame between the date in which the supported investment/expenditure was deemed to be ready to enter in the production process and two years before that date