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ABSTRACT

One Billion Euro Program for Early Childcare Services in Italy*

In 2007 the Italian central government started a program by transferring funds to regional governments to develop both private and public early childcare services. Exploiting the different timing of program implementation across regions, we evaluate its effectiveness in boosting the public supply of early childhood educational services. We find that the ratio between the available slots in public early childhood education and the population of those aged 0-2 increased by 18.1% three years after the start of the program, with respect to the pre-program level. The program impact was however nil in the South and totally driven by the Center-North.

JEL Classification: C23, H52, H70, J13, R10

Keywords: early childcare services, public early childhood education, government transfers, difference-in-differences

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1 Introduction

Over the last decades, European policy-makers' agenda has supported the increase in female labour force participation (FLFP) as one of the most crucial goals to reach. From the Lisbon Strategy (CEU, 2000) to the Europe 2020 Strategy of Smart, Sustainable and Inclusive Growth (European Commission, 2010), the targets of female employment rate were set respectively to 60% and to 75% in the European Union. To favor this strategy, in particular to boost maternal employment, Barcelona European Council (CEU, 2002) established that early childcare provision should reach at least 33% of children under three years of age, especially in Southern countries where early childcare facilities have been scarce.

Early studies showed that female labour supply is elastic to childcare access and its cost,[1] so that childcare subsidies were important in encouraging FLFP (Blau and Robins, 1988; Ribar, 1995; Blau, 2003). The meta-analysis in Akgunduz and Plantenga (2018) however revealed that labour supply elasticities became somewhat smaller over time and that they were insignificant in some countries. They claimed that this heterogeneity across countries might be due to different institutions. In countries with high FLFP, high part-time rates, and/or already highly subsidized childcare systems like Norway, France, the Netherlands, and Sweden, policies expanding subsidized child care had a weak effect on maternal employment (Lundin et al., 2008; Havnes and Mogstad, 2011; Givord and Marbot, 2015; Bettendorf et al., 2015), but rather crowded out informal child care arrangements. In countries like Germany, Italy, and Belgium, where childcare is "rationed",[2] maternal employment is instead mainly affected by an increase in the supplied slots of early childhood education, with price reductions playing a secondary role (Wrohlich, 2004; Del Boca and Vuri, 2007; Valdelanoote et al., 2015). The impact of childcare access and prices on FLFP was also found to be heterogeneous across subpopulations: the labour supply of low-income, single, and low-educated mother was more responsive to childcare access and prices (Del Boca et al., 2009; Akgunduz and Plantenga, 2018).

Empirical studies for Italy pointed out that making it easier to access early childcare services would be very effective in allowing households to reconcile family and work (Del Boca, 2002; Bratti et al., 2005; Del Boca et al., 2005; Del Boca and Vuri, 2007; Del Boca and Sauer, 2009). Brilli et al. (2016) found indeed that an increase by one percent in public childcare coverage raised maternal employment by 1.3 percentage points, with this impact being larger in provinces with lower childcare availability. Figari and Narazani

[1] See Blau and Currie (2006) and Akgunduz and Plantenga (2018) for recent reviews.

[2] In these countries, the demand of slots in public early childcare education exceeds their supply. Local authorities set therefore eligibility criteria and this selection process is known as "rationing".

(2017) estimated a joint structural model of Italian female labour supply and childcare behaviour including choices in formal or informal childcare services. They found that increasing childcare coverage rate of formal care is more effective than decreasing the costs in encouraging FLFP.

The Italian government, in order to catch up with the European target (CEU, 2002) about the local coverage of early childcare services and to increase the FLFP,[3] started with the 2007 Budget Law (Law 296/2006) a three-year special public plan, called "Piano Straordinario per lo Sviluppo dei Servizi per la Prima Infanzia" (PSSSPI). The program was further extended in 2010, 2012, and 2014, for a total public expenditure of about €1 billion. The funds were allocated to regional governments in order to subsidize the development of both public and private early childcare services. The regional governments were asked to co-finance the transfer from the national government. Public and private childcare providers, among which also municipalities, had to apply to obtain the subsidy from their own regions.

The €1 billion program was expected to be effective in increasing maternal employment to the extent to which the transfers were actually and efficiently used in expanding the supply of childcare services. Furthermore, in order to boost the employment rate of mothers belonging to disadvantaged groups, the transfers should have been able to expand the supply of inexpensive childcare services, typically public early childhood educational services. Our study aims at evaluating the impact of PSSSPI on the availability of slots in public early childhood educational services. This is of utmost importance. If the impact is weak or nil, we cannot expect effects on maternal employment. Moreover, in general, it cannot be given for granted that large transfers from the central governments to local authorities are able to generate the expected impact. There might be several reasons to doubt about the efficient use of government funds when transferred to local authorities. The effectiveness of transfers from the central government to local administrations could be limited, for example, by the poor functioning of local institutions in the administrations of the resources or by distorting mechanisms in political economy, such that additional resources increase political corruption and politicians grabbing rents from the transfers (Brollo et al., 2013). About the former, Bandiera et al. (2009) found that in Italy more than 80% of the public waste is related to an inefficient administration of the transfers from the central government. About the latter, there is evidence for Italy of biases in the allocation and use of central transfers: i) Barone and Narciso (2013) detected connections between the local presence of organized crime and the amount of public funding trans-

[3]The Italian FLFP and the female employment rates (15-64 years) are still away from the achievement of the targets set by European Commission (2010). In 2015 they were 55.9% and by 47.2% , respectively (Eurostat, Labour Force Survey).

ferred from the central government; ii) Carozzi and Repetto (2016) showed that transfers to municipalities depend on the birth town of the members of Parliament, rather than exclusively on local development needs; iii) De Angelis et al. (2018) found that white collar crimes increased in the South in the presence of EU disbursements.

The main difficulty in identifying the impact of a nationwide policy intervention consists in disentangling its true effect from the spurious one related to the time trend. However, the transfers to the regions did not take place at the same moment. Regions had indeed to pass a set of acts to receive the transfers from the central government. They needed to update their legislation about the different types of early childcare services and to design the executive authorizing procedures for transferring grants to the final childcare service providers (Istituto degli Innocenti, 2009). The different timing with which the funds were transferred from the central government to the regions were plausibly exogenous with respect to the level of supply of slots in public early childhood education at the local level. The implementation timing is indeed likely to be determined by the level of administrative capacity of the regional bureaucracy, as reported by Soncin (2013, p. 73). Consistently, while studying the determinants of the performance of Italian regions in spending resources from European structural funds, Milio (2007) showed that the delays in the programmatic acts to spend their allocated resources were due to their own administrative capacity. Exploiting the different timing of transfers across the Italian regions, we estimate, in a Difference-in-Differences (DiD) model, the causal impact of PSSSPI on the coverage rate of public early childcare services, defined as the ratio between the available number of slots in public early childhood education and the population aged 0-2 (up to 36 months of age). The empirical analysis is based on a dataset at municipal level collected by the Italian Department of Territorial and Internal Affairs over the years 2004-2013 and containing, among other variables, also information on local public formal childcare supply.

We find that the PSSSPI was effective in increasing the ratio between the available slots in public early childhood education and the population of those aged 0-2: with respect to the pre-program average coverage rate, it increased by 5.5% in the year of intervention and by 18.1% three years after the start of the program. The effect was not however homogeneous across regions. Even if the Southern regions were asked to co-finance the transfers from the national government more heavily, no increase in the coverage rate is detected in the Southern regions. On the contrary, in the Center-North, the increase in the coverage rate amounted to 12.7% in the year of intervention and by 32.1% three years after the beginning of the program. Finally, we found that the program had positive effects on the coverage rate in the Center-North both in the provincial capitals and in the rest of the territory.

The set-up of our paper is as follows. Section 2 describes the policy intervention and the program implementation. Section 3 presents the dataset used for the econometric analysis. Section 4 explains the econometric model and the identification strategy of the causal effect of the program. Section 5 reports and comments on the estimation results and on falsification checks. Finally, Section 6 concludes.

2 Supply of early childcare services and the PSSSPI program

In Italy, the authorities in charge of making the policies for early childcare services are mostly the municipalities, which are the lowest level of local government and are often also providers of childcare services. The regional governments, which are the highest level of local government, are in charge of defining the general management criteria. Finally, the national government allocates funds among the regions. This institutional set-up might explain why an important heterogeneity across regions is observed in terms of supply and use of early childcare services. While the coverage rate of early childcare services, defined as the ratio between the supply of slots of early childcare services and the population aged 0-2, was in 2013 22.5% at national level, it amounted to 28.2% in the Center-North and to 11.5% in the South.[4] Although the fraction of users of early childcare services increased over time, moving from 11.2% in 2004 to 12.9% in 2013, it was however still quite far from reaching the European target of 33% (ISTAT, 2016).

The 2007 Budget Law (Law 296/2006) stated the financial coverage of the three-years special public budget for the program PSSSPI to: i) subsidize the development of both public and private early childcare services; ii) to reduce differences between the South and the Center-North in terms of early availability of childcare services. After the initial three years, the program was further extended in 2010, 2012, and 2014, with the labels "Intesa 2010", "Intesa '2012", and "Intesa 2014". From 2007 to 2014 the central government invested about €621 million in the program. Panel a) of Table 1 reports by region and year the transfers from the central government. The distribution of the national transfers across the regions was decided by the central government on the basis of regional indicators correlated to the demand of childcare services, (e.g. the size of the population under three years of age, female employment, and unemployment) and the gap between regional and national childcare service indexes.

During the first three years of the program, the regional governments were asked to

[4]The Southern regions are: Abruzzo, Molise, Puglia, Campania, Basilicata, Calabria, Sicilia, and Sardegna.

co-finance the intervention, with a total contribution of almost €300 million. Central and Northern regions had to co-sponsor 30% of the national transfer. Southern regions, in which the supply of early childcare services was especially low, had instead to give a larger contribution, which went from 35.4% for Sardegna to 116.4% for Campania. Panel b) of Table 1 reports the national and regional funds in the first three years of the program, as well as the regional co-sponsoring rate.

The funds reported in Table 1 were provisions of transfers from the national government. The actual transfers took place with different timing across regions. Regions had indeed to pass a set of acts to receive the transfers from the central government. They needed to update their legislation about the different types of early childcare services and to design the executive authorizing procedures for transferring grants to the final childcare service providers (Istituto degli Innocenti, 2009). Figure 1 clarifies the heterogeneity across regions in the actual implementation of the PSSSPI. Trentino, Veneto, Emilia-Romagna, Lazio, and Molise were the first ones in obtaining the transfers in 2007. In the next year, ten further regions started the program. The last region was Campania in 2010.

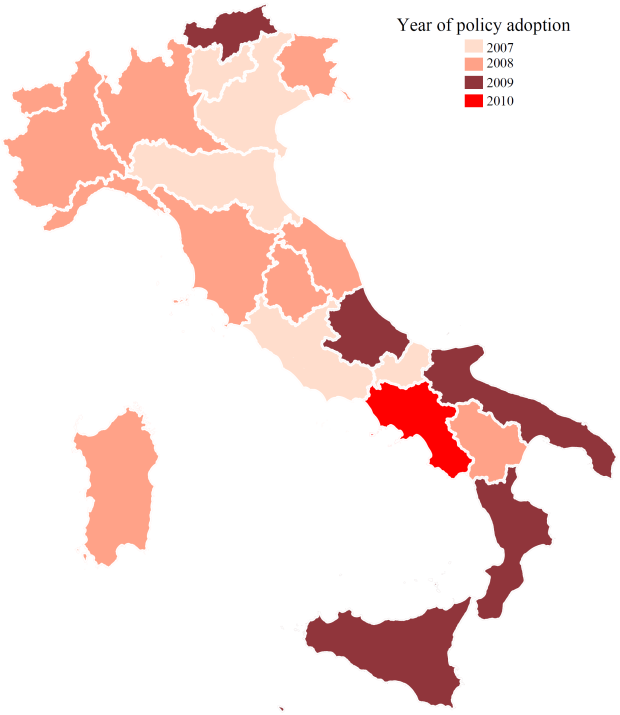

Figure 1: Timing of PSSSPI implementation across Italian regions

Source: Own elaboration based on Istituto degli Innocenti (2009).

Table 1: Special public budget plan for the development of early childcare services from 2007 until 2014 (thousand of €)

	a) National funds, 2007-2014							b) National and regional funds, 2007-2009			
	2007	2008	2009	2010	2012	2014	2007-14	National funds	Regional funds	Regional co-financing (%)	Total funds
Piemonte	7,211	10,634	5,151	7,181	5,026	359	35,562	22,996	6,899	30.0	29,895
Valle d'Aosta	335	494	239	288	203	15	1,575	1,069	321	30.0	1,390
Lombardia	17,515	25,830	12,511	14,150	9,905	708	80,618	55,855	16,757	30.0	72,612
Alto Adige	926	1,366	661	824	574	41	4,392	2,995	898	30.0	3,893
Trentino	939	1,385	671	844	588	42	4,469	2,953	886	30.0	3,839
Veneto	9,239	13,626	6,599	7,277	5,096	364	42,201	29,464	8,839	30.0	38,303
Friuli Venezia Giulia	2,322	3,424	1,658	2,193	1,533	110	11,241	7,405	2,221	30.0	9,626
Liguria	2,461	3,629	1,758	3,019	2,114	151	13,131	7,847	2,354	30.0	10,201
Emilia Romagna	8,401	12,390	6,001	7,084	4,956	354	39,186	26,792	8,038	30.0	34,830
Toscana	6,885	10,153	4,918	6,555	4,592	328	33,431	21,956	6,587	30.0	28,543
Umbria	1,504	2,218	1,074	1,642	1,148	82	7,669	4,797	1,439	30.0	6,236
Marche	2,892	4,265	2,066	2,645	1,855	133	13,857	9,224	2,767	30.0	1,1991
Lazio	12,127	17,883	8,662	8,600	6,020	430	53,722	38,672	11,602	30.0	50,274
Abruzzo	3,158	4,657	2,256	2,451	1,715	123	14,361	10,073	7,800	77.4	17,873
Molise	946	1,395	676	798	560	40	4,415	3,016	3,029	100.4	6,045
Campania	23,941	35,306	17,100	9,983	6,986	499	93,815	76,347	88,848	116.4	165,195
Puglia	12,516	18,457	8,940	6,977	4,886	349	52,125	39,913	37,678	94.4	77,591
Basilicata	1,681	2,478	1,200	1,230	861	62	7,512	5,359	4,916	91.7	10,275
Calabria	6,966	10,273	4,976	4,112	2,877	206	29,409	22,214	24,813	111.7	47,027
Sicilia	14,857	21,910	10,612	9,185	6,433	460	63,457	47,379	40,877	86.3	88,256
Sardegna	3,178	4,687	2,270	2,960	2,072	148	15,316	10,136	3,590	35.4	13,726
Total	140,000	206,462	100,000	100,000	70,000	5,000	621,462	446,462	281,158	63.0	727,620

Source: Istituto degli Innocenti (2014).

The final beneficiaries of the program are providers of early childcare services. They could be both private and public entities. Typical beneficiaries of the program were municipalities and private entities supplying daycare centers and supplementary services for 0-2 years old children.

3 Data and sample

For the empirical analysis, the main data source is the dataset on local public finance collected by Italian Department of Territorial and Internal Affairs over the years 2004-2013.[5] This dataset contains information on demographics, public finance (tax revenues and expenditures), and public individual-demand services (such as public and financed by public funds daycare centers and school canteens) for all the 8,092 Italian municipalities. In particular, we have information on the number of available slots in public and public financed early childhood education. A secondary data source, still at municipality level, concerns information on the population size by age categories, including the group 0-2, obtained by the National Institute of Statistics (Istat).[6] Finally, our third data source comes from Istat as well: the regional time series of real GDP growth rate and female employment rate, which will be used as time-varying controls.

After deleting from the sample 7 municipalities on the regional borders which switched regions in 2009,[7] we aggregated the variables at municipality level at the level of provinces. There are 110 provinces in Italy and they are the intermediate level of local government between the municipalities and regions. Regions are composed of a certain number of provinces which, in turn, are made up of a certain number of municipalities. This implies that each province belongs to one and only one region. After grouping the data at the level of provinces, we have a balanced panel of 1,100 observations, over 10 years and across 110 provinces.

The outcome variable of primary interest is the *coverage rate*, defined as the ratio between the available slots of public (or financed by public grants) early childhood educational services in a province and the population aged 0-2 in the same province. We grouped the data at the level of provinces for three main reasons. First, most of the municipalities in Italy are small in terms of population and have therefore no public childcare service. For example, in 2007 more than 70% of the municipalities had less than 5,000

[5] See Finanza Locale website on http://finanzalocale.interno.gov.it/apps/floc.php/in/cod/4.

[6] Information on population from 2004 until 2012 comes from the "Atlante Statistico dei Comuni". For 2013, data on population was downloaded from the online archive "Popolazione e Famiglie".

[7] In 2009, Casteldelci, Maiolo, Novafeltria, Pennabilli, San Leo, Sant'Agata Feltria, and Talamello passed from Marche to Emilia Romagna, as a consequence of a referendum result in 2006.

inhabitants and 94% of them reported a coverage rate equal to 0. Nationwide, the mass of municipalities with no public childcare services amounted to 81%. If we have worked at the level of municipalities, we would have had to face this corner solution problem or stick to an evaluation of the effect at the extensive margin. Second, given that there are many small municipalities with no public childcare services, it is likely that the demand for public childcare services of parents living in small municipalities is served by the closest large municipality. It might then be that the program will generate an effect only on larger municipalities, so as to exploit economies of scale and allow all the families of the surrounding towns to benefit from the enlarged supply of public slots. In other words, we would consider as treated small municipalities only because they are in a region which implemented the program, although the chances that they react to the program are virtually zero, not having the critical size to do it. Third, if the unit of observation were the municipality, it would be unclear how to weight units in order to take into account the extremely large variability in terms of population (both total and conditional of age) among municipalities and get estimates that could reflect the average impact for a representative municipality. For example, in 2007, the median population was 2,424 inhabitants, the 99th percentile was 68,739, and 22.7% of the Italian population was concentrated in the top 0.5% municipalities. Grouping the data at the level of provinces importantly reduces these problems.

Table 2 reports descriptive statistics of the coverage rate, disaggregated by implementation time, geographical area, and type of municipality. Panel a) of Table 2 shows that, over the ten year time window under analysis, on average in the Italian provinces there were 8.8 available slots in public early childhood education per 100 children younger than 36 months. This figure increased over time: before the policy it amounted to 7.9, whereas it increased by 1.6 points (20%) in the period after the program implementation. Figure 2 allows to visually inspect more in detail at the change in the supply of public childcare services: it clearly shows that the mode shifted to the right, with the right tail becoming fatter.

As we explained in Section 2 and showed in Table 1, the funds were assigned across regions taking into account their heterogeneity and needs. More than one half of the national and regional transfers were indeed used for the 8 regions of the South. In the econometric analysis we will study this dimension of heterogeneity of the effect. Panel b) of Table 2 reports the coverage rate in the 8 regions of the South and in the rest of Italy, before and after the program implementation. The situation is quite different across the regions. In the South, the coverage rate was 0.041, against 0.118 for the Center-North. The change after the policy seems to be more important in the South, whose coverage rate increased by about 16%, whereas in the rest of the country it raised by 9%.

Table 2: Descriptive statistics of the outcome variable and the timing of the program implementation

	Mean	Std. Dev.	Minimum	Maximum	Observations
a) Coverage rate, whole sample					
Coverage rate	0.088	0.060	0.000	0.305	1,100
Coverage rate before PSSSPI	0.079	0.055	0.001	0.276	451
Coverage rate after PSSSPI	0.095	0.062	0.000	0.305	649
b) Coverage rate, South and Center-North					
Center-North	0.118	0.057	0.023	0.305	680
South	0.041	0.026	0.000	0.110	420
Center-North before PSSSPI	0.111	0.052	0.023	0.276	250
South before PSSSPI	0.038	0.024	0.001	0.106	201
Center-North after PSSSPI	0.121	0.059	0.026	0.305	430
South after PSSSPI	0.044	0.027	0.000	0.110	219
c) Coverage rate, provincial capitals and the rest of the territory					
Capital	0.146	0.093	0.000	0.462	1,100
Not capital	0.069	0.054	0.000	0.277	1,100
Capital before PSSSPI	0.132	0.087	0.000	0.435	451
Not capital before PSSSPI	0.061	0.050	0.000	0.248	451
Capital after PSSSPI	0.156	0.096	0.000	0.462	649
Not capital after PSSSPI	0.075	0.056	0.000	0.277	649
d) Policy indicators (lags and leads)					
3 or more years before of adoption	0.210	0.407	0.000	1.000	1,100
2 years before of adoption	0.100	0.300	0.000	1.000	1,100
1 year before of adoption	0.100	0.300	0.000	1.000	1,100
Year of adoption	0.100	0.300	0.000	1.000	1,100
1 year after of adoption	0.100	0.300	0.000	1.000	1,100
2 years after of adoption	0.100	0.300	0.000	1.000	1,100
3 or more years after of adoption	0.290	0.454	0.000	1.000	1,100

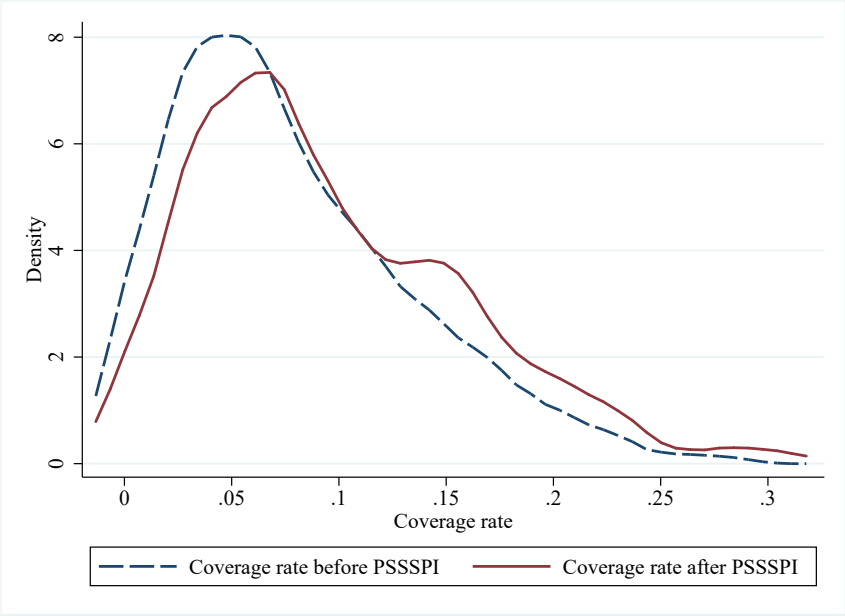

Figure 2: Kernel[(a)] density distribution of the coverage rate before and after PSSSPI implementation

[(a)] Epanechnikov kernel function.

Panel c) of Table 2 reports the sample means of the coverage rate by focusing first on the provincial capitals only and then on provinces after excluding their capital. This is a further heterogeneity dimension that we will investigate. The capitals are, aside from a few exceptions, the largest cities of the province in terms of population[8] and from the economic point of view. It is interesting to evaluate whether the program impact can differ between capitals and the rest of the provinces. The theory does not provide indeed clear-cut predictions. On the one hand, provincial capitals are attraction poles for childcare services because of a higher population density and because they absorb workers from the surrounding small municipalities. If many childcare service providers are already located in the capital, it is more likely that they will apply and obtain the program transfers. On the other hand, the coverage rate in small municipalities is low, if not zero. The excess of demand for public early childcare services could then be an important leverage for small municipalities to request the transfers and develop them. Understanding whether the program was effective in developing early childcare services both in provincial capitals and in the rest of the territory is a valuable piece of information to shed more light on how and to what extent the PSSSPI modified the local supply of public early childcare services.

[8]In the capitals live approximately one third of the Italian population.

As expected, the coverage rate is larger in capitals (0.146) than elsewhere (0.069). Both in the capitals and in the rest of the provinces, the coverage rate went up after the program implementation, respectively by about 18% and 23%. At least from raw statistics, it seems that the supply of public childcare services increased both in larger and smaller municipalities. The following econometric analysis aims at disentangling the spurious effect due to eventual already ongoing positive trends in the coverage rate, from the true effect of the program.

Finally, 3 displays summary statistics of the covariates that will be used in the regression model. Apart from the regional indicators, we will also control for the regional female employment and the regional real GDP growth to control for time-varying regional heterogeneity.

Table 3: Summary statistics of covariates

	Mean	Std. Dev.	Minimum	Maximum
Regional female employment rate	0.473	0.112	0.254	0.623
Regional real GDP growth rate	-0.003	0.025	-0.085	0.048
Regions				
Piemonte	0.073	0.266	0.000	1.000
Valle d'Aosta	0.009	0.095	0.000	1.000
Lombardia	0.109	0.312	0.000	1.000
Province of Trento	0.009	0.095	0.000	1.000
Province of Bolzano	0.009	0.095	0.000	1.000
Veneto	0.063	0.244	0.000	1.000
Friuli Venezia Giulia	0.036	0.187	0.000	1.000
Liguria	0.036	0.187	0.000	1.000
Emilia Romagna	0.082	0.274	0.000	1.000
Toscana	0.091	0.288	0.000	1.000
Umbria	0.018	0.134	0.000	1.000
Marche	0.045	0.208	0.000	1.000
Lazio	0.045	0.208	0.000	1.000
Abruzzo	0.036	0.187	0.000	1.000
Molise	0.018	0.134	0.000	1.000
Campania	0.045	0.208	0.000	1.000
Puglia	0.055	0.227	0.000	1.000
Basilicata	0.018	0.134	0.000	1.000
Calabria	0.045	0.208	0.000	1.000
Sicilia	0.082	0.274	0.000	1.000
Sardegna	0.073	0.260	0.000	1.000
Provinces (Total observations)		110 (1,100)		

4 Method

Identification of the effect of PSSSPI implementation on the coverage rate is attained by exploiting the fact that the program started in the regions with different timing, gradually from 2007 until 2010. Simply comparing provinces before and after the program

implementation is problematic since there may have been many economic and political influences other than the PSSSPI that affected the supply of early childcare services over time. Similarly, by focusing on a particular year in a cross-section framework, a simple difference in the average coverage rate between regions which already implemented the program and those which have not done it yet also pauses a problem because there might be fundamental differences in the political attention towards childcare services between the two groups of regions. As a result, we employ a DiD estimator and estimate changes in the differences of the coverage rate of public early childcare services between early and late implementing regions before and after the reform. The identification of causal effects requires some assumptions. In what follows, we conduct statistical tests for each of these assumptions to check whether they are supported by the data.

Our empirical evaluation will be in a panel data framework. We specify the following model for coverage rate y of province i of region r in year t:

$$y_{irt} = \mathbf{x}'_{irt}\boldsymbol{\beta} + \boldsymbol{\gamma}_r + \boldsymbol{\phi}_t + \delta_0 I_{rt} + \delta_1 I_{rt-1} + \delta_2 I_{rt-2} + \delta_3 I_{rt-3} + u_{irt}, \tag{1}$$

where

- $\mathbf{x}_{irt}$ is the vector containing the time-varying variables, the regional employment rate and real GDP growth rate of regressors, and $\boldsymbol{\beta}$ is the conformable vector of coefficients.
- $\boldsymbol{\gamma}_r$ is a set of regional fixed effects. There are 21 regions in our data, hence they amount to 20 regional indicators.
- $\boldsymbol{\phi}_t$ is a set of year fixed effects.
- $(I_{rt}, I_{rt-1}, I_{rt-2}, I_{rt-3})$ are the regressors of interest. They are indicator variables. $I_{rt-\tau}$, with $\tau = 0, 1, 2$, is equal to 1 if the program was implemented in region r at time $t - \tau$. I_{rt-3} is equal to 1 if the program was implemented 3 or more years ago. The parameter δ_0 is the effect of the program in the year of implementation; δ_1 is the effect one year after the year of implementation; δ_2 and δ_3 are the program impact two and three or more years after the program implementation, respectively.
- u_{irt} is the error term at the provincial level.

The parameters of Equation (1) are estimated using Ordinary Least Squares (OLS). Inference deserves a special discussion. In our DiD application the identification of the PSSSPI effect is based on variations across regions and years. The regressors of primary interest $(I_{rt}, I_{rt-1}, I_{rt-2}, I_{rt-3})$ are therefore correlated within regions. Proper inference should take this into account. The cluster-robust variance estimator (CRVE) is a simple

way to deal with correlation within-groups (Liang and Zeger, 1986). However, this approach is unbiased only when the number of clusters is large enough and the asymptotic results can be safely invoked. In our study, the number of regions is just 21. The CRVE is therefore likely to suffer from a small sample bias, resulting in a type I error.[9] Cameron et al. (2008) proposed a wild cluster bootstrap-t procedure to get critical values when the number of clusters is small. When reporting the estimation results, the presentation of the point estimates of the coefficients of $(I_{rt}, I_{rt-1}, I_{rt-2}, I_{rt-3})$ will be accompanied by p-values based on the wild cluster bootstrap (WCB) procedure by Cameron et al. (2008) with restricted residuals.[10]

Some assumptions are required for the OLS estimation of the DiD model in Equation (1) to return unbiased estimates of the causal effect of the program implementation.

Assumption 1 (Parallel trend assumption): Conditional on the control variables, provinces in regions which have already implemented the program would have experienced similar trends in the coverage rate as provinces in regions which have not implemented yet the program, in the absence of the program.

Since we cannot observe the counterfactual evolution of the coverage rate in the absence of the program implementation, this assumption is not testable. However, we can check whether it is at least supported by the data before the policy implementation, by testing whether the provinces were following parallel trends before regions started distributing the funds. In the same spirit of Autor (2003), we checked this by augmenting Equation (1) by leads of the indicator for the program implementation, from $t+1$ up to $t+5$. If the trend between treated and not treated yet is parallel before the policy implementation, the coefficients of these further indicators are to be nil. When this is the case, the provinces were following parallel trends in the coverage rate while approaching the implementation moment. We report the results of this check in Subsection 5.3.

Assumption 2 (Exogeneity of the timing of program implementation): Conditional on observables, the timing of the implementation is exogenous with respect to the supply and the demand of public early childhood educational services. Rather, the timing is politically determined.

The timing of program implementation differed across regions because the transfers from the central government took place in different moments. In order to be financed, regions

[9] See Cameron and Miller (2015) for an overview of the problems in doing inference when the number of clusters is small.

[10] In the WCB procedure with restricted residuals, the bootstrap algorithm the model is re-estimated under the null hypothesis of no treatment effect. We bootstrapped the residuals 5,000 times using the Webb six-point distribution as weights (Webb, 2014).

had to pass a set of acts to update their legislation about the different types of early childcare services and to design the executive authorizing procedures for transferring grants to the final childcare service providers (Istituto degli Innocenti, 2009). The different timing with which the funds were transferred from the central government was therefore likely determined by the level of administrative capacity of the regional bureaucracy (Soncin, 2013, p. 73). There is evidence that this also explains the heterogeneity across regions in spending resources from European structural funds (Milio, 2007). The fact that the Southern regions, which were the most in need of early childcare services, delayed the program implementation also supports Assumption 2: if the timing had been endogenous, one would have expected the opposite.

Assumption 3 (No anticipation): The local authorities were not able to anticipate the PSSSPI implementation.

This assumption would fail if the municipalities or the region itself anticipated the start of the program and decided either to invest more in childcare services before the actual arrival of the transfers or to postpone some planned investment in childcare services, so as to sponsor them with the PSSSPI. The direction of the eventual bias could go in either way. To check whether anticipation might be an issue, in Subsection 5.3 we provide a robustness check by removing for all the provinces the year before the program implementation.

5 Estimation results

5.1 Baseline estimation results and their heterogeneity across regions and municipality type

Table 4 displays the DiD estimation results of Equation (1). In model (i), the whole sample is used. In models (ii) and (iii) we split the sample in provinces in the South and in the Center-North. Overall, in the year of implementation the effect is not significantly different from zero, although the magnitude is already important: an increase in the coverage rate by 0.0043 means, relatively to the sample mean before the policy implementation, an increase by 5.5%. One and two years after the program implementation the estimated impact becomes significant at 10% and the magnitude doubles: plus 9.6% and 12.2% one and two years after the start of PSSSPI, respectively. Finally, 3 or more years after the program implementation the coverage rate significantly increases by 1.4 slots per 100 children aged 0-2, which is an 18.1% increase relatively to the before-program sample mean.

Table 4: Estimated effect of the program implementation on the coverage rate in the year of adoption (δ_0), 1 year after the adoption (δ_1), 2 years after the adoption (δ_2), and 3 or more years after the adoption (δ_3)

	(i) Italy			(ii) Center-North			(iii) South	
	Coeff.		WCB[a] p-value	Coeff.		WCB[a] p-value	Coeff.	WCB[a] p-value
I_{rt} (δ_0)	0.0043		0.1546	0.0140	***	0.0068	0.0011	0.6996
I_{rt-1} (δ_1)	0.0075	*	0.0786	0.0229	***	0.0088	0.0019	0.7002
I_{rt-2} (δ_2)	0.0096	*	0.0878	0.0289	**	0.0132	-0.0008	0.8754
I_{rt-3} (δ_3)	0.0142	**	0.0206	0.0338	**	0.0196	-0.0006	0.9002
Joint significance test		**	0.0114		**	0.0174		0.7132
# of observations	1,100			690			410	
# of provinces	110			69			41	
# of regions	21			13			8	
R^2	0.6868			0.4902			0.6280	

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. The estimated parameters of the coefficient all the other regressors are reported in Appendix A, Table A.1. The estimated equations contain a full set of regional indicators, year indicators, the regional female employment rate, the regional real GDP growth rate, and the constant.
[a] WCB indicates that the p-values come from the wild cluster bootstrap-t statistics based on restricted residuals and 5,000 replications using the Webb six-point distribution as weights.

When splitting the provinces in those in Southern regions and in the Center-North, we realize that the positive effect of PSSPI in Italy is due to what happened in the Center-North. The program implementation was indeed ineffective in the South, where the impact on the coverage rate is small in size, never significant, and even negative 3 or more years after the start of the program. In the provinces in the Center-North, the impact was immediate: already in the year of the implementation, the transfers generated a highly significant increase in the coverage rate by 1.4 slots in public early childhood education per 100 children aged 0-2. Relatively to the average coverage rate before the program in the Center-North, the rise amounts to 12.6%. The impact becomes much stronger when moving ahead: 3 or more years after the start of PSSSPI, the coverage rate increases by 30.5% with respect to the pre-intervention average.

Finally, we investigated whether the PSSSPI effect could differ between provincial capitals and the rest of the territory. Panel I) of Table 5 reports the estimate program effect for the 110 provincial capitals, whilst panel II) focuses on the effect elsewhere. Nationwide, the program increased the supply of public childcare services both in the provincial capitals and in the rest of the territory, with magnitudes that, relatively to the before-program average, are very much the same: 3 (or more) years after the program implementation the available slots in public childhood education increased by 19.2% in the capitals and by 19.6% in the rest of the provinces. This means that the PSSSPI program was effective also in increasing the supply of public childcare services in smaller towns

and less populated areas, where traditionally the availability of public childcare services have been quite scarce.

Table 5: Estimated effect of the program implementation in provincial capitals and in the rest of the territory

	Italy			Center-North			South	
	Coeff.		WCB[(a)] *p*value	Coeff.		WCB[(a)] *p*value	Coeff.	WCB[(a)] *p*value
i) Provincial capitals								
I_{rt} (δ_0)	0.0077		0.1718	0.0179	*	0.0542	0.0052	0.1354
I_{rt-1} (δ_1)	0.0178	**	0.0452	0.0306	**	0.0476	0.0195	0.1068
I_{rt-2} (δ_2)	0.0200	**	0.0428	0.0351	*	0.0516	0.0155	0.3242
I_{rt-3} (δ_3)	0.0256	**	0.0420	0.0441	**	0.0450	0.0132	0.4968
Joint significance test		**	0.0170		**	0.0396		0.1086
# of observations		1,100			690		410	
# of capitals		110			69		41	
# of regions		21			13		8	
R^2		0.4893			0.2615		0.7666	
ii) Provinces excluding capitals								
I_{rt} (δ_0)	0.0039	**	0.0380	0.0111	**	0.0124	0.0010	0.6408
I_{rt-1} (δ_1)	0.0064	**	0.0366	0.0180	**	0.0248	-0.0015	0.7358
I_{rt-2} (δ_2)	0.0080	*	0.0740	0.0221	*	0.0584	-0.0044	0.3656
I_{rt-3} (δ_3)	0.0120	**	0.0142	0.0235	*	0.0954	-0.0037	0.4160
Joint significance test		*	0.0638		**	0.0270		0.1392
# of observations		1,100			690		410	
# of provinces		110			69		41	
# of regions		21			13		8	
R^2		0.6651			0.4923		0.7762	

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. The estimated parameters of the coefficient all the other regressors are reported in Appendix A, Tables A.2 and A.3. The estimated equations contain a full set of regional indicators, year indicators, the regional female employment rate, the regional real GDP growth rate, and the constant.

[(a)] See footnote [(a)] of Table 4.

By splitting the sample of capitals (and of the provinces excluding their capitals) in those in Southern regions and the ones in the Center-North, we get the same picture coming from Table 4: the effect is driven by the Center-North and no program effect is detected in the South, neither in the provincial capitals nor in the rest of the territory.

5.2 Further heterogeneity analysis

In order to have a better understanding of the heterogeneity of the program effect across regional differences, we decided to split the sample on the basis of the level of the GDP growth rate and of the female employment rate. We looked at the median of these two covariates in 2004 and split the sample in regions below and above the median GDP growth rate and female employment rate. Regions with a high GDP growth rate in 2004 might have been more likely to approach the start of the program with more resources

which, in turn, might have had a knock-on impact on the effectiveness of the PSSSPI. There are 8 regions with a high GDP growth rate in 2004: 3 from the South (Molise, Calabria, and Sardegna), 2 from the Center (Marche and Lazio), and 3 from the North (Province of Bolzano, Veneto, and Emilia Romagna). The estimation results for model (i) in Table 6 show that, for high GDP growth rate regions, the PSSSPI was effective. Given that the coverage rate in the years before the program start in these 8 regions was equal to 0.080, the estimated effect 3 or more years after the program implies a significant increase by 20% with respect to the before-program average coverage rate. Splitting the sample according to the level of female employment rate resembles very much the South/Center-North division and it does not add much to the discussion.

Table 6: Estimated effect of the program implementation by GDP growth rate and female employment rate

	(i) High GDP growth[b]			(ii) Low GDP growth[b]		(iii) High female employment rate[c]			(iv) Low female employment rate[c]	
	Coeff.		WCB[a] p-value	Coeff.	WCB[a] p-value	Coeff.		WCB[a] p-value	Coeff.	WCB[a] p-value
I_{rt} (δ_0)	0.0068	**	0.0204	-0.0017	0.2490	0.0129	**	0.0242	0.0023	0.3866
I_{rt-1} (δ_1)	0.0095	***	0.0098	-0.0003	0.8970	0.0195	*	0.0532	0.0060	0.2966
I_{rt-2} (δ_2)	0.0130	***	0.0100	0.0010	0.7590	0.0237	*	0.0966	0.0081	0.3792
I_{rt-3} (δ_3)	0.0161	**	0.0486	0.0083	0.1612	0.0282		0.1580	0.0123	0.2502
Joint significance test			0.1538		0.2688			0.1008		0.1652
# of observations	420			680		580			520	
# of provinces	42			68		58			52	
# of regions	8			13		10			11	
R^2	0.7635			0.6120		0.4958			0.6821	

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. The estimated parameters of the coefficient all the other regressors are reported in Appendix A, Table A.4.

[a] See footnote [a] of Table 4.

[b] On the basis of the median value of the real GDP growth in 2004 (1.5%), we split the sample in high and low GDP growth rate regions. Regions with a high GDP growth rate in 2004 were: Veneto, Province of Bolzano, Emilia Romagna, Marche, Lazio, Molise, Calabria, and Sardegna.

[c] On the basis of the median value of the female employment rate in 2004 (52.4%), we split the sample in high and low female employment rate regions. Regions with a high female employment rate in 2004 were: Piemonte, Valle d'Aosta, Lombardia, Provinces of Trento and Bolzano, Veneto, Friuli Venezia Giulia, Emilia Romagna, Toscana, and Marche.

5.3 Falsification

In Section 4 we outlined the assumptions under which we can credibly identify the causal impact of the program implementation on the supply of public early childcare services. Assumption 1 states that provinces in regions which have already implemented the program would have experienced similar trends in the coverage rate as provinces in regions

which have not implemented yet the program, in the absence of the program. Although we cannot test this assumption, we check whether it is supported by the data before the policy implementation, by verifying whether the provinces were following parallel trends before their regions started transferring the funds. As in Autor (2003), we augment Equation (1) by leads of the indicator of the program implementation, from $t+1$ up to $t+5$. If the trend between treated and not treated yet is parallel before the policy implementation, the coefficients of these further indicator variables should be zero. Table 7 reports the estimated coefficients of the leads of the indicator of the program implementation. For all the main models, we find that both for the total sample and in the heterogeneity analyses, all the coefficients of the leads are not significantly different from zero.

Table 7: Placebo test for the parallel trend assumption

	Total		Center-North[(b)]		South		Provincial capitals		Provinces without capitals	
	Coeff.	WCB[(a)] p-value	Coeff.	WCB[(a)] p-value	Coeff.	WCB[(a)] p-value	Coeff.	WCB[(a)] p-value	WCB[(a)] Coeff.	p-value
I_{rt+1}	0.0033	0.9158	0.0372	0.4666	-0.0062	0.5096	0.0099	0.3682	0.0036	0.6418
I_{rt+2}	0.0032	0.8870	0.0279	0.5366	-0.0037	0.6192	0.0029	0.6888	0.0003	0.9816
I_{rt+3}	0.0023	0.8854	0.0220	0.5932	-0.0046	0.4574	0.0053	0.6730	0.0024	0.9310
I_{rt+4}	0.0021	0.8502	0.0167	0.6100	-0.0037	0.4320	0.0056	0.7076	0.0037	0.9236
I_{rt+5}	0.0047	0.4606	–	–	0.0009	0.6086	0.0075	0.6930	0.0044	0.9222
Joint significance test		0.5092		0.3982		0.1818		0.4676		0.5750
# of observations	1,100		690		410		1,100		1,100	
# of provinces	110		69		41		110		110	
# of regions	21		13		8		21		21	
R^2	0.6869		0.4909		0.6289		0.4895		0.6651	

[(a)] See footnote [(a)] of Table 4.
[(b)] Since the regions of the Center-North implemented the program by the end of 2009 and the first observed year is 2004, we cannot identify the coefficient of I_{rt+5}.

A further assumption is the no anticipation assumption (Assumption 3). This assumption would fail if the local authority anticipated the start of the program and decided either to invest more in childcare services before the actual arrival of the transfers or to postpone some planned investment in childcare services, so as to sponsor them with the PSSSPI. To check whether anticipation might be an issue, we removed for all the provinces the year before the program implementation and re-estimated Equation (1). Table 8 reports the estimation results of the baseline models once we removed the year before the program implementation. The point estimates are very much in line with those reported in Tables 4 and 5. We lose the significance at the 5% level of some coefficients, but this is expected since we reduced the sample size by 10%.

Finally, we checked the sensitivity of our results to the aggregation level of the original dataset of Italian municipalities. We grouped the data at regional level instead of at

Table 8: Estimation results after removing the year before the program implementation

	Total			Center-North[(b)]			South			Provincial capitals			Provinces without capitals		
	Coeff.		WCB[(a)] p-value	Coeff.		WCB[(a)] p-value	Coeff.		WCB[(a)] p-value	Coeff.		WCB[(a)] p-value	Coeff.		WCB[(a)] p-value
I_{rt} (δ_0)	0.0058		0.1266	0.0271		0.2500	0.0008		0.8730	0.0142	**	0.0346	0.0039		0.1752
I_{rt-1} (δ_1)	0.0098	*	0.0900	0.0373		0.1306	0.0014		0.8312	0.0264	**	0.0148	0.0069		0.1228
I_{rt-2} (δ_2)	0.0119		0.1098	0.0444	*	0.0780	-0.0015		0.8554	0.0289	**	0.0148	0.0085		0.1816
I_{rt-3} (δ_3)	0.0166	*	0.0530	0.0505	*	0.0680	-0.0015		0.8454	0.0350	**	0.0146	0.0124	*	0.0628
Joint significance test		**	0.0336		***	0.0076			0.7710		**	0.0126		*	0.0868
# of observations	990			621			369			990			990		
# of provinces	110			69			41			110			110		
# of regions	21			13			8			21			21		
R^2	0.6826			0.4825			0.6234			0.4843			0.6626		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%.
[(a)] See footnote [(a)] of Table 4.

the level of provinces, implying a relevant reduction in the sample size: when the unit of observations moved from the provincial to the regional level, the number of observations went from 1,100 to 210. Table 9 reports the estimation results when Equation 1 is estimated at the regional level. The point estimates are very much in line with the ones reported in Table 4. We lose the significance of the parameters, but this is related to the loss of precision due to the reduced number of observations.

Table 9: Baseline estimation results of the program implementation at regional level

	(i) Italy		(ii) Center-North			(iii) South	
	Coeff.	WCB[(a)] *p*value	Coeff.		WCB[(a)] *p*value	Coeff.	WCB[(a)] *p*value
I_{rt} (δ_0)	0.0024	0.5696	0.0120	*	0.0598	-0.0008	0.7226
I_{rt-1} (δ_1)	0.0050	0.5408	0.0204	*	0.0876	0.0002	0.9524
I_{rt-2} (δ_2)	0.0070	0.6074	0.0280		0.1756	-0.0013	0.8822
I_{rt-3} (δ_3)	0.0120	0.5014	0.0337		0.2512	-0.0005	0.9496
Joint significance test		0.5090			0.2126		0.6512
# of observations	210		130			80	
# of regions	21		13			8	
R^2	0.9727		0.9514			0.9765	

Notes: * Significant at 10%.
[(a)] See footnote [(a)] of Table 4.

6 Conclusions

We evaluated the effectiveness of PSSSPI, a national program co-financed by regions and started in 2007, in increasing the available slots in public early childhood education. The transfers towards public and private early childcare providers amounted to almost €1 billion. The central government designed this intervention in order to enlarge the supply of early childcare services and to reduce the imbalances between the South and the Center-North in the supply and use of early childcare services.

Since PSSSPI was a nationwide program, disentangling the impact of the time trend from the true effect of the program is not trivial. However, the transfers from the central government to the regional authority did not take place at the same moment in each region. Regions had indeed to pass a set of acts to receive the transfers from the central government to update their legislation about the different types of early childcare services and to design the executive authorizing procedures for transferring grants to the final childcare service providers. We took advantage of the different timing of transfers across regions and, by the DiD technique, we estimated the causal impact of PSSSPI on the available

slots in public early childhood education. The empirical analysis is based on a dataset at the municipal level collected by the Italian Department of Territorial and Internal Affairs over the years 2004-2013. We aggregated the data at the level of the 110 Italian provinces which are observed for 10 years.

We found that PSSSPI was only partially successful. Whilst on average in Italy three (or more) years after the program intervention the available slots in public early childhood education increased by 18.1% with respect to the pre-intervention average, the program impact was not homogeneous across regions. We showed indeed that the program effectiveness was nil in the Southern regions and quite strong in the Center-North where, three or more years after the policy implementation, the increase in the coverage rate amounted to more than 30% and characterized both provincial capitals and the rest of the territory. Hence, the program failed in reducing regional differences in the supply of early childcare services, at least the public ones. The reasons of this failure are not in question in this paper, but they should be investigated in order to design policy interventions that might be fully effective in reducing regional disparities in the availability of public early childcare services and, thereby, in the maternal employment rates.

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Appendix

A Full set of estimation results

Table A.1: Full set of estimation results of the results reported in Table 4

	(i) Italy			(ii) Center-North			(iii) South		
	Coeff.		Std. Err.[(a)]	Coeff.		Std. Err.[(a)]	Coeff.		Std. Err.[(a)]
Program implementation impact									
I_{rt} (δ_0)	0.0043	*	0.0022	0.0140	***	0.0018	0.0011		0.0023
I_{rt-1} (δ_1)	0.0075	**	0.0030	0.0229	***	0.0039	0.0019		0.0040
I_{rt-2} (δ_2)	0.0096	**	0.0040	0.0289	***	0.0053	-0.0008		0.0048
I_{rt-3} (δ_3)	0.0142	***	0.0046	0.0338	***	0.0071	-0.0006		0.0050
Region - Reference: Piemonte (Campania in model iii)									
Valle d'Aosta	0.0051		0.0032	-0.0031		0.0053	–		–
Lombardia	-0.0304	***	0.0003	-0.0311	***	0.0005	–		–
Province of Trento	0.0198	***	0.0028	0.0107	**	0.0049	–		–
Veneto	-0.0460	***	0.0017	-0.0437	***	0.0026	–		–
Fiuli Venezia Giulia	-0.0024	***	0.0007	-0.0007		0.0011	–		–
Liguria	0.0058	***	0.0019	0.0109	***	0.0033	–		–
Emilia Romagna	0.0700	***	0.0043	0.0570	***	0.0074	–		–
Toscana	0.0367	***	0.0007	0.0386	***	0.0012	–		–
Umbria	-0.0058	***	0.0020	-0.0007		0.0034	–		–
Marche	-0.0002		0.0011	0.0026		0.0018	–		–
Lazio	-0.0284	***	0.0059	-0.0150		0.0097	–		–
Abruzzo	-0.0345	***	0.0093	–		–	0.0342	***	0.0059
Molise	-0.0634	***	0.0139	–		–	0.0044		0.0041
Campania	-0.0547	**	0.0237	–		–	–		–
Puglia	-0.0482	**	0.0220	–		–	0.0094	***	0.0007
Basilicata	-0.0324	*	0.0174	–		–	0.0308	***	0.0026
Calabria	-0.0633	***	0.0209	–		–	-0.0047	***	0.0012
Sicilia	-0.0173		0.0227	–		–	0.0398	***	0.0006
Sardegna	-0.0288	**	0.0132	–		–	0.0380	***	0.0043
Province of Bolzano	-0.0633	***	0.0028	-0.0685	***	0.0049	–		–
Year - Reference: 2004									
2005	0.0019	*	0.0010	0.0018		0.0019	0.0008		0.0011
2006	0.0015		0.0015	-0.0008		0.0027	0.0011		0.0018
2007	0.0029	*	0.0016	-0.0039		0.0035	0.0029	**	0.0011
2008	0.0002		0.0029	-0.0170	***	0.0049	0.0027		0.0017
2009	0.0005		0.0037	-0.0180	***	0.0055	0.0029		0.0029
2010	-0.0010		0.0040	-0.0210	***	0.0063	0.0030		0.0038
2011	-0.0033		0.0049	-0.0237	***	0.0078	0.0039		0.0046
2012	-0.0072		0.0060	-0.0283	***	0.0096	0.0038		0.0051
2013	-0.0083		0.0059	-0.0288	***	0.0093	0.0029		0.0051
Regional female employment rate	0.0015	*	0.0008	0.0037	***	0.0014	0.0008	*	0.0003
Regional real GDP growth rate	0.0000		0.0002	0.0000		0.0003	0.0000		0.0001
Constant	0.0986	***	0.0055	0.0851	***	0.0086	0.0283	***	0.0068
# of observations	1,100			690			410		
# of provinces	110			69			41		
# of regions	21			13			8		
R^2	0.6868			0.4902			0.6280		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%.
[(a)] CRVE standard errors.

Table A.2: Full set of estimation results of the results reported in Table 5 for provincial capitals

	(i) Italy			(ii) Center-North			(iii) South		
	Coeff.		Std. Err.[(a)]	Coeff.		Std. Err.[(a)]	Coeff.		Std. Err.[(a)]
Program implementation impact									
I_{rt} (δ_0)	0.0077		0.0047	0.0179	**	0.0064	0.0052		0.0031
I_{rt-1} (δ_1)	0.0178	**	0.0069	0.0306	***	0.0092	0.0195	**	0.0078
I_{rt-2} (δ_2)	0.0200	**	0.0079	0.0351	***	0.0108	0.0155		0.0128
I_{rt-3} (δ_3)	0.0256	**	0.0098	0.0441	***	0.0129	0.0132		0.0169
Region - Reference: Piemonte (Campania in model iii)									
Valle d'Aosta	-0.0189	***	0.0040	-0.0227	**	0.0080	–		–
Lombardia	-0.0094	***	0.0004	-0.0094	***	0.0008	–		–
Province of Trento	0.0908	***	0.0035	0.0860	***	0.0077	–		–
Veneto	-0.0542	***	0.0024	-0.0540	***	0.0036	–		–
Fiuli Venezia Giulia	-0.0458	***	0.0009	-0.0450	***	0.0016	–		–
Liguria	-0.0176	***	0.0024	-0.0155	***	0.0049	–		–
Emilia Romagna	0.0597	***	0.0053	0.0531	***	0.0115	–		–
Toscana	0.0096	***	0.0010	0.0105	***	0.0018	–		–
Umbria	-0.0586	***	0.0025	-0.0565	***	0.0050	–		–
Marche	-0.0469	***	0.0013	-0.0457	***	0.0027	–		–
Lazio	-0.0528	***	0.0077	-0.0476	***	0.0143	–		–
Abruzzo	-0.0845	***	0.0117	–		–	0.0618	**	0.0210
Molise	-0.1531	***	0.0177	–		–	-0.0048		0.0140
Campania	-0.1438	***	0.0297	–		–	–		–
Puglia	-0.1568	***	0.0277	–		–	-0.0116	***	0.0021
Basilicata	-0.0885	***	0.0220	–		–	0.0584	***	0.0086
Calabria	-0.1809	***	0.0263	–		–	-0.0355	***	0.0038
Sicilia	-0.1150	***	0.0285	–		–	0.0302	***	0.0016
Sardegna	-0.0520	***	0.0167	–		–	0.0952	***	0.0148
Province of Bolzano	-0.1910	***	0.0038				–		–
Year - Reference: 2004									
2005	0.0035		0.0022	0.0069	*	0.0033	-0.0032		0.0025
2006	0.0043		0.0036	0.0066		0.0040	-0.0012		0.0080
2007	0.0082	**	0.0037	0.0068		0.0050	0.0023		0.0062
2008	-0.0035		0.0062	-0.0178		0.0105	-0.0028		0.0087
2009	-0.0025		0.0086	-0.0181		0.0142	-0.0045		0.0118
2010	-0.0081		0.0087	-0.0208		0.0150	-0.0145		0.0135
2011	-0.0044		0.0101	-0.0210		0.0177	-0.0047		0.0172
2012	-0.0131		0.0115	-0.0317	*	0.0174	-0.0073		0.0204
2013	-0.0117		0.0118	-0.0294		0.0169	-0.0050		0.0227
Regional female employment rate	-0.0004		0.0011	0.0006		0.0021	-0.0004		0.0013
Regional real GDP growth rate	-0.0001		0.0005	-0.0004		0.0007	-0.0001		0.0008
Constant	0.1881	***	0.0070	0.1807	***	0.0129	0.0460		0.0255
# of observations	1,100			690			410		
# of provinces	110			69			41		
# of regions	21			13			8		
R^2	0.4893			0.2615			0.4059		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%.
[(a)] CRVE standard errors.

Table A.3: Full set of estimation results of the results reported in Table 5 for provinces without their capitals

	(i) Italy			(ii) Center-North			(iii) South		
	Coeff.		Std. Err.[(a)]	Coeff.		Std. Err.[(a)]	Coeff.		Std. Err.[(a)]
Program implementation impact									
I_{rt} (δ_0)	0.0039	**	0.0015	0.0111	***	0.0020	0.0010		0.0027
I_{rt-1} (δ_1)	0.0064	**	0.0023	0.0180	***	0.0029	-0.0015		0.0035
I_{rt-2} (δ_2)	0.0080	**	0.0036	0.0221	***	0.0052	-0.0044		0.0038
I_{rt-3} (δ_3)	0.0118	***	0.0042	0.0235	**	0.0079	-0.0037		0.0038
Region - Reference: Piemonte (Campania in model iii)									
Valle d'Aosta	0.0163	***	0.0035	0.0078		0.0067	–		–
Lombardia	-0.0205	***	0.0003	-0.0213	***	0.0006	–		–
Province of Trento	0.0086	**	0.0031	-0.0001		0.0062	–		–
Veneto	-0.0372	***	0.0018	-0.0340	***	0.0032	–		–
Fiuli Venezia Giulia	0.0193	***	0.0007	0.0210	***	0.0014	–		–
Liguria	0.0012		0.0021	0.0065		0.0041	–		–
Emilia Romagna	0.0639	***	0.0047	0.0511	***	0.0094	–		–
Toscana	0.0377	***	0.0008	0.0396	***	0.0015	–		–
Umbria	0.0094	***	0.0022	0.0148	***	0.0041	–		–
Marche	0.0171	***	0.0012	0.0200	***	0.0022	–		–
Lazio	-0.0342	***	0.0065	-0.0195		0.0122	–		–
Abruzzo	-0.0177		0.0103	–		–	0.0280	**	0.0081
Molise	-0.0396	**	0.0153	–		–	0.0046		0.0052
Campania	-0.0293		0.0262	–		–	–		–
Puglia	-0.0225		0.0243	–		–	0.0101	***	0.0010
Basilicata	-0.0234		0.0192	–		–	0.0155	****	0.0035
Calabria	-0.0322		0.0231	–		–	0.0016		0.0015
Sicilia	0.0083		0.0251	–		–	0.0402	***	0.0006
Sardegna	-0.0310	**	0.0146	–		–	0.0123	*	0.0058
Province of Bolzano	-0.0252	***	0.0031	-0.0318	***	0.0056	–		–
Year - Reference: 2004									
2005	0.0029	**	0.0011	0.0028		0.0019	0.0017		0.0012
2006	0.0018		0.0017	-0.0009		0.0035	0.0016		0.0009
2007	0.0027		0.0022	-0.0040		0.0049	0.0037	**	0.0013
2008	0.0035		0.0031	-0.0094		0.0065	0.0043	*	0.0019
2009	0.0036		0.0041	-0.0085		0.0079	0.0046	**	0.0019
2010	0.0008		0.0041	-0.0133		0.0086	0.0064	*	0.0032
2011	-0.0024		0.0051	-0.0143		0.0120	0.0056		0.0036
2012	-0.0045		0.0067	-0.0164		0.0144	0.0065		0.0038
2013	-0.0073		0.0067	-0.0196		0.0141	0.0045		0.0037
Regional female employment rate	0.0017	*	0.0009	0.0040	**	0.0018	0.0009		0.0005
Regional real GDP growth rate	0.0002		0.0003	0.0005		0.0004	0.0003		0.0002
Constant	0.0692	***	0.0059	0.0543	***	0.0101	0.0218	*	0.0103
# of observations	1,100			690			410		
# of provinces	110			69			41		
# of regions	21			13			8		
R^2	0.6650			0.4923			0.4513		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%.
[(a)] CRVE standard errors.

Table A.4: Full set of estimation results of the results reported in Table 6

	(i) High GDP growth[b]			(ii) Low GDP growth[b]			(iii) High female employment rate[c]			(iv) Low female employment rate[c]		
	Coeff.		SE[a]	Coeff.		SE[a]	Coeff.		SE[a]	Coeff.		SE[a]
Program implementation impact												
I_{rt} (δ_0)	0.0068	**	0.0022	-0.0017		0.0014	0.0129	***	0.0020	0.0023		0.0019
I_{rt-1} (δ_1)	0.0095	**	0.0029	-0.0003		0.0023	0.0195	***	0.0043	0.0060		0.0034
I_{rt-2} (δ_2)	0.0130	**	0.0040	0.0010		0.0037	0.0237	***	0.0059	0.0081		0.0053
I_{rt-3} (δ_3)	0.0161	**	0.0057	0.0083		0.0050	0.0282	***	0.0082	0.0123	*	0.0064
Region - Reference: Piemonte (Emilia Romagna in model i and Campania in model iv)												
Valle d'Aosta	–		–	0.0035		0.0028	-0.0055		0.0068	–		–
Lombardia	–		–	-0.0304	***	0.0003	-0.0313	***	0.0006	–		–
Province of Trento	–		–	0.0193	***	0.0022	0.0091		0.0061	–		–
Veneto	-0.1130	***	0.0105	–		–	-0.0419	***	0.0035	–		–
Fiuli Venezia Giulia	–		–	-0.0020	***	0.0006	-0.0002		0.0014	–		–
Liguria	–		–	0.0067	***	0.0017	–		–	0.0849	***	0.0156
Emilia Romagna	–		–	–		–	0.0542	***	0.0094	–		–
Toscana	–		–	0.0372	***	0.0006	0.0391	***	0.0015	–		–
Umbria	–		–	-0.0050	**	0.0017	–		–	0.0732	***	0.0156
Marche	-0.0670	***	0.0096	–		–	0.0034		0.0023	–		–
Lazio	-0.0935	***	0.0181	–		–	–		–	0.0466	***	0.0126
Abruzzo	–		–	-0.0302	***	0.0079	–		–	0.0363	***	0.0103
Molise	-0.1237	***	0.0325	–		–	–		–	0.0026		0.0070
Campania	–		–	-0.0442	**	0.0202	–		–	–		–
Puglia	–		–	-0.0377	*	0.0189	–		–	0.0086	***	0.0012
Basilicata	–		–	-0.0236		0.0151	–		–	0.0297	***	0.0045
Calabria	-0.1205	**	0.0449	–		–	–		–	-0.0053	**	0.0020
Sicilia	–		–	-0.0065		0.0195	–		–	0.0388	***	0.0008
Sardegna	-0.0899	**	0.0312	–		–	–		–	0.0379	***	0.0074
Province of Bolzano	-0.1330	***	0.0030	–		–	-0.0714	***	0.0063	–		–
Year - Reference: 2004												
2005	0.0049	**	0.0015	0.0009		0.0014	0.0010		0.0022	0.0018		0.0016
2006	0.0048	**	0.0016	-0.0008		0.0015	-0.0021		0.0035	0.0021		0.0015
2007	0.0055	**	0.0020	0.0001		0.0018	-0.0049		0.0040	0.0044	***	0.0013
2008	0.0032		0.0040	0.0007		0.0017	-0.0172	***	0.0050	0.0037	*	0.0019
2009	0.0041		0.0055	0.0036		0.0027	-0.0154	**	0.0059	0.0025		0.0027
2010	-0.0024		0.0052	0.0068	*	0.0031	-0.0175	**	0.0069	0.0007		0.0033
2011	-0.0054		0.0062	0.0032		0.0052	-0.0196	*	0.0089	-0.0026		0.0050
2012	-0.0085		0.0096	-0.0016		0.0064	-0.0246	*	0.0110	-0.0056		0.0061
2013	-0.0058		0.0101	-0.0046		0.0061	-0.0260	**	0.0111	-0.0062		0.0053
Regional female emp. rate	0.0019		0.0015	0.0019	**	0.0007	0.0043	**	0.0018	0.0006		0.0006
Regional GDP growth rate	0.0006		0.0006	-0.0003		0.0003	0.0001		0.0004	-0.0002		0.0002
Constant	0.1605	***	0.0180	0.0973	***	0.0050	0.0816	***	0.0112	0.0238	*	0.0129
# of observations	420			680			580			520		
# of provinces	42			68			58			52		
# of regions	8			13			10			11		
R^2	0.7635			0.6120			0.4958			0.6821		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%.

[a] CRVE standard errors.

[b] On the basis of the median value of the real GDP growth in 2004 (1.5%), we split the sample in high and low GDP growth rate regions. Regions with a high GDP growth rate in 2004 were: Veneto, Province of Bolzano, Emilia Romagna, Marche, Lazio, Molise, Calabria, and Sardegna.

[c] On the basis of the median value of the female employment rate in 2004 (52.4%), we split the sample in high and low female employment rate regions. Regions with a high female employment rate in 2004 were: Piemonte, Valle d'Aosta, Lombardia, Provinces of Trento and Bolzano, Veneto, Friuli Venezia Giulia, Emilia Romagna, Toscana, and Marche.