



# Do subsidies to private capital boost firms' growth? A multiple regression discontinuity design approach<sup>☆</sup>

Augusto Cerqua<sup>\*</sup>, Guido Pellegrini

Department of Social and Economic Sciences, Sapienza University of Rome, P.le Aldo Moro, 5-00185 Rome, Italy



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## ABSTRACT

There is still little consensus among economists on the effectiveness of business support policies. The evaluation of such policies requires a reliable identification procedure that is hardly achieved in empirical studies. We analyse the impact of a policy instrument – Law 488/92 (L488), the main Italian regional policy – that allocates subsidies to private firms by a multiple ranking system. Thanks to the peculiar L488 selection process that creates the conditions for a local random experiment, we are able to assess the effectiveness of these types of incentives for a relevant subgroup of firms. We propose a nonparametric multiple rankings regression discontinuity design that exploits the sharp discontinuities in the L488 rankings and extends the regression discontinuity design (RDD) approach to a context where the treatment is assigned by multiple rankings with different cut-off points. We find that the impact of the subsidies on employment, investment, and turnover is positive and statistically significant, while the effect on productivity is mostly negligible. The new subsidised capital is additional but non-complementary with the owner-financed investment. The results are robust to different specifications and not due to intertemporal substitution.

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## 1. Introduction

Business support programmes are popular industrial policies used by most governments in the EU and other industrialised countries to foster competitiveness, self-sustaining growth and employment, most notably in disadvantaged areas. A huge amount of funds are spent each year on regional policies and subsidies or “state aid”.<sup>1</sup> Not surprisingly, several studies have evaluated the extent of the economic payoff of these subsidies (see, *inter alia*, Roper and Hewitt-Dundas, 2001; Harris and Trainor, 2005; Bondonio and Greenbaum, 2012; Criscuolo et al., 2012); however, the literature is still relatively limited considering the importance of the topic. Moreover, as clearly shown in the GEFRA-IAB (2010), there is little consensus among economists on the effectiveness of investment incentives. In a time of limited public budgets, this is clearly a hot issue.

Assessing the effectiveness of these types of incentives is basically an empirical question, but evaluating the impact of business incentive programmes is a challenging task (Bondonio, 2009). The main problems

are due to the difficulties faced in isolating the effects of the subsidies from the confounding effects induced by other factors and in controlling for the high selection bias. This is why credible micro-econometric evaluations are rare in the literature.

In this paper, we present a robust econometric analysis of the causal effect of capital subsidies to private firms by exploiting an unusual characteristic of an important regional policy in Italy that creates the conditions for a local random experiment. We analyse the impact of subsidies distributed by Law 488/92 (henceforth L488), which has been the main policy instrument for reducing territorial disparities in Italy during the period 1996–2007. This law has been characterised by a rigorous and transparent selection procedure. Each year, subsidies are allocated to a broad range of investment projects through regional “calls for tenders”, which mimic an auction mechanism. In each regional “call for tender”, the investment projects are ranked on the basis of a score that depends on a number of (known) characteristics of both the project and the firm. Projects receive subsidies according to their position in the ranking system until the financial resources granted to each region are exhausted.

L488 has financed firms in both northern (Objective 2 or 5b) and southern regions (Objective 1) of the country<sup>2</sup>; however, the subsidy intensity is by far higher in the latter areas, following the map of state aid delineated by the European Commission (De Castris and Pellegrini,

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<sup>\*</sup> Corresponding author. Tel.: +39 3494105711.

E-mail address: [augusto.cerqua@uniroma1.it](mailto:augusto.cerqua@uniroma1.it) (A. Cerqua).

<sup>1</sup> Excluding crisis measures, since the early 2000s the share of state aid for industry and services as a percentage of GDP in the EU-27 economies has been stable, amounting to 0.5% in 2011 (EU Commission, 2012). On top of this, national governments themselves also spend large amounts (EU member states devote 1% of GDP on average) on regional policies and subsidies or “state aid” which are allowed by the EU up to a certain degree, which depends on how “disadvantaged” the region is (Dupont and Martin, 2006).

<sup>2</sup> In the southern regions, L488 has been financed not only with national funds but also with the EU Structural Funds (the southern regions were the only eight Objective 1 Italian regions in the 1994–1999 cycle of EU regional policies).

2012). This is why we analyse only incentives to the southern regions (Mezzogiorno), i.e. the southern section of the Italian Peninsula (Abruzzi, Basilicata, Calabria, Campania, Molise, and Puglia) and the two major islands (Sardinia and Sicily).<sup>3</sup>

The presence of sharp discontinuities in the L488 rankings allows using a quasi-experimental method deriving from a regression discontinuity design (henceforth RDD) approach, enabling us to identify the causal effect of subsidies on firms' performances. Due to the presence of multiple rankings by regions and years, we use different ranking cut-off points. Therefore, we modify the classical RDD framework, proposing a nonparametric multiple rankings regression discontinuity design (henceforth MRDD) that brings the RDD to our treatment context. The main assumption is that, in each ranking, the best control group for the units just above the cut-off point is represented by the firms ranked just below the cut-off point (the firms that are not treated). Because we focus our analysis on the firms ranked around the cut-off point of each ranking, our parameter of interest is a local average treatment effect (LATE) that reflects the impact of the L488 subsidies on this subgroup of firms.

The data we use come mainly from two sources: an administrative dataset containing detailed information on the instrument and a financial statement dataset covering the period 1995 to 2004. This time span is perfectly suitable for the evaluation of the short-term impact (1995–2001) of the L488 subsidies, as well as the long-term impact (1995–2004).

Over the period from 1995–2001, the tangible capital growth rate is considerably higher in subsidised firms growing each year 14 to 17% faster than in non-subsidised firms (approximately doubling with regard to the median tangible capital in non-subsidised firms), while the yearly growth rate of turnover is as large as 6.5 to 8% higher in subsidised firms. Also the impact of L488 on employment is positive: subsidised firms hire on average from 5 to 8 extra employees in respect to non-subsidised firms. On the contrary, the impact on the output per worker is mostly negligible.

A year by year evaluation during the period 1995–2004 clearly shows that turnover and especially investment markedly increased during the years of the subsidies, and after that they grew at the same rate of the non-subsidised firms. We find that the subsidised investment is additional; however, subsidies do not trigger either positive or negative spillovers on the rest of the owner-financed investment activities. On the whole, the results show that subsidies generate additional capital stock and productive capacity in subsidised firms but without a productivity improvement. Therefore, the analysis suggests that investment incentives cause a boost in private capital accumulation; however, this private benefit does not per se signal the usefulness of the policy from a social welfare perspective. For instance, in a Diamond and Mirrlees (1971a, 1971b) setting, firm-specific capital subsidies are considered not desirable as they distort the allocation of factors of production causing productive inefficiency. Accordingly, we expect that L488 would engender a socially inefficient allocation of resources between treated and non-treated firms. Still, the conclusions of the Diamond–Mirrlees' production efficiency theorem rely on assumptions (competitive markets, constant returns to scale, and flexibility in choosing different commodities taxes for different goods) that are hardly met in the Mezzogiorno. Here, widespread underdevelopment engenders imperfect and incomplete markets, undercapitalised firms, massive unemployment and a local economy far away from the production possibilities frontier. Consequently, L488 could represent a way to move the Mezzogiorno's

economy out of the “poverty trap” (see Azariadis and Stachurski, 2005), by increasing productive efficiency and social welfare.<sup>4</sup>

The paper has been organised as follows: the next section summarises the literature and presents the policy in more detail. Section 3 details the evaluation method, followed by a presentation of the data in Section 4. The results are discussed in Section 5, while Section 6 assesses their robustness. Section 7 concludes the paper.

## 2. The previous literature and the L488 policy

### 2.1. The literature

Different business support schemes have been implemented in developed countries over the last decades, particularly in lagging areas. Non-repayable grants, interest-rate subsidies, equity participation and participation in venture capital are among the most adopted tools in industrialised countries (see Dupont and Martin, 2006). Evaluating the effectiveness of these tools is a pivotal step to orientate policymakers' decisions and thereby optimise the use of taxpayers' money. The evaluation literature has devoted particular attention towards the incentives to R&D as well documented in the surveys by García-Quevedo (2004) and Parsons and Phillips (2007). Recently, another policy has experienced a surge in the number of evaluation studies: the Enterprise Zones (EZs) programme<sup>5</sup> (see, among others, Ham et al., 2011; Givord et al., 2012; Busso et al., 2013). Instead, not as many policy evaluators have focused their research on the effectiveness of investment incentives to firms located in lagging areas. Besides, the empirical evidence is mixed: some analysts suggest that regional capital incentives can induce additional investment in subsidised firms (Faini and Schiantarelli, 1987; Harris, 1991; Daly et al., 1993; Schalk and Untiedt, 2000; Bondonio and Greenbaum, 2012; Criscuolo et al., 2012); while others argue that intertemporal substitution effects prevail (Bronzini and de Blasio, 2006). Moreover, the employment impact of capital subsidies is doubtful (Gabe and Kraybill, 2002). Finally, the effect of subsidies on efficiency and productivity seems negligible or negative (Lee, 1996; Bergstrom, 2000; Harris and Trainor, 2005; Criscuolo et al., 2012).

The selection process of the Italian L488 is particularly apt for the empirical evaluation of the investment incentive programme. Starting in the late 1990s, a number of scholars have tried to evaluate the effectiveness of this policy<sup>6</sup> (see, inter alia, Chiri et al., 1998; Scalera and Zazzaro, 2000; Carlucci and Pellegrini, 2003; Losurdo, 2004; Vadalà, 2005; Bronzini and de Blasio, 2006; Adorno et al., 2007; Bernini and Pellegrini, 2011), but none of the previous studies have exploited its features in a natural experiment framework like we do.

Bernini and Pellegrini (2011) show evidence of higher growth in output, employment and fixed assets in subsidised firms but a less significant increase in Total Factor Productivity than in unsubsidised firms, while Adorno et al. (2007) highlight a positive but U-reversed relationship between the amount of subsidies and production. Bronzini and de Blasio (2006) investigate the presence of cross-sectional substitution (financed firms may receive some of the investment opportunities that non-financed firms would have otherwise had in the absence of the incentives) and intertemporal substitution (firms may have brought forward investment projects originally planned for the post-intervention period in order to take advantage of the incentives), and find evidence in favour of the latter substitution effect. However, none

<sup>3</sup> In the medium-large firms, the subsidy intensity with respect to the total investment is 40–50% in the southern regions and 10–20% in the northern regions (plus an additional 15% for small firms). Moreover, the limited concentration of the funds in northern regions and the circumscribed territorial extension of the Objective 2 and 5b areas (in 2000 about 15% of the northern regions population was covered by L488, i.e. 5.7 million inhabitants) allow neighbouring firms to easily delocalise their industrial plants into these areas, carrying out projects that would also have been realised without L488. Therefore, the additional effect of L488 should be much stronger in the Mezzogiorno.

<sup>4</sup> An accurate analysis of the social optimality of L488 would require an investigation of the optimal deviations from production efficiency under a plausible set of assumptions. Such comprehensive evaluation of the social welfare effects is beyond the scope of our paper.

<sup>5</sup> In this programme, delineated zones – usually neighbourhoods with socio-economic difficulties – are granted “special dispensation” status, and firms that choose to locate and invest in these zones benefit from temporary incentives such as tax rebates, job-trainings or relaxed regulatory barriers (Givord et al., 2012).

<sup>6</sup> To increase the transparency and the accountability of the programme, the data have been made publicly available by the Ministry of Economic Development.

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