Do Business Investment Incentives Promote Employment in Declining Areas? Evidence from EU Objective 2 Regions

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ABSTRACT

To help address the large regional disparities in income that stubbornly persist across Europe, billions of euros have been invested in business investment incentives co-funded through the European Regional Development Fund. Since 1989, these incentives have been spatially targeted through various Structural Funds aimed at promoting economic and social cohesion among all European Union countries. "Objective 2" of the Structural Funds aims to help revitalize those areas with persistently high unemployment and declining industrial production. Despite the continued popularity of these initiatives, no reliable ex-post empirical evidence of their impact is yet available to help EU policy makers refine future geographically targeted economic development policies. To begin to address the void, this paper uses unique firm-specific data available for northern and central and Italy to estimate a parametric difference in difference model that calculates the employment impact of the "Objective 2" area business incentives net of all changes due to the economic trends that are exogenous to the program intervention. Mean impact results show that the incentives did promote positive employment growth in the target areas that would not have otherwise occurred. Accounting for the employment outcomes by degree of pre-intervention industrial decline, the analysis further finds that the incentives were most effective when targeting production in province-industry pairs that had the least severe declines during the years prior to the program intervention.

Keywords: Urban and regional economic development; impact evaluation; employment policy; Structural Funds

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1. Introduction

Business investment incentives co-financed through the Structural Funds, and through the European Regional Development Fund (ERDF) in particular, over the past decade and a half, have become popular regional economic development tools for European Union "Objective 2" (Obj.2) areas, regions with declining industrial production. Business incentive packages have been offered in more than 80 Obj.2 areas covering 18% of the EU population. In the 1994-1996 programming sub-period alone, approximately five billion euros, or 11% of the entire EU budget dedicated to the fulfillment of economic and social cohesion objectives, were drawn from the ERDF to finance incentive packages to support small and medium enterprise (SME) investments in Obj.2 areas. Initiatives such as these also have an important role in the current 2000-2006 cycle of EU regional policies and are similar to other spatially targeted programs such as the enterprise zone incentive packages that were first offered in the late 1970s in distressed areas of the United Kingdom, the United States, and other countries.

Despite the wide popularity of these initiatives, no reliable ex-post evidence of their employment impact in the Obj.2 areas is yet available to help EU policy makers refine future geographically targeted economic development policies. To date, employment impact results are derived primarily through two evaluation practices: application of standard macroeconomic multipliers to the volume of investments co-financed by the ERDF in the Obj.2 areas[1] and solicitation of entrepreneurs' judgments on the effectiveness of the programs in affecting their investment behavior (e.g., Ernst & Young, 1999). Both types of procedures have serious drawbacks. The multiplier analysis not only cannot measure actual net pre to post intervention employment changes in the target areas, but it

[1] Examples of employment impact estimates obtained by application of standard multipliers to the volume of subsidized investments are contained, for example, in the "Final Evaluation Reports" of the "1994-1996" Obj.2 Program prepared by Ecoter (1999) for the Piedmont Region.

also cannot estimate marginal differences in employment impact due to the different program features adopted across EU regions and countries. Thus, this method of evaluation is of limited use for policymakers attempting to glean information from previous policies to craft future program interventions. While surveys may be better suited to capture some of the impacts of policy heterogeneity, the applicability of survey results is limited by response bias: Business respondents have incentives to overestimate the outcomes attributable to the programs in hope of increasing the chances of maintaining the intervention (Bartik, 1991; Boarnet and Bogart, 1996; Dowall, 1996; Lambert and Coomes, 2001; Papke, 1993, 1994). For instance, Gabe and Kraybill (2002) documented that economic development incentives tended to have a much greater positive impact on *announced* growth rather than on *actual* growth among expanding business establishments.

Conducting reliable ex-post impact evaluations based on actual pre-post intervention data is difficult, however. Assessing the causal link between the program intervention and observed employment outcomes is challenging because it requires disentangling changes due to the program from changes due to all of the economic and social factors exogenous to the program intervention. This task is particularly demanding for the case of the Obj. 2 area business investment incentives because the targets of the interventions are disadvantaged areas that would likely under perform their respective national economies in the absence of the program intervention. Consequently, impact estimates can be biased if the analysis fails to carefully control for the economic trends and exogenous economic factors that affect employment outcomes concurrently with the program interventions (Bondonio 2000).

Italy presents an ideal opportunity to evaluate the impact of Obj. 2 incentives. While many of the southern regions are impoverished and thus receive the more generous and geographically comprehensive Obj.1 incentives, the Obj.2 areas are concentrated in north-central Italy, a region with a great deal of employment in the manufacturing sector and a very diverse industrial base. Italy is also ideal because of the unique availability of data sufficient to perform an outcome evaluation of the business investment incentives offered to SMEs. Such data cover information regarding both the program incentives paid to each assisted SME and the firms' yearly employment changes recorded by the Italian Social Security Agency's (INPS) mandatory worker registration archives.

The econometric models estimated in the paper use INPS employment data sorted by industry and aggregated by geographic areas corresponding to the Obj.2 areas and adjacent non-Obj.2 areas of comparable size. Following an evaluation strategy proven reliable for analyzing US enterprise zone programs (Boarnet and Bogart, 1996; Bondonio, 2002; Bondonio and Engberg, 2000; Greenbaum and Engberg, 2004; Papke, 1993, 1994), the analysis is implemented through a number of parametric difference in difference specifications that allow impact estimates of incentives offered between 1995 and 1998 to be retrieved net of the following factors exogenous to the program intervention:

- Local economic trends that may affect Obj.2 areas differently from the non-Obj.2 areas of the EU;
- Cyclical macroeconomic factors that may affect employment growth in both Obj.2 and non-Obj.2 areas during the program intervention period;
- Sector-specific market trends that may affect the performance of firms in the targeted industrial sectors differently than in non-targeted sectors;
- Structural characteristics of Obj.2 areas that may affect firm performance differently than in non-Obj.2 areas.

The econometric specifications utilized also allow the marginal employment impact of the programs' financial generosity to be estimated along with differences in the employment impact due to different degrees of pre-intervention industrial decline in the treated units. The analysis finds positive and significant marginal employment impacts in SMEs when the financial generosity of the incentives is increased. The estimated employment impacts, however, are much lower than those offered by the evaluation reports that either apply standard macroeconomics multipliers to the volume of subsidized investments or collect entrepreneurs' judgments on the employment effectiveness of the program. Accounting for the employment outcomes by degree of pre-intervention industrial decline, the incentives were found to be most effective when they targeted production in industry-province pairs with the least severe decline in the years before the program intervention. Sensitivity analysis indicates that the significance and magnitude of the impact estimates are robust across various specifications, data, and assumptions regarding the selection process of the target areas and industries. The cost of each new job created, measured in terms of public resources devoted to the incentives, is estimated to be between approximately 15,900 € and 29,400 €.

The remainder of the paper is organized as follows: The next section discusses the economic rationale for the programs and provides additional information about their history and implementation in the EU and Italy. Section 3 presents the evaluation strategy, and section 4 describes the data. Sections 5 and 6 summarize the empirical model and results, and section 7 offer concluding remarks.

2. EU "Objective 2 area" programs

The EU's geographically targeted Obj.2 areas are named after the second of a number of *objective propositions* set to regulate and coordinate all of the initiatives co-funded by the

EU structural funds.[2] Since 1989, the Obj.2 areas are the targets of incentive packages that have been administered through three distinct programming rounds, covering the periods 1989-1993, 1994-1999 and 2000-2006, respectively (Greenbaum and Bondonio, 2004).[3] During the first two rounds, 1989 to 1999, eligible Obj.2 areas were required to meet three specific distress criteria: an unemployment rate exceeding the EU average for the last three years prior to the beginning of each programming period; the share of industrial unemployment exceeding the EU average in any year after 1975; and an overall decline in industrial employment since 1975. In the current 2000-2006 period, eligible Obj.2 areas were extended to include certain rural areas, urban areas with distressed socio-economic conditions, and areas with high percentages of jobs in the fishing industry.

Throughout the three programming periods, Obj.2 areas were designated in 56 NUTS_1 regions across 12 different EU countries[4] covering, on average, more than 16% of their population. For the two earlier programming periods, the designated Obj.2 areas enjoyed a total financing of more than 22.6 billion euros, as shown in Table 1.[5] The percentage of each country's population covered by Obj.2 areas during the 1994-1996 sub-period averaged 16.4% and varied from a low of 7.5% in Austria to a high of 34.6% in Luxembourg.

[2] The second objective proposition is concerned with the promotion of economic revitalization in industrially declining regions, while the other propositions are concerned with either different economic adjustment of poor regions or non spatially-targeted objectives focusing on agriculture, economic integration and training of youth and long-term unemployed. The total number of EU objective propositions was seven in the 1989-1999 period and is three since 2000.

[3] The first and second periods were further divided into the following sub-periods: 1989-1991; 1992-1993; 1994-1996; and 1997-1999.

[4] The number of countries in which Obj.2 areas were located varies from nine for the first programming period to 12 for the third period.

[5] Table 1 breaks the 1994-1999 programming period up into the two sub-periods to account for the fact that Austria and Sweden were not members of the EU when the 1994-1996 sub-period began and thus did not receive incentives until the 1997-1999 sub-period. Finland also joined the EU in 1995, although a decision with regard to their Obj.2 incentives was made earlier than for Austria or Sweden.

Table 1

The incentive packages offered in the Obj.2 areas vary somewhat across the EU. The single regional administrations that have jurisdiction over designated Obj.2 areas each autonomously set their own "program agenda" in which different incentives and economic revitalization policies were adopted following common EU policy guidelines. Business investment incentives targeting small and medium enterprises comprised the bulk of virtually each Obj.2 area incentive package in all countries other than Austria. The SME incentives accounted for an average of almost 60% of the entire budget of the Obj.2 area program intervention during the 1994-1996 sub-period, as can be seen in the last column of Table 1.

For the programming period that ended in 1999, Obj.2 areas were designated in 11 regions located in the northern and central parts of Italy: Valle d'Aosta, Piemonte, Liguria, Lombardia, Veneto, Friuli Venezia Giulia, Emilia Romagna, Toscana, Marche, Umbria and Lazio. Obj.2 areas represent approximately 25% of the population and 39% of the land area in those north-central regions. The percentages of the total contribution devoted to SMEs offered in the Italian Obj.2 areas are similar to those recorded in other EU countries. Because the Obj.2 areas located in Lombardia cover only a negligible portion of the total population and land area of that region, Lombardia's Obj.2 areas are excluded from the analysis. Further, because Valle d'Aosta's Obj.2 area incentive package does not include any SME investment subsidy, its employment data is included in the analysis only as part of the control group.

The specific composition of the Obj.2 area incentive packages set by each Italian region for the 1994-1996 programming sub-period is summarized in Table 2. All regions other than Valle d'Aosta provide SME capital expenditure incentives, human resource training and business technical assistance. Additional business incentives include research and development (R&D) and infrastructure assistance, aid with environmental protection, and tourism incentives.

Table 2

Subsidies to SMEs' investments, which often take different names in the various regional programming documents describing the Obj.2 intervention packages, are the most common type of intervention, typically accounting for more than 65% of the program budgets. In most cases, these subsidies are capital grants that support up to 15 to 30% of the total investment expenditures. They are aimed at expanding production capacity, supporting technological upgrades of the production process, or restructuring plants and equipment. In a few cases, SME capital expenditures incentives take the form of interest rate abatements.

3. The evaluation strategy

This paper focuses on investigating whether there is a direct impact of these Obj.2 area business incentives on the subsequent economic performance of targeted areas. While more global impacts are also possible if the programs are successful, the focus on outcomes measured in the targeted areas is consistent with the main economic rationale supporting geographically targeted policies such as the Obj.2 area business subsidies. Such programs are often justified not only on the equity grounds of attempting to reduce regional inequities but also on efficiency grounds as a way to address market failures such as information asymmetries, immobile resources, and externalities that inhibit the efficient spatial distribution of economic activity (Martin, 2000). While imperfect markets for information may prevent people from knowing about economic opportunities in particular locations, market rigidities may preclude them from taking advantage even if aware. Labor is often immobile, and union agreements often restrict the ability of firms from being able to offer lower wages in regions of higher unemployment to take advantage of the underutilized resources (Faini, 1999).

Externalities further distort markets. When based exclusively upon private costs and benefits, firms' location decisions do not properly account for the entire social costs and benefits involved with their decisions. When businesses leave industrial areas, there is often an increase in urban sprawl accompanied by environmental and health consequences. Abandoned areas may also be conducive to crime, which only encourages further flight. These increased costs on those who remain behind may justify the use of geographically targeted public incentives (Bartik, 2000; Gyourko, 1998).

As there may be economy-wide efficiency gains from moving jobs to places with higher unemployment and lower reservation wages (Bartik, 1991), Obj.2 area business incentives potentially produce socially desirable outcomes even if the economic growth of the target areas occurs at the expense of the non-target areas. Because the redistribution of jobs is not necessarily zero-sum, it is important that the investigation of the program effects is primarily focused on looking for impacts in the targeted areas.

Successful geographically targeted programs should boost economic growth in the assisted areas by either attracting new firms or helping existing firms to expand their business. While empirical evidence of such increases in economic development could be quantified in various ways, this paper uses employment as the outcome measure for two main reasons. First, increasing employment in distressed areas is a top priority for national and regional EU policymakers. Second, firm-level employment data are much more reliable and accessible than data on indicators such as sales and capital expenditures, which are not readily available for smaller firms.

The Obj.2 area business incentives typically aid the targeted distressed regions by providing a richer program budget that enables a greater number of firms to take advantage of the business incentives than would otherwise be the case. For each assisted firm, however, the value of the Obj.2 incentives is very often comparable to those of other non-geographically targeted business investment incentives available in each EU country. As individual firms located outside the Obj.2 areas may also gain access to investment incentives comparable to those of the Obj.2 programs, the empirical approach developed in this paper uses outcome data from groups of target and non-target firms aggregated by geography and industrial sector. The method of choice is a longitudinal parametric model that analyzes firm data aggregated by province and 2-digit industrial sector. Aggregated longitudinal data recorded from non-Obj.2 areas is exploited in the model to estimate the counterfactual employment change conditioned on industrial sector and region-specific trends and pre-intervention area-specific characteristics.

This evaluation strategy is preferred to a more basic firm-level comparative analysis of changes in employment between treated and non-treated areas for two main reasons. First, if treated firms were compared to comparison non-Obj.2-area firms that did not receive any other type of public financial aid, there would be concerns about selection bias. The fact that some firms did not succeed in applying for financial incentives for which they were eligible might reflect shortcomings in unobserved managerial abilities, and it is likely that the treated Obj.2-area firms would outperform comparison-group firms even in the absence of the business incentives. Second, if treated firms were compared to non-Obj.2-area firms that received financial incentives from sources other than the Obj.2-area program, the validity of impact estimates would depend critically on precisely observing the quantity and timing of the financial incentives received by the non-Obj.2-area firms. In this case, results from the analysis would be interpreted as estimates of the employment elasticity of firm-specific incentives rather than as estimates of the employment impact of program interventions targeting selected geographically defined economies.

Threats to the validity of the analysis and control variables

Longitudinal examination of employment changes in Obj.2 areas relative to non-Obj.2 areas yields reliable impact estimates only if the empirical models successfully control for all factors exogenous to the program intervention that may cause employment changes to be different in the targeted areas than in the excluded areas. With Obj.2 programs, the main factors that may lead to selection and omitted variable biases can be summarized as follows:

A) Business cycles that could similarly affect profitability, investment, and hiring decisions for all firms operating in the same national or regional economy.

B) Economic conditions that affect the costs and revenues of all firms located within the same local economy. Such common local economic conditions may affect investment and hiring decisions for all firms located within the same geographic area regardless of whether or not the firms are eligible to receive public subsidies.

C) Business sector-specific market conditions that could affect costs and revenues for all firms operating in related industrial sectors.

For parametric longitudinal models that compare the pre-post intervention employment outcomes in Obj.2 areas relative to non-Obj.2 areas, the national- or regional-business cycle factors of point A) do not pose any particular threats to the validity of the analysis. Such business cycles have the same affects on Obj.2-area and non-Obj.2-area firms and would therefore not bias estimates of employment outcomes. A number of other empirical program evaluation studies have also adopted such approach to control for national- or regional- economic cycle factors (e.g., Bartik and Bingham, 1995; Boarnet and Bogart, 1996; Dowall, 1996; Greenbaum and Engberg, 2004).

Exogenous factors such as the local economic conditions and sector-specific market conditions of points B) and C) potentially pose more significant threats to the validity of the analysis. Concerns regarding the local economic conditions are mitigated because the firms eligible for receiving Obj.2-area incentives predominantly operate in industrial manufacturing sectors. Since their outputs and many of the factor inputs are typically traded in national and international markets, conditions in the local economy play less of a role impacting the costs and benefits of a particular location.[6] Moreover, using a longitudinal approach with simple panel data estimators (such as *fixed effects*, *first-differencing,* or *long-differencing*) would allow any residual local economic conditions that may be correlated with the treatment status to be controlled for, provided that such conditions affect the dependent variable in a relatively time-unvarying manner.

Sector-specific market conditions [point C)] pose the greatest threat to the analysis of the Obj.2-area incentive program. If firms operating in different industrial sectors are affected by different sector-specific market conditions, they would make different investment and hiring decisions and, therefore, display different employment growth rates even in the absence of the program intervention. If the sector composition of Obj.2-area and non-Obj.2-area economies differ greatly, as is likely to be the case due to the high concentration of declining industrial sectors in the Obj.2 areas, impacts estimated would

[6] While unemployment rates vary across labor markets, even labor costs are unlikely to vary significantly because of the role unions play in standardizing wages.

be biased without adequately controlling for the sector compositions of target and non-target areas. To avoid selection bias, the empirical model must condition to the same industrial sectors the comparison of employment outcomes between Obj.2-areas and non-Obj.2-areas.

One possible drawback of conditioning on industrial sectors is that impact estimates may not be reliable if the Obj.2-area incentives spur investments that allow firms to expand beyond their core businesses into new industrial sectors. This occurrence, however, is likely much less common for SMEs than for more diversified larger firms. Italian SMEs typically operate in the industrial sector in which their owner or manager is most qualified. Such owner-specific abilities and experience do not vary substantially over time, making it less likely that SME businesses would diversify into other industrial sectors in the short run (e.g., IRES 2003).

4. Data

The geographically aggregated employment data necessary for the analysis is obtained from the "Enterprise Observatory" (EO) of INPS, which is the national social security agency of Italy. INPS tabulates firms' employment data by province,[7] industrial sector,[8] and firm size.[9] As the Obj.2 area business investment incentives are targeted at SMEs,[10] only firms in size classes with fewer than 200 employees are examined.[11] The units of

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[7] There are 102 provinces in Italy.
[8] There are 45 different industrial sectors.
[9] There are nine size categories based upon number of employees.
[10] The vast majority of employment in Italy is in smaller firms (Guiso, 2003).
[11] Although SMEs are legally identified as firms with fewer than 250 employees, INPS data are aggregated by firm size classes that yield employment information only for firms with fewer than either 200 or 500 employees. The analysis focus on firms in size classes with fewer than 200 employees with very little loss of generality as, in the Italian regions with Obj.2 areas, much less than one percent of SMEs have between 200 and 250 employees.

observation for the analysis are cross-sectional province-sector (*p-j*) pairs for the years 1984 to 1998:

$Y_{p,j,t}$ = aggregated employment level at the end of year *t*, for all SMEs located in province *p* and belonging to the industrial sector *j*.

INPS EO are the most appropriate data available. They offer more reliable employment figures than self-reported employment data obtained from firm interviews or Obj.2 area incentive firm application forms. They include annual employment flows from 1984 to 1998, covering the 1995-1998 intervention period. They allow employment changes to be categorized into those that occurred in Obj.2 areas and non-Obj.2 areas and those that are accounted for by SMEs and large firms. Because the focus of the analysis is limited to SMEs, geographic problems that plague larger firms are avoided. INPS EO data measure firm-level rather than establishment-level employment. Thus, all employment is attributed to the administrative offices. For large, mulit-establishment firms, this can be very misleading, particularly if the establishments are in disparate locations. The overwhelming majority of Italian SMEs have only one location, thus avoiding the coding problem.

Data for the analysis cover all the provinces in each Italian region containing at least one Obj.2 area. All of southern Italy (i.e., the regions of Abruzzo, Campania, Molise, Puglia, Basilicata, Calabria, Sicilia, and Sardenia) is excluded from the analysis due to the severe economic distress that qualifies those regions for the more generous and geographically comprehensive Obj.1 incentives. These incentives and very different economic conditions make the southern Italian provinces inappropriate comparisons for the Obj.2 areas.

Information on the location of the Obj.2 areas is obtained from EU documents and brochures by the regional governments administering the program. Unfortunately, the boundaries of Obj2 areas do not completely coincide with those of the Italian province boundaries. Because of this, a coding scheme must be used to assign each province as a treatment Obj.2 area province or a control province. A number of alternative assignment rules are used to assure that the estimated program impacts are not a function of miscoding. Under the first rule, a province is coded as an Obj.2 area only if at least 80% of the province population resides within the boundaries of an actual Obj.2 area. Provinces with an Obj.2 area coverage of less than 80% are excluded from the analysis, and only provinces with 0% Obj.2 area coverage are coded as non-Obj.2 areas. Under the second rule, treatment areas are coded by a continuous rather than binary variable. The Obj.2 area status of each province is coded directly as the percentage of the province population residing within the boundaries of the actual Obj.2 area. Under the third rule, a province is coded as an Obj.2 area if 100% of the province population resides within the boundaries of an actual Obj.2 area. The use of this range of alternative coding rules allows the robustness of the results to be tested.

Table 3 illustrates the aggregated employment growth, recorded during both a treatment (1995-1998) and pre-treatment period (1986-1991), for the group of eligible industrial sectors in the Obj.2 area provinces (i.e., the treated province-sector (p-j) pairs) and for the group of all sectors in the non-Obj.2 area provinces (i.e., the non-treated province-sector (p-j) pairs).[12] The assignment rule illustrated in the tables is the first one in which the Obj.2 area provinces are those with at least 80% of residents living within the boundaries of the Obj.2 area zone.

[12] The 1986-1991 is the non-treatment period because the incentive payments of the first programming period of the Obj.2 programs began after 1991. As reported later in the paper, data on the 1991-1994 incentive payments were not available.

Table 3

For both the treated and non-treated province-sector pairs, employment growth was much faster in the pre-treatment 1986-1991 period. While the growth rates were similar in that period (approximately 15%), the treated province-sector pairs grew more rapidly (5.62%) than the non-treated pairs (2.49%) during the 1995-1998 period. However, as the province-level and industrial sector heterogeneity has not been accounted for, this faster growth rate does not necessarily imply that the Obj.2 business incentives were successful. In addition, t-tests of the means indicate that none of the differences between the treated and non-treated province-sector pairs are statistically significantly different at the 0.1 level.

Pre-treatment province level characteristics are measured using 1991 decennial census data available from the Italian national statistical agency, ISTAT. These measures include the percentage of residents with high-school or college degree, the number of crimes per thousand residents, the business closure rate, the population density and the percentage of jobs in manufacturing sectors. Table 4 illustrates the distribution of the ISTAT pre-treatment characteristics of the provinces in the data set by Obj.2-area status.

Table 4

Based upon the 1991 decennial census data, the Obj.2 provinces had a higher fraction of residents with a high school or college degree and were much more densely populated (380 versus 174 residents per square kilometer) than the non-Obj.2 provinces. However, the Obj.2 provinces also had higher crime rates, higher business closure rates, and a smaller fraction of jobs in the manufacturing sector. Only the crime rate and population density differences are statistically significantly different at typical levels.

Data measuring the amount of the Obj.2 investment subsidies received by each assisted SME are from either program monitoring reports produced by consulting firms[13] or from archives maintained by the regional Obj.2 program administrators. The data used in the analysis are the business investment incentive payments that occurred between 1995 and early 1998 in the Obj.2 areas of the following regions: Piemonte, Liguria, Veneto, Friuli-Venezia-Giuglia, Emilia-Romagna, Toscana, Marche, Umbria and Lazio. These payments are referred to as those of the "1994-1996" programming sub-period. Although the payments occurred with certainty between 1995 and early 1998, the exact payment dates within the period were not recorded in the documentation available for the analysis, which only includes the total value of the subsidies received by each assisted firm for the entire 1995-1998 period.

The payments referred to as those of the "1989-1993" programming sub-period, which actually took place mainly only after 1991, and the "1997-1999" sub-periods, which actually took place only after 1998, are unusable for the analysis. The former lacks retrospective information concerning both the exact dates and amounts of the subsidies, and the latter is unusable because no incentive payment was actually received by the assisted firms before 1998, the last year for which employment information are available. Such incomplete information on the program incentive payments limits the usable portion of the INPS employment data to the years prior to 1992 and the years 1995-1998. Data for the 1992-1994 years need to be excluded in order to avoid potentially serious omitted variable biases and endogeneity problems due to the lack of information on the incentive payments that occurred in these years.

[13] E.g., Viatec (1997, 1999) for the Piemonte and Liguria regions.

5. Empirical model

By exploiting the ISTAT 1991 decennial census data and the usable portion of the INPS EO data, it is possible to construct econometric models that yield unbiased employment impact estimates under the assumption that by controlling for the industrial sector, region, pre-treatment province specific characteristics, p-j specific pre-treatment employment growth and unobserved time invariant fixed-effects, treatment assignment becomes independent from any factor that may affect employment growth outcomes:

$$Y^0_{pjt}, Y^1_{pjt} \perp T_{pjt} \mid S_j, R_p, X91_p, GRW_{pj}, \alpha_{pj} \qquad (1)$$

where

Y^0_{pjt}, Y^1_{pjt} = employment in region p and sector j without and with treatment, respectively;

T_{pj} = treatment assignment which equals 1 if treated in the period [t-(t-1)] and 0 otherwise;

S_j = industrial sector;

R_p = region;

$X91_p$ = set of pre-intervention province-specific observed characteristics from 1991 decennial census;

GRW_{pj} = p-j-specific pre intervention (1986-1991) employment growth;

α_{pj} = time-invariant fixed-effects.

As the usable data for the analysis do not include the single years within the incentive payment period (1995-1998), models like the random growth rate of Heckman and Hotz (1989), Papke (1993, 1994), Boarnet and Bogart (1996), and Bondonio and Engberg

(2000) cannot be estimated. The available data only offer relevant information on a single pre- and post- intervention time (1995 and 1998, respectively). While data also exist for the period prior to 1992, that period is too distant from the intervention. Random growth rate models would yield unbiased impact estimates under the weakest condition of:[14]

$$Y^0_{pjt},\ Y^1_{pjt} \perp T_{pjt} \mid S_j,\ R_p,\ X91_p,\ GRW_{pj},\ \alpha_{pj},\ \beta_{pj}\mathbf{t} \qquad (2)$$

where

$\beta_{pj}t$ = unobservable province-sector (p-j) specific growth trends;

Condition (2) implies that results would be unbiased even if unobservable p-j specific growth trend (for example, formalized in linear form as $\beta_{pj}t$) were correlated with treatment assignment.

Given the features of the actual selection process, however, retrieving unbiased impact estimates of the program intervention should not require estimating models based on the weakest assumption (2). Assuming dependence between $\beta_{pj}\mathbf{t}$ and T_{pj} would require that the program officials designate the treated p-j units of observations (province-sector pairs) based on information unknown to the evaluator that would allow them to forecast which industrial sector and which province would grow the least or the most. Such a hypothesis is very unlikely because the Obj.2 area selection into treatment process is based on three separate stages that do not allow direct selection of specific province-sector (p-j) pairs to take place. At the first stage, Obj.2 areas are designated based on area-designation proposals made by regional governments and presented to the EU by each respective

[14] Random growth rate models are estimated through a double differencing procedure in which data are first-differenced, and then the model is estimated with a panel data fixed effects estimator (differences from the mean).

national government. Obj.2 designation rewards areas with declining industrial production from 1975 to the date of the designation round. At the second stage, each separate regional government administering Obj.2 areas selects a range of eligible industrial sectors based on its specific regional programming goals. At the third stage, eligible firms submit investment proposals to their regional governments. At a later time, the regional governments select firms to be assisted based on a ranking of investment proposals that rewards high ratios between the amount of own resources invested by the firm and the amount of the capital grant requested. Thus, at first, locations are designated as Obj.2 areas without consideration of specific industrial sectors. At a second time, and through a separate selection process, wide ranges of industrial sectors are made eligible for the program incentives within each designated Obj.2 area. Finally, based on different criteria at a later time, assisted firms are selected within the already designated industrial sectors and areas. As a result, the overall selection process tends to reward, on the one hand, economically distressed areas and sectors, and, on the other hand, firms that are willing to risk large portions of their own financial resources in the proposed investment projects.

5.1 The baseline model

The estimated baseline longitudinal parametric model, which yields unbiased employment impact estimates under condition (1), is as follows:

$$\Delta Y_{pj} = \lambda + \Sigma_{\boldsymbol{J}}\beta_{\boldsymbol{J}}S\_\boldsymbol{J}_{j} + \Sigma_{\boldsymbol{r}}\omega_{\boldsymbol{r}}R\_\boldsymbol{r}_{p} + \delta FIN_{pj} + \gamma GRW_{pj} + \Sigma_{\boldsymbol{n}}\psi_{\boldsymbol{n}}X91\_\boldsymbol{n}_{p} + \delta STK94_{pj} + e_{pj} \quad (3)$$

where:

ΔY_{pj} = province-sector (p-j) 1995-1998 employment growth;

$\sum_{J} S\_J_{j}$ = sector dummies (non-eligible sectors are excluded) [J=1, 2…N_J]. [N_J = number of sectors receiving Obj.2 program assistance in at least one region];

$\sum_{r} R\_r_{p}$ = region dummies;

FIN_{pj} = linear treatment variable expressing the monetary value of the incentives paid to the province-sector p-j [= 0 if the province-sector p-j was not assisted by the program];

GRW_{pj} = province-sector p-j pre-intervention (1986-1991) employment growth;

$\sum_{n} X91\_n_{p}$ = set of n pre-intervention province-specific characteristics [n=5]: 1) percentage of residents with high-school or college degree; 2) number of crimes per 1,000 residents; 3) business closure rate; 4) population density 5) percentage of jobs in industrial sectors);

$STK94_{pj}$ = p-j stock of employment at the end of 1994;

e_{pj} = random error term

The model of equation (3) is obtained through long differencing equation (4). Long differencing was preferred to the more standard differencing from the mean or first differencing procedures due to the lack of reliable information on the exact dates of the incentive payments that occurred within the period 1995-1998,

$$Y_{pjt} = \lambda \mathbf{t} + \mathbf{t}[\textstyle\sum_{J}\beta_{J}\, S\_J_{j}] + \mathbf{t}\, [\textstyle\sum_{r}\omega_{r} R\_r_{p}] + \beta \mathbf{t} FIN_{pj} + \gamma \mathbf{t} GRW_{pj} + \mathbf{t}[\textstyle\sum_{n}\psi_{n} X91\_n_{p}] +$$

$$\delta \mathbf{t} STK94_{pj} + \alpha_{pj} + e_{pjt} \qquad (4)^{15}$$

where:

$\mathbf{t}$ = time;

α_{pj} = province-sector (p-j) fixed effects.

Based on the long differencing, the model measures the employment impact of the incentive payments within a mean time lag of two years. This represents a compromise between requiring there to be an immediate impact in the first year and attempting to isolate an impact years later after a number of other confounding events have taken place. While it is possible that the returns of the business incentive programs may take longer than two years before they are fully reaped, estimating the net employment effect of the intervention at a more distant time period would not be as appropriate due to confounding economic and policy factors.[16] Firms are not isolated from the rest of the economy, and all economic developments subsequent, but unrelated, to the intervention work their way through the economy through a multiplier type of chain of events that affects the performance of both assisted and non-assisted groups of firms. This can thus lead to a violation of the assignment assumption that treated and untreated firms are not subject to the same treatment. Further, the greater the period since assistance was offered, the

[15] Coefficients of equation (5) are to be considered one quarter of those of equation (4) in order to allow exact correspondence between equations (4) and (5).

[16] Evaluation of business incentive outcomes at distant periods from the program intervention could be performed only at the level of a regional economy and by running macro-economic simulations with the use of general equilibrium models that attempt to estimate all of the interactions between the regional economic parameters affected by the initial stimulus caused by the program intervention. By their nature, results of such simulations are only suggestive of the mid-to-long term impacts of the sets of all regulatory-, socio-economic- and policy changes that may take place during the long time period considered in the analysis. Reliable impact evaluation, therefore, should provide evidence only on outcomes that reflect the net initial economic stimulus provided by the program intervention, offering evidence on whether or not the program business incentives were able to modify the investment behaviour of the assisted entrepreneurs compared to what would have happened without the program intervention.

greater the possibility that any firm's performance has been affected by a variety of subsequent policy changes. For example, changes in such areas as trade rules, fiscal regimes, union-agreements, and hiring and firing rules may impact assisted and non-assisted firm groups in different ways.

In the model of model of equation (3), the possible lack of independence among the cross-section areas (p-j) clustered within a same province *p* or a same sector *j* is dealt with by estimating the coefficient standard error of the model also through the "robust cluster estimator" of STATA (Statcorp, 2003), which is based upon estimators derived by Huber (1967) and White (1980, 1982). Adequate modeling of multi-level clustering of observations can improve the estimates of the standard errors on the coefficients and provide more reliable t-statistics (e.g., Pepper, 2002 and Wooldridge, 2003). Often, theory suggests grouping cross-sectional data based upon clusters of provinces, states or regions. In this case, however, the nature of the clustering is not obvious and clustering by same geographic areas (provinces or regions) is supported neither by strong geographic differences in administrative and tax rules nor by strong economic differences between provinces and/or regions. Firms composing the industrial sectors *j* of the cross-section areas are predominantly manufacturers that operate in national and international markets rather than in local or regional markets. In Italy, administrative and tax rules are very similar across the provinces and regions in which firms are located. As a result, geographic clustering hypotheses are not supported by economic rationale any stronger than other alternative clustering hypotheses such as by sector, by same prevailing workers' union affiliation, or by firm size. Thus, we choose to estimate regression coefficients with robust standard errors (e.g., Huber, 1967; Royall, 1986; White, 1980, 1982) and to test the robustness of the results by replicating the analysis with both uncorrected standard errors and standard errors retrieved from robust cluster procedures (Rogers, 1993; StataCorp, 2003; Williams, 2000) that adjust for possible correlation of observations within either provinces or industrial sectors.

5.2 Model specifications

The baseline model of equation (3), which estimates the mean impact of the program incentives, is also implemented through two other specifications that estimate the impacts by industrial sector, equation (5), and degree of pre-intervention decline of the target cross-section areas (province-sector p-j pairs), equation (6):

$$\Delta Y_{pj} = \lambda + \Sigma_{\boldsymbol{J}}\beta_{\boldsymbol{J}}S\_\boldsymbol{J}_j + \Sigma_{\boldsymbol{r}}\omega_{\boldsymbol{r}}R\_\boldsymbol{r}_p + \Sigma_{\boldsymbol{J}}\delta_{\boldsymbol{J}}FIN\_\boldsymbol{J}_{pj} + \gamma GRW_{pj} + \Sigma_{\boldsymbol{n}}\psi_{\boldsymbol{n}}X91\_\boldsymbol{n}_p + \delta STK94_{pj} + e_{pj} \tag{5}$$

where:

$\Sigma_{\boldsymbol{J}}FIN\_\boldsymbol{J}_{pj}$ = set of ***J*** linear treatment variables expressing the cost of the incentives paid to the treated (p-j) areas by industrial sectors [***J***=18: total number of 2-digit industrial sectors containing assisted firms]. E.g., if ***J*** = "DA-food industries," then FIN_DA_{pj} = cost of the incentives paid to the pair p-j if j ="DA-food industries"; = 0 otherwise];

$$\Delta Y_{pj} = \lambda + \Sigma_{\boldsymbol{J}}\beta_{\boldsymbol{J}}S\_\boldsymbol{J}_j + \Sigma_{\boldsymbol{r}}\omega_{\boldsymbol{r}}R\_\boldsymbol{r}_p + \Sigma_{\boldsymbol{g}}\delta_{\boldsymbol{g}}FIN\_\boldsymbol{g}_{pj} + \gamma GRW_{pj} + \Sigma_{\boldsymbol{n}}\psi_{\boldsymbol{n}}X91\_\boldsymbol{n}_p + \delta STK94_{pj} + e_{pj} \tag{6}$$

where:

g = 1st quartile, 2nd quartile, 3rd quartile and 4th quartile of the 1986-1994 total employment change distribution for the treated p-j areas;

$\sum_g$FIN_$\boldsymbol{g}_{pj}$ = set of [$\boldsymbol{g}$=4] linear treatment variables expressing the cost of the incentives paid to the treated (p-j) areas by quartile of pre-intervention employment growth. E.g., if $\boldsymbol{g}$="1st quartile (I_qrt)", FIN_I_qrt$_{pj}$ = cost of the incentives paid to the area p-j if p-j experienced an employment growth within the 1st quartile of the 1986-1994 employment growth distribution of all treated pairs; = 0 otherwise;

Each of the specifications of equation (3), (5) and (6) is estimated following the three different coding rules used to operationalize the Obj.2 area status of each province, p, included in the data set. Table 5 summarizes the complete set of specifications.

Table 5

Depending on the Obj.2 area coding rule used, the number of treatment provinces varies from 4 to 27. Note that the total number of provinces included in the analysis varies across the different coding rules because the number of excluded provinces varies based upon the restrictiveness of the coding rules.

6. Results

Table 6 reports results from the model of equation (3), which estimates the mean impact of Obj.2 area incentives using the value of the incentives paid as the treatment variable. In the first specification, provinces are coded as Obj.2 areas only if at least 80% of the population lives within the Obj.2 boundaries. The coefficient estimate of 0.047 on the treatment variable, FIN, indicates that every 1,000 € worth of incentives paid to the treated p-j (province-sector) pairs generates approximately 0.05 additional jobs. Using the two alternative Obj.2 area coding rules for the treated areas produces little change in the impact estimates. 1,000 € of incentives yields 0.034 jobs in specification II, in which Obj.2 area status is granted as percentage of the province residents located within the boundaries of an actual Obj.2 area, and 0.062 jobs in specification III, in which Obj.2 area status is coded only for provinces with 100% of their residents located within the boundaries of an actual Obj.2 area. All three estimates are significant at the .01 level.

As expected in view of the arguments presented in the discussion of section 3, most of the coefficients on the sector dummies included as control variables in the model of equation (3) are significant (the coefficients are not shown in Table 6 due to space constraints), a finding that confirms the importance of having controlled for sector specific market trends that may effect firms' employment growth over the 1995-1998 period. Also significant among the control variables of equation (3) is the pre-intervention 1986-1991 employment growth of the p-j pairs. All province-specific (p) time-unvarying pre-intervention characteristics and regional dummy coefficients (the latter also not reported in Table 6 due to space constraints) are consistently not significant. This is suggestive that the effect on the p-j employment level of the regional- and province-specific time unvarying characteristics have stable intensity in each period covered by the data, resulting in a non-significant impact on the 1995-1998 employment change recorded by the dependent variable. In other words, all of the time-unvarying regional- and province-specific characteristics are already sufficiently controlled for by the long-differencing of the dependent variable of the model.

Table 6

The point estimates yielded by the first model specification imply that generating one additional job required 21,277 € worth of program incentives. The cost varies from 15,873 € to 29,412 € in the two alternative specifications. The entire budget of the program interventions benefiting SMEs during the "1994-1996" programming sub-period was approximately 509.6 million euros. Thus, the first model specification estimates that the Obj.2 area business investment incentives generated approximately 23,951 additional jobs between 1995 and 1998 that would not have existed otherwise. Specifications II and III yield estimates of 17,326 and 32,105 additional jobs.

Table 7 reports the industrial sector coefficients from estimation of equation (5), which allows impact estimates to vary by the 18 grouped industrial sectors of the treated (p-j) pairs. Results do not reveal noticeable differences in the impact estimates by the industrial sectors of the treated pairs. Standard errors are often large compared to their coefficient point estimates, and only five of the sector-specific treatment variables reach statistical significance levels consistently across the three estimated specifications. This is due primarily to the small sample size of the treated p-j pairs included in each of the industrial sector categories used in the analysis, as indicated by the joint significance F-test that rejects the hypothesis of null impact of the entire set of sector-specific treatment variables on the dependent variable. This is consistent with the positive treatment impact estimates reported in Table 6.

The 18 sector-specific categories used in the model of equation (5) are grouped into categories that maintain relatively homogeneous levels of labor and capital intensity in their production methods. This enables the empirical testing of whether or not the employment outcomes of the subsidized units are indeed sensitive to the degrees of labor or capital intensity in their production processes. In an attempt to improve the precision of the coefficient estimates, alternative specifications were also estimated that aggregated the industrial sectors into many fewer categories. However, estimates resulting from such aggregation are very difficult to interpret because the sector groups become too heterogeneous to allow meaningful economic interpretation of the findings. Thus, due to the insufficient sample size of the data used in the analysis, the model on the across-sector differentials in employment can provide no reliable empirical evidence by treatment impacts.[17] Future research should focus on adding programs from additional EU countries to the data sample in order to provide better empirical evidence on the subject of across-sector differentials in the treatment impacts of the Obj.2 area business incentives.

Table 7

Table 8 reports impact estimates by degree of pre-intervention decline in the treated (p-j) pairs, measured by the 1986-1994 total employment change. Results indicate that the Obj.2 area incentives are most effective in treated p-j pairs that experienced the least negative pre-intervention employment changes, those in the fourth quartile of the employment distribution. The point impact estimates for those (p-j) pairs range from 0.048 in specification VIII to 0.067 additional jobs for each 1,000 euros worth of program incentives in specification IX. For treated units in the second and third quartile of the pre-intervention employment change distribution, the program incentives are not shown to

[17] The five sector-specific variables ('DA-food industries,' 'DB-textile industries,' 'DI-processing of non-metallic minerals,' 'DJ-metal and metallic products' and 'DL-manufacturing of electrical machinery') that reach statistical significance levels in Table 7 are all among those with the largest sample size in terms of number of p-j units with non-zero values in treatment variable. Two of such sectors ('DA-food industries' and 'DI-processing of non-metallic minerals') have negative impact coefficients. For these two sectors, anecdotal evidence indicates that the subsidized investment projects were specifically designed to increase automation of the production process. Automation increases were not the main focus of the subsidized investment projects that took place in the three sectors ('DB-textile industries', 'DL- manufacturing of electrical machinery' and 'DJ-metal and metallic products') that display positive coefficient estimates. Given the small size of the sample, however, we feel that such findings cannot be generalized without being first confirmed by replicating the analysis on a larger sample of Obj.2 programs.

have any significant impact in any of the three estimated specifications. Although the coefficient estimates are negative, they are all close to zero and have standard errors of similar size to the point estimates. Impact estimates are also not significant for the treated units in the first quartile of the pre-intervention employment change distribution for specifications VII and VIII. The coefficient on the impact estimate of specification IX is significant at the 0.1 percent level, indicating that 0.036 jobs are generated for each 1,000€ worth of program incentives. Thus, within the targeted areas, the industries already experiencing the least negative employment growth appear to have created the most new jobs due to the program.

Table 8

As discussed, all of the results reported in Tables 6-8 were estimated with robust standard errors. For the vast majority of estimated specifications, replicating the analysis with either uncorrected standard errors or robust cluster estimators, based on either provinces or two digits industrial sectors, yielded results with unchanged significance levels for the coefficient estimates of the treatment variables. Results with uncorrected and robust cluster standard errors are not reported for the sake of brevity and are available upon request.

Overall, sensitivity analysis indicates that the reported impact estimates are robust across different specifications.

7. Conclusions

The paper is the first to use objective econometric modeling to evaluate the impact of European Union Obj.2 business investment incentives. The results indicate that the business investment subsidies offered in Italy between 1995 and 1998 did indeed create new jobs, albeit at a higher cost than previous analysis reported. The analysis in the preferred specification indicates that 23,951 additional jobs between 1995 and 1998 can be attributed to the program, with a range of 17,326 to 32,105 jobs across two different specifications using alternative definitions of the target areas.

The cost of generating each of these jobs is estimated to be 21,277 € in the first specification, with a range of 15,873 € to 29,412 € across the two alternative specifications. These estimates highlight a higher cost of the incentives per job created than those obtained from evaluations utilizing either macroeconomic multipliers or employment data collected by interviews with the assisted entrepreneurs. In a study on the employment impact of the Obj.2 area business incentives offered to the small and medium enterprises (SMEs) of the Piedmont Region during the "1994-1996" programming sub-period, for example, application of standard macroeconomic multipliers to the amount of subsidized investment yielded a per-job cost of the program incentives of 11,362 €.[18] The same study, using employment figures self-reported by the assisted entrepreneurs, estimated that the program incentives led to the retention of 80,000 jobs in the Piedmont Region. This implies a dubious per-job cost of the program incentives of less than 1,500 €.

While our estimated per-job cost estimates are higher than most of those calculated for the same intervention by methods that likely over-estimated the number of jobs created by the incentives, the cost figures compare rather favorably to those from estimates of the impacts of enterprise zone programs in other countries. Based upon a review of evaluation results, Ladd (1994) estimates a cost range of $40,000 to $60,000 per new job

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[18] Figure is obtained from use of the impact estimates reported in the "Final Evaluation Report" of the "1994-1999 Obj.2 area program" prepared by Ecoter (1999) for the Piedmont Region.

(approximately 30,600 € to 45,900 €) for zone residents in US state programs in Indiana and New Jersey as well as the English program. Further, Peters and Fisher (2002) estimate a gross undiscounted per job cost range of $20,000 to $60,000 (approximately 15,300 € to 45,900 €) across 75 cities in 13 US states.

Results sorted by degree of pre-intervention decline in the treated units highlight that, within the Obj.2 areas, the program incentives were more effective when targeting production that had declined the least during the years prior to the program intervention. On one hand, this finding is not surprising. The program is not intended to help the most persistently distressed areas – that is the role of the more generous Obj.1 incentives. The finding is also consistent with those of Engberg and Greenbaum (1999), who found that state enterprise zone incentives in the United States had the biggest impact on improving property values in the areas that were initially the least distressed in terms of vacancy rates. On the other hand, if the Obj.2 program incentives are not as successful in areas with the most pre-intervention decline, the finding may be an indication that the incentives are not as effective at reducing regional inequalities as they are intended to be. This is consistent with some of the recent evidence that the broader set of EU programs has not been successful at fostering regional economic convergence (e.g., Boldrin and Canova, 2001; Hurst et al., 2000; Puga, 2002; Rodriguez-Pose and Fratesi, 2004).

The findings suggest that the geographically targeted business incentive programs were more successful when rewarding production activities that displayed the most promising economic performances in years prior to the program intervention. Thus, while the programs can be successful at helping promote additional economic activity, they are likely to be less successful in the more distressed areas and thus less successful in reducing regional inequalities.

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Table 1. EU "Obj.2 Area" Programs

Country	"1989-1993" programming period EU contribution (millions of €)	"1994-1999" programming period: "1994-1996" programming sub-period EU contribution (millions of €)	"1994-1999" programming period: "1997-1999" programming sub-period EU contribution (millions of €)	Percent population covered by Obj.2 areas[a]	Percent contribution devoted to SME incentives[a]
Austria[b]	-	-	108.2	7.5	12.5
Belgium	214.0	160.0	216.2	14.2	74.2
Denmark	25.0	56.0	68.2	8.5	68.3
Finland[b]	-	69.2	135.3	25.1	78.5
France	1225.0	1763.3	2246.3	25.1	72.4
Germany	581.0	733.0	901.1	8.8	50.9
Italy	387.0	808.0	967.8	11.0	65.7
Luxembourg	12.0	7.0	9.8	34.6	68.5
Netherlands	165.0	300.0	442.2	17.4	78.9
Spain	1506.0	1130.0	1485.0	20.4	47.6
Sweden[b]	-	-	160.0	11.5	63.7
United Kingdom	2015.0	2142.0	2675.8	30.9	54.2
MEAN	681.1	716.8	784.7	16.4	59.7
TOTAL	6130.0	7168.0	9415.9	-	-

[a] Values based on Obj.2 areas in existence for the 1994-1996 programming sub-period.
[b] Austria, Finland, and Sweden all joined the EU in January 1995. Obj.2 programs were decided for Finland in July 1995 and for Austria and Sweden in November 1995.

Table 2. "Obj.2 Area" Incentives in Italy:

EU Support by Region and Type of Intervention 1994-1996 Programming Sub-Period

Region[(a)]	Total EU contribution (millions of euros)	Percent contribution devoted to SME incentives	Incentive[(b)]			
			Research & Development	Infrastruc-ture	Environ-mental protection	Tourism
Piemonte	205	55.28	x	x	x	x
Liguria	96	56.74		x	x	
Veneto	70	45.51			x	
Friuli Ven. Giulia	24	72.79	x	x		
Emilia Romagna	12	88.12	x			
Toscana	251	78.72	x	x	x	x
Marche	21	54.41		x		x
Umbria	35	87.58			x	
Lazio	64	66.05		x	x	x

[(a)] Lombardia's and Valle d'Aosta's Obj.2 areas are excluded from the analysis.
[(b)] All regions provide industrial SME capital expenditure incentives, human resources training, and business technical assistance.

Table 3. Employment Growth by Treatment Status of the Province-Sector (p-j) Pairs

	N	Absolute change (Total number of jobs)		Percentage change[a]	
		1986-1991	1995-1998	1986-1991	1995-1998
Treated (p-j) pairs[b]	99	291.20 (944.49)	248.62 (811.93)	14.57 (31.24)	5.62 (19.84)
Not-treated (p-j) pairs[c]	542	419.21 (1001.75)	137.65 (677.71)	15.57 (36.68)	2.49 (26.52)

(Standard deviations are in parentheses.)

[a] Percentage growth based on the average stock of employment between the beginning and the end of the two time periods.
[b] At lest 80% of the province resident population lives within Obj.2 boundaries.
[c] None of the province population lives within Obj.2 boundaries.

T-tests of the means indicate that none of the differences between the treated and non-treated province-sector pairs are within statistically significant levels.

Table 4. Pre-treatment Characteristics of Provinces by "Objective 2" Status[a]

Variable	Obj.2 Provinces[b]	Non-Obj.2 Provinces[c]
Percent of residents with high school or college degree	23.51 (3.18)	21.91 (2.47)
Number of crimes per 1000 residents	47.29 (25.18)	31.39** (10.63)
Business closure rate (number of business clusures/ number of active businesses)	4.08 (2.44)	3.29 (1.57)
Population density (residents per KM^2)	380 (36.92)	174*** (11.81)
Percent of jobs in manufacturing sector	34.33 (8.15)	37.77 (8.53)
N	8	27

[a] Data are from the 1991 decennial census by ISTAT.
[b] At lest 80% of the province resident population lives within Obj.2 boundaries.
[c] None of the province population lives within Obj.2 boundaries.

Tests of the equality of means between obj.2 provinces and non-obj.2 provinces:
* P-value ≤ 0.1 ** P-value ≤ 0.05 *** P-value ≤ 0.01

Table 5. Model Specifications

Treatment variable/s	Obj.2 area coding rule: Provinces are coded as Obj.2 areas if at least 80% of their residents are located within the boundaries of Obj.2 areas	Obj.2 area status = percentage of province residents located within the boundaries of Obj.2 areas	Provinces are coded as Obj.2 areas if 100% of their residents are located within the boundaries of Obj.2 areas
FIN_{pj} = cost of the incentives paid to the province-sectors (p-j) pairs	Specification (I)	Specification (II)	Specification (III)
$\sum_J \delta FIN\_J_{pj}$ = set of linear treatment variables (cost of the incentives paid to p-j) by industrial sectors	Specification (IV)	Specification (V)	Specification (VI)
$\sum_g FIN\_g_{pj}$ = set of linear treatment variables (cost of the incentives paid to p-j) by quartile of pre-intervention employment growth	Specification (VII)	Specification (VIII)	Specification (IX)
Number of Obj. 2 provinces	8	27[a]	4
Number of non-Obj. 2 provinces	27	19[b]	27

[a] Number of provinces in which the percentage of province residents located within the boundaries of Obj.2 areas is greater than zero.
[b] Number of provinces in which the percentage of province residents located within the boundaries of Obj.2 areas equals zero.

Table 6. Mean Impact of The Program Incentives[(a)]

Variable		Specification (I)[(c)]		Specification (II)[(d)]		Specification (III)[(e)]	
Treatment							
Cost of the incentives paid to treated (p-j) pairs [1=1,000 Euros]	**FIN[(b)]**	**0.047**	**0.0164(se) 0.004(P-val.)**	**0.034**	**0.012(se) 0.008(P-val.)**	**0.063**	**0.018(se) 0.001(P-val.)**
(p-j)-specific control variables							
Employment stock at the beginning of 1994	STK94	-0.004	0.018(se) 0.792(P-val.)	0.022	0.010(se) 0.031(P-val.)	-0.006	0.021(se) 0.778(P-val.)
Pre-intervention employment growth (1986-1991)	GRW	0.410	0.088(se) 0.000(P-val.)	0.335	0.050(se) 0.000(P-val.)	0.391	0.056(se) 0.000(P-val.)
(p)-specific control variables							
% of residents with high-school or college degree [1=1%]		11.726	9.374(se) 0.211(P-val.)	6.167	5.416(se) 0.255(P-val.)	5.721	11568(se) 0.621(P-val.)
N. of crimes per 1,000 residents		0.020	1.796(se) 0.991(P-val.)	-0.407	1.461(se) 0.781(P-val.)	0,799	2.452(se) 0.745(P-val.)
Business closure rate (N. clusures/ N. active businesses)		6.517	8.308(se) 0.433(P-val.)	11.633	4,917(se) 0.018(P-val.)	23,860	11.118(se) 0.032(P-val.)
Population density (residents per Km^2)		-106.616	152.789(se) 0.486(P-val.)	-110.70	107.056(se) 0.301(P-val.)	-77,234	308.504(se) 0.802(P-val.)
% of jobs in manufacturing		-369.527	225.142(se) 0.101(P-val.)	29.549	175.431(se) 0.866(P-val.)	-496,225	304.526(se) 0.104(P-val.)
Number of observations			641		840		569
R^2			0.597		0.605		0.616

[(a)] Results from estimation of equation (3) with robust standard errors. The dependent variable is 1995-98 employment change. Coefficient estimates of the sector and regional dummies are omitted for space constraints. Complete regression results are available upon request to the authors.
[(b)] Coefficient estimates for FIN are the number of jobs for each 1,000 € worth of incentives paid to assisted firms.
[(c)] Provinces are coded as Obj.2 areas if at least 80% of their residents are located within the boundaries of Obj.2 areas.
[(d)] Obj.2 area status is coded as the percentage of province residents located within the boundaries of Obj.2 areas.
[(e)] Provinces are coded as Obj.2 areas if 100% of their residents are located within the boundaries of Obj.2 areas.

Table 7. Impacts by Industrial Sector of the Treated Areas[a]

Treatment variables by industrial sector[b]	**Specification (IV)**[c]		**Specification (V)** [c]		**Specification (VI)** [c]	
Value of incentives paid to (p-j) if j =						
CB [Non energetic mineral extraction]; =0 otherwise.	-0.007	0.169 (se) 0.965(P-val)	-0.022	0.088 (se) 0.805 (P-val)	-0.105	0.239 (se) 0.661 (P-val)
DA [Food industries]; =0 otherwise.	-0.041	0.019 (se) 0.038 (P-val)	-0.046	0.021 (se) 0.035 (P-val)	-0.055	0.027 (se) 0.041 (P-val)
DB [Textile industries]; =0 otherwise.	0.137	0.044 (se) 0.002 (P-val)	0.092	0.033 (se) 0.006 (P-val)	0.150	0.041 (se) 0.000 (P-val)
DC [Hide and leather industries]; =0 otherwise.	0.005	0.010 (se) 0.664 (P-val)	-0.013	0.007 (se) 0.063 (P-val)	0.005	0.012 (se) 0.642 (P-val)
DD [Wood industry]; =0 otherwise.	0.089	0.095 (se) 0.349 (P-val)	0.036	0.090 (se) 0.690 (P-val)	0.081	0.113 (se) 0.476 (P-val)
DE [Paper, printing and publishing]; =0 otherwise.	0.012	0.010 (se) 0.266 (P-val)	0.005	0.007 (se) 0.508 (P-val)	0.028	0.027 (se) 0.153 (P-val)
DF [Coke manufacturing and refineries]; =0 otherwise.	0.883	0.378(se) 0.020 (P-val)	0.211	0.315 (se) 0.503 (P-val)	0.632	0.664 (se) 0.342 (P-val)
DG [Chemical product manufacturing]; =0 otherwise.	0.008	0.006 (se) 0.167 (P-val)	0.010	0.005 (se) 0.052 (P-val)	0.068	0.190 (se) 0.002 (P-val)
DH [Rubber and plastics]; =0 otherwise.	0.015	0.027 (se) 0.592 (P-val)	0.021	0.022 (se) 0.351 (P-val)	0.058	0.017 (se) 0.001 (P-val)
DI [Processing of non-metallic minerals]; =0 otherwise.	-0.009	0.004 (se) 0.021 (P-val)	-0.022	0.008 (se) 0.011 (P-val)	-0.008	0.004 (se) 0.085 (P-val)
DJ [Metal and metallic products]; =0 otherwise.	0.057	0.022(se) 0.010 (P-val)	0.039	0.0154 (se) 0.012 (P-val)	0.065	0.021 (se) 0.003 (P-val)
DK [Manufacturing and repair of machinery]; =0 otherwise.	0.055	0.040 (se) 0.169 (P-val)	0.046	0.033 (se) 0.165 (P-val)	0.081	0.031 (se) 0.010 (P-val)
DL [Manufacturing of electrical machinery]; =0 otherwise.	0.132	0.022 (se) 0.000 (P-val)	0.129	0.020 (se) 0.000 (P-val)	0.144	0.0144 (se) 0.000 (P-val)
DM [Vehicle manufacturing]; =0 otherwise.	0.052	0.037 (se) 0.170 (P-val)	0.039	0.0293 (se) 0.180 (P-val)	0.051	0.037 (se) 0.169 (P-val)
DN [Other manufacturing industries]; =0 otherwise.	-0.011	0.069 (se) 0.877 (P-val)	-0.003	0.065 (se) 0.966 (P-val)	-0.048	0.072 (se) 0.506 (P-val)
F [Construction]; =0 otherwise.	0.209	0.196 (se) 0.288 (P-val)	0.182	0.164 (se) 0.270 (P-val)	0.225	0.188 (se) 0.232 (P-val)
G [Commerce]; =0 otherwise.	-0.049	0.066 (se) 0.461 (P-val)	0.055	0.118 (se) 0.645 (P-val)	-0.057	0.067 (se) 0.398 (P-val)
K [Business services]; =0 otherwise.	0.107	0.101 (se) 0.295 (P-val)	0.019	0.070 (se) 0.788 (P-val)	0.103	0.103 (se) 0.318 (P-val)
N		641		840		569
R^2		0.615		0.618		0.632

[a] Results from estimation of equation (5) with robust standard errors. The dependent variable is 1995-98 employment change. Coefficient estimates are the number of jobs for each 1,000 € worth of incentives paid to assisted firms. Due to space constraints, coefficients of all control variables included in equation (5) are omitted. Complete results are available upon request to the authors.

[b] Two-digit Ateco_91 industrial sector classification by ISTAT.

[c] Specifications IV, V, and VI follow the same coding rules as specifications I, II, and III. See Table 5.

Test F, Ho[Coefficients of all eighteen sector-specific treatment variables (DA-K)=0]:
F(18, 591) = 3.02 Prob > F = 0.0000

Table 8. Impacts by degree of pre-intervention decline of the treated (p-j) pairs[(a)]

Treatment variables	Specification (VII)[(b)]		Specification (VIII)[(b)]		Specification (IX)[(b)]	
Value of the incentives paid to the treated pairs (p-j) if (p-j) belongs to the:						
1st quartile of the 1986-1994 employment growth distribution; =0 otherwise.	0.038	0.026(se) 0.150(P-val)	0.025	0.019(se) 0.191(P-val)	0.072	0.036(se) 0.052(P-val)
2nd quartile of the 1986-1994 employment growth distribution; =0 otherwise.	-0.008	0.015(se) 0.592(P-val)	-0.023	0.022(se) 0.318(P-val)	-0.004	0.019(se) 0.823(P-val)
3rd quartile of the 1986-1994 employment growth distribution; =0 otherwise.	-0.009	0.007(se) 0.184(P-val)	-0.012	0.008(se) 0.139(P-val)	-0.001	0.009(se) 0.876(P-val)
4th quartile of the 1986-1994 employment growth distribution; =0 otherwise.	0.060	0.018(se) 0.001(P-val)	0.048	0.016(se) 0.004(P-val)	0.067	0.019(se) 0.001(P-val)
N		641		840		569
R^2		0.602		0.609		0.619

[(a)] Results from estimation of equation (6) with robust standard errors. The dependent variable is employment change. Coefficient estimates are the number of jobs for each 1,000 € worth of incentives paid to assisted firms. Due to space constraints, coefficients of all control variables included in equation (6) are omitted. Complete results are available upon request to the authors.

[(b)] Specifications VII, VIII, and IX follow the same coding rules as specifications I, II, and III. See Table 5.