How Big Is the Big Push?
The Macroeconomic Effects of a Large-Scale Regional Development Program

Andrea Cerrato*

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Abstract

Between 1950 and 1992, Italy implemented one of the largest regional development programs in history to foster industrialization in its Southern regions. Exploiting three distinct identification strategies, I estimate that the big push substantially increased local manufacturing activity, with gains persisting up to 2011. At the same time, the program shifted production across regions, limiting labor reallocation from the lagging South to the industrialized Center-North. To account for crowding-out effects, I develop a multi-region growth model with public capital and factor mobility, allowing for increasing returns to scale through regional agglomeration economies. Calibrating the model to match my reduced-form estimates, I find that, despite large crowding-out effects, the program induced gains in national industrial production that outweighed its costs. However, 80% of the South vs. Center-North convergence in manufacturing labor productivity observed since 1951 would have occurred even without the program through factor reallocation and diminishing returns. Together, these results document that big push programs can promote cost-effective structural change in distressed regions, but general equilibrium effects substantially mitigate their impact on aggregate output and regional convergence.

*UC Berkeley, Economics Department. E-mail address: andrea.cerrato@bos.frb.org. Website: Andrea Cerrato. I am grateful to my advisors Emi Nakamura and Enrico Moretti for their guidance and support during the program. I thank Livia Alfonsi, Felipe Arteaga-Ossa, Luisa Cefalà, Eva Davoine, Javier Feinmann, Francesco Filippucci, Giulia Gitti, Chen Lian, Miguel Ortiz, Christina Romer, Francesco Ruggieri, Benjamin Schoefer, Jón Steinsson, Matteo Tranchero, and Damián Vergara for their support and helpful comments about the paper. I would also like to thank all the participants at the UC Berkeley Macro Seminar, Macro Lunch, Labor Lunch, and Public-Labor Job Market Symposium. This project has received funding from the UC Berkeley Opportunity Lab – Place-Based Policy Initiative.

1 Introduction

Many countries exhibit remarkable differences in GDP per capita across regions. In 2022, real GDP per capita in the state of New York, the most productive U.S. state, was 2.2 times higher than in Mississippi, the least productive one. Regional disparities are even more pronounced in Italy, the context of this study. In 2022, GDP per capita in Trentino-Alto Adige was 2.5 times higher than in Calabria. Governments often address such disparities through large-scale regional development programs targeting disadvantaged areas. These programs usually combine infrastructure spending and firm grants with a twofold objective. First, they aim to encourage convergence by narrowing regional productivity gaps. Second, they intend to foster national long-term economic growth by channeling investments in relatively underdeveloped areas, where returns to public capital might be higher, as hypothesized by the *big push* theory (Rosenstein-Rodan 1943; Murphy et al. 1989).

However, the effects of these policies are, in principle, ambiguous. First, encouraging economic activity in low-productivity places may be inefficient if place-specific factors prevent them from generating agglomeration economies. Moreover, these policies may induce distortions that may dampen their potentially positive impacts. For instance, crowding out of production factors from the more productive regions may mitigate the gains accruing to distressed regions. Notably, the empirical evidence assessing this ambiguity is scarce because the treatment assignment is non-random – thus making it difficult to isolate the effects of the program from other unobservable drivers of place-level outcomes – and the estimation of long-run effects – particularly relevant to assess the desirability of these policies – is challenging, due to the scant availability of high-quality data spanning several decades.

I overcome these challenges by studying the long-term local and national effects of one of the most extensive regional big push programs in history: the Italian *Cassa per il Mezzogiorno* (CasMez). From 1950 to 1992, CasMez devoted an extraordinary amount of resources to foster the industrialization of Southern Italian regions, whose economies considerably diverged from the Center-North ones since unification in 1861. Specifically, CasMez provided Southern Italian regions with infrastructures (e.g., systems for water and electricity provision, roads, ports, etc.) and offered firms incentives to locate in the South.

Two reasons make CasMez a particularly suited context to examine the general equilibrium consequences of large-scale regional development programs. First of all, the size of the program is unprecedented. According to administrative sources, a total of 450 billion US$ (2010) was devoted to this massive industrialization effort, corresponding to an average of 1% of national GDP per year for more than 40 years (Felice and Lepore, 2017) and about 6 times the GDP of Southern Italian regions in 1950. In absolute terms, the program was 17 times larger than the Tennessee Valley Authority, the most extensive regional development program ever implemented in the U.S. (Kline and Moretti, 2014), 12 times larger than what Germany spent to foster convergence of its Eastern regions after unification (Siegloch et al., 2021), and 3.5 times larger than the Marshall Plan, whose target was the whole Western European territory (Bianchi and Giorcelli, 2023). Second, the diverging economic conditions of the targeted and the non-targeted areas at the time were pushing millions of individuals to move from the lagging South to the industrialized Center-North. Therefore, it is reasonable to hypothesize that such a large-scale, geographically targeted industrialization effort had non-negligible spillover effects on the rest of the country.

My analysis proceeds in three steps. First, I combine administrative data from historical archives covering the universe of CasMez-financed projects and decennial census data geo-localized at the municipality level to provide reduced-form evidence of the impact of CasMez's investments on municipal economies up to 2011. I propose three distinct identification strategies. The first two strategies consist of difference-in-differences designs leveraging variation in the allocation of funds across municipalities within CasMez's jurisdiction stemming from the establishment of *Industrial Development Areas* (IDAs).[1] Specifically, the first strategy compares municipalities belonging to early IDAs (i.e., formed between 1960 and 1965) with municipalities belonging to late IDAs (i.e., formed between 1966 and 1974), while the second compares each municipality belonging to an IDA with another Southern municipality not belonging to an IDA, matched according to baseline characteristics and pre-treatment trends. The third strategy exploits differences across municipalities induced by their location, just North or South of CasMez's jurisdiction border (Albanese et al., 2023). For all empirical strategies, identification requires the parallel trends assumption to hold. I assess its validity by testing the significance of pre-treatment coefficients.

Consistently across the three empirical strategies, I find that CasMez's funds substantially increased manufacturing employment, total employment, population, and employment rates in the targeted municipalities, with gains persisting up to 20 years after the end of the program. Nevertheless, I estimate a high cost per job created at the municipal level, about 6 to 12 times the 2010 Southern GDP per capita, depending on the empirical strategy. Moreover, substantial effects on the resident population suggest the presence of sizeable crowding-out effects on non-targeted municipalities.

To account for crowding-out effects, I extend the reduced-form analysis to a more aggregated geo-

[1] IDAs consist of agglomerates of municipalities (i.e., *Aree di Sviluppo Industriale* or *Nuclei di Industrializzazione*) that become eligible for extra manufacturing-oriented investments upon formation. 48 IDAs, corresponding to the major urban areas of the South, were formed over the 1960-1974 period.

graphical level, exploiting province-level variation in investments induced by the first of my three identification strategies. Using administrative data on province-to-province migration flows, I document that province-level population gains stem from lower out-migration rates (both to the rest of the South and the Center-North). This implies that the program shifted national production across provinces, thus limiting the ongoing mass migratory waves from the South to the Center-North. Therefore, a general equilibrium model is needed to account for both the direct effects on the targeted areas and the indirect effects on the rest of the country induced by factor mobility.

To assess the aggregate effects of the regional big push, I develop a one-sector multi-region growth model that builds on typical features of both the growth (Solow 1956; Swan 1956) and economic geography (Roback 1982; Kleinman et al. 2023) literature. In my model, regional manufacturing production depends on regional productivity, labor, capital, and a fixed factor. I allow for increasing returns to scale by modeling regional productivity as a function of "public capital" (i.e., the cumulative investments in infrastructures and firm grants) and employment density. This second channel captures the idea that the effects of temporary public investments might be highly persistent due to agglomeration economies (Marshall 1890; Ciccone and Hall 1993; Glaeser and Gottlieb 2008; Kline and Moretti 2014). Notably, the model accounts for cross-regional crowding-out effects due to factor reallocation, as labor and private capital are assumed to be mobile across regions (Blanchard and Katz, 1992).

I use steady-state approximations of the model to derive closed-form expressions for the local and aggregate effects on industrial production of a region-specific change in the public capital stock. With perfectly mobile private capital, the impact of a regional big push on national manufacturing output is larger the lower the initial endowment of public capital in the targeted region due to decreasing returns to regional public capital. Moreover, the effect is larger the more elastic the aggregate labor supply to the manufacturing sector, the lower the cross-regional labor mobility, and the lower the difference in output per worker and agglomeration forces between the non-targeted and the targeted regions. This follows from the intuition that reallocating the marginal worker from a high-productivity to a low-productivity region decreases aggregate output per worker. The model's structural parameters are derived by combining standard calibration techniques with the causally identified parameters estimated in my reduced-form analysis.

The model-based analysis reveals that CasMez's investments increased national manufacturing output by an average of 2.7% per year over the 1951-2011 period. This average masks substantial regional heterogeneity. Relative to the counterfactual, industrial production in the South increased by an average of 35.7% per year, while it decreased by an average of 2.6% per year in the rest of the country. Consistently, the ratio between the net present value of industrial production gains in the South induced by CasMez's investments and CasMez's spending over the 1951-2011 period (i.e., the *long-run regional multiplier*) is 2.2, while the same statistic for the whole country (i.e., the *long-run aggregate multiplier*) is 1.3. Therefore, the program is cost-effective in the long run, although the aggregate industrial production gains are 41% lower than the regional ones.

According to my calibration exercise, the regional big push explains a small fraction of the reduction in the Center-North vs. South manufacturing labor productivity gap observed between 1951 and 2011. In fact, the ratio between Center-North vs. South manufacturing output per worker, which decreased from 1.5 to 1.19 in the 1951-2011 period, would have decreased to 1.24 in the absence of CasMez's activity. This result implies that more than 80% of the South vs. Center-North convergence in manufacturing labor productivity would have occurred even without the program, arguably through more pronounced factor reallocation and diminishing returns. Intuitively, fewer investments devoted to the industrialization of the South would have triggered larger migration flows to the Center-North. In turn, larger migration flows would have exacerbated the crowding of the fixed factor of production in the Center-North, causing regional labor productivity to fall. The reverse dynamic would have occurred in the South, with sizeable mitigating effects on the Center-North vs. South manufacturing labor productivity gap.

Two counterfactual exercises allow me to quantify the contribution of regional differentials in fundamentals to the size of crowding-out effects and distinguish between *cost-effectiveness* and *optimality* of the program. In the first exercise, removing regional differentials in manufacturing employment rate, output per worker, and agglomeration forces causes the long-run aggregate multiplier to rise to 1.9. This result implies that regional development programs are substantially less effective in spurring national long-term growth precisely in the presence of those large regional differentials that often motivate them. In the second exercise, I simulate a government spending program of the same size as CasMez but not directed to any specific region of the country (i.e., a *place-blind* program). Even under conservative assumptions about the structural parameters governing the direct effect of investments on productivity in the Center-North, I find that such a program would have had larger long-term effects on national industrial production.

Overall, both the reduced-form and structural analyses suggest that the big push generated substantial long-term gains for distressed areas in the South that persisted even two decades after the end of the program. These positive effects are partially dampened by negative spillovers on the highly productive regions of the Center-North. Taken together, these results document that big push programs can promote cost-effective structural change in distressed regions, but general equilibrium effects substantially mitigate their impact on aggregate output and regional convergence.

This paper builds on and contributes to four strands of the literature. First, I contribute to the literature on big push programs and economic growth by studying one of the largest government-financed industrialization efforts of the past century. In doing so, I account for general equilibrium effects induced by cross-regional reallocation of economic activity and heterogeneous agglomeration economies. The big push literature dates back to Rosenstein-Rodan (1943) and Hirschman (1958). In the 1990s and 2000s, the main view was that industrial policy would harm developing economies through increased resource misallocation (Krueger 1990; Rodrik 2006). Liu (2019) challenges this view by providing theoretical basis for the positive impact of industrial policies in 1970s South Korea and modern-day China. Juhász et al. (2023) provide the most updated and comprehensive review of recent papers on industrial policy. Among them, studies focusing on the long-term effects of different industrial policies in South Korea (Kim et al. 2021; Choi and Levchenko 2021; Lane 2022) and the U.S. (Kantor and Whalley, 2023) tend to find positive partial and general equilibrium effects.[2] My study emphasizes that increased cross-regional factor misallocation mitigates the aggregate output gains from industrial policies, especially in contexts characterized by marked regional labor productivity differentials, such as post-WWII Italy.

Second, my work contributes to the broad literature on place-based policies by estimating the long-term general equilibrium effects of combined infrastructure spending and firm grants. My study most closely relates to Kline and Moretti (2014), who estimate the aggregate welfare gains induced by the Tennessee Valley Authority (TVA) in the U.S. In contemporaneous work, Atalay et al. (2023) quantify the general equilibrium effects of a place-based industrial policy implemented in Turkey in 2012 using the framework developed by Caliendo et al. (2019). Both their work and mine argue that regional development programs are only modestly successful in reducing spatial labor productivity differentials because of their impact on factor allocation. More broadly, the paper relates to numerous studies analyzing the impact of place-based policies on local economic activity. Neumark and Simpson (2015) provide a comprehensive summary of these studies. Among more recent papers, my study closely relates to Criscuolo et al. (2019), Slattery and Zidar (2020), Siegloch et al. (2021), and Bianchi and Giorcelli (2023).

Third, I contribute to the long-standing literature on the Italian regional divide (Clough and Livi 1956, Eckaus 1961, Iuzzolino et al. 2011, Felice 2019), the problem of Southern Italy's development (Ch-

[2] Kim et al. (2021) represent an exception in this respect, as they find worsened resource allocation within industries-regions in South Korea with null effects at the industry-region level.

enery, 1962), and CasMez's activity (Felice and Lepore, 2017). In a recent paper, Fernández-Villaverde et al. (2023) propose a wedge decomposition of the Center-North vs. South per-capita income gap, arguing that it is mostly explained by differences in intermediate input sector productivity and government transfers. My work complements their analysis by quantifying the extent to which a sizeable and prolonged government transfer designed to increase productivity in the intermediate input sector contributed to reducing the Center-North vs. South labor productivity gap. More broadly, this paper relates to Borgomeo (2018), Buscemi and Romani (2022), and Albanese et al. (2023), who study relevant political economy aspects of the program.[3]

Last, my study contributes to the literature on the aggregate effects of resource misallocation by empirically assessing the extent to which regional differentials in manufacturing employment rate, output per worker, and agglomeration forces amplify the crowding-out effects of regional big push policies induced by factor mobility. Seminal work in this literature includes Restuccia and Rogerson (2008), Hsieh and Klenow (2009), and Midrigan and Xu (2014). Among many other contributions, my work builds on insights provided by Gaubert (2018), Rotemberg (2019), and Hsieh and Moretti (2019).

The paper is structured as follows. Section 2 provides a historical background of the Center-North vs. South divide in Italy and describes the institutional context. Section 3 discusses the identification strategies and presents the reduced-form results at the municipality and province levels. In Section 4, I present the model, while Section 5 uses it to calculate the aggregate effects of the program. Section 6 concludes.

2 Historical Background

This section provides a summary of the historical evolution of the Center-North vs. South divide in Italy and a brief description of CasMez's activity throughout its 42 years of existence.

[3] Borgomeo (2018) and Buscemi and Romani (2022) document that political interests affected resource allocation, finding limited long-run effects induced by this subset of interventions. Exploiting the spatial discontinuity induced by CasMez's border, Albanese et al. (2023) show that higher exposure to government transfers persistently increases demand for redistributive policies.

2.1 The Center-North vs. South Divide

The Italian economy has been characterized by a pronounced divide between the Center-North and the South of the country ever since unification in 1861.[4] Figure 1 displays the ratio between the Center-North and the South GDP per capita over the 1871-2011 period (Vecchi et al., 2011), both in nominal terms (blue line) and adjusting for regional purchasing power (red line). Starting in the late 1800s, the two regions began diverging markedly, as the economy of the Center-North was industrializing fast, while the Southern economy was primarily trapped in agriculture. Many factors contributed to this rising divergence. The Center-North was geographically closer and better connected to the rapidly expanding European markets. Moreover, the Center-North was characterized by relatively more pro-market institutions encouraging private entrepreneurial initiatives. Between 1891 and 1951, the ratio between the Center-North and the South GDP per capita increased from 1.2 to 2.

In the aftermath of WWII, Italy underwent the so-called *economic miracle*, i.e., about 20 years of significant and sustained development, encouraged by the 1948-1952 U.S. reconstruction aid and consolidated by fast capital accumulation in the following decades. The 1951-1971 period is the only one in Italian history in which the Southern economy converged vis-à-vis the rest of the country. Two important factors contributed to this achievement. First, sizeable per-capita income differentials triggered mass migratory waves from the South to the Center-North. In this period, about 2 million citizens (i.e., more than 10% of the 1951 Southern population) moved their residency from the lagging South to the Northern industrial hubs, providing a relatively cheap workforce to the fast-growing manufacturing and construction sectors.[5] Second, the government undertook an unprecedented effort to bring industrialization to the South through the institution of CasMez.

The convergence process suddenly stopped at the beginning of the 1970s in the face of the international oil crisis. From 1971 to 2011, the ratio between the Center-North and the South GDP per capita has remained relatively constant at 1.6-1.7. During this period, migration flows from the South to the Center-North and capital accumulation started slowing down, thus curbing convergence. A large per-capita income gap persists today, explained mainly by differences in employment rate rather than output per worker.

[4]The Center-North of the country includes the following regions: Valle d'Aosta, Piedmont, Lombardy, Liguria, Veneto, Trentino Alto Adige, Friuli Venezia Giulia, Emilia Romagna, Toscana, Umbria, Marche, and Lazio. The South includes the following regions: Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria, Sicilia, and Sardegna.

[5]Figure 2 displays the decade-level South to Center-North net outmigration rate.

2.2 CasMez and the Extraordinary Intervention

In the aftermath of WWII, the development of Southern regions was an issue of primary importance for Italian policymakers. In 1950, Prime Minister Alcide De Gasperi established CasMez to promote self-sustained economic development in the South. Figure 3 shows the territory covered by CasMez's jurisdiction. Over the whole 1950-1992 period, CasMez spent the equivalent of about 6 times the 1950 GDP of Southern regions, with the largest share of expenditures devoted to land improvements, public infrastructures, and firm grants.[6] Figure 4 shows the time series of CasMez's investments in public infrastructures and firm grants, the focus of this paper. The value of these investments accounts for about 62% of CasMez's total endowment over the 1951-1992 period.

During the first decade of its activity, CasMez's expenditures were concentrated in basic public infrastructures and land improvements. Over the whole period of its activity, CasMez financed and executed significant investments in water and electricity provision, roads, waste management, ports, and the prevention of natural calamities.[7] Figure 5 shows the amount of resources devoted to each type of public infrastructure. Starting from 1957, the main focus of CasMez's activity shifted from land improvements toward firm grants in an attempt to foster industrialization in the South.[8] Grants could cover installation costs, which included expenses for opening new establishments in the South, expanding existing ones, or purchasing machinery. CasMez's management was technical and independent during this period, and the decision-making process was centralized.

From the 1970s, with the establishment of regional governments, allocating funds and assessing projects increasingly became a prerogative of local bureaucrats. The amount of resources devoted to firm grants, as opposed to public infrastructures, increased dramatically during this period, causing the costs of the regional development program to rise substantially (Buscemi and Romani, 2022). CasMez was suppressed in 1984 and substituted in 1986 by a new entity, named *Agenzia per la Promozione e lo Sviluppo del Mezzogiorno* (AgenSud), with similar goals and endowments. The extraordinary intervention was gradually phased out and officially terminated in 1992.

[6] This corresponds to an average of about 1% of national GDP for more than 40 years (Felice and Lepore, 2017).

[7] A smaller amount of resources was devoted to other infrastructures, including railways and airports, tourism, training programs, schools, hospitals, and sports facilities.

[8] See Law 634/1957 and Law 555/1959.

3 The Local Effect of the Regional Big Push

3.1 Data Collection

I assemble two panel datasets, at the municipality and province level, combining three data sources. First, to measure local exposure to the regional development program, I collect data on the universe of infrastructure projects and firm grants financed by CasMez from digitized historical archives, named *Archivi dello Sviluppo Economico Territoriale* (ASET). Importantly, the data provide information regarding each project's timing and cost, specifying the amount financed by CasMez. Appendix A provides a detailed description of the raw data for both infrastructure projects and firm grants.

I geo-localize all infrastructure projects and firm grants at the municipality level to measure the total funds invested in each municipality for every year of CasMez's activity. The source typically provides the location of the project. If missing, I parse the provided description to assign at least one location to each project. Sometimes, multiple locations are affected by the realization of a project. In those cases, I divide the amount of resources assigned to the project among the municipalities involved, according to their population. The year assigned to each project corresponds to the year the project was approved.

I measure municipality-level demographic and labor market outcomes using data from the decennial population Censuses. The main outcome variables include manufacturing, agriculture, total employment, resident population, and employment rate. Other variables in this dataset, such as the share of the illiterate population and the share of manufacturing employment, are useful to control for baseline municipal characteristics that could correlate with the amount of funds received or with the outcome variables.

Finally, to estimate the impact of CasMez's investments on internal migration patterns, I use an updated version of the data in Bonifazi and Heins (2000), measuring yearly province-to-province migration flows. The data cover the 1955-2011 period and are constructed using entries to, and cancellations from, the population registries for changes of residence. From the province-to-province migration matrix, I compute the net migration flows for each province from and to the South and the Center-North.

3.2 Early vs. Late Industrial Development Areas

In the late 1950s, the focus of CasMez's investments shifted from land improvements to manufacturing-oriented infrastructures and firm grants to foster industrialization. To this end, Law 634/1957 established that CasMez could cover up to 20% of the expenses incurred by firms for the installation of new establishments within CasMez's jurisdiction and up to 10% of the expenses for purchasing machinery. Moreover, in an attempt to trigger agglomeration economies, the government sought to identify areas within CasMez's jurisdiction that were particularly suited for industrial development. Therefore, the status of *Industrial Development Area* (i.e., IDA) was introduced, defining a consortium of municipalities with the power to propose, execute, and manage additional infrastructure projects to encourage local industrial production. A governmental committee established the necessary criteria to constitute an IDA, and CasMez was authorized to cover up to 50% of the proposed infrastructure projects' costs.

Between 1960 and 1974, 48 IDAs, made of 879 municipalities, were approved, corresponding to most of the major Southern metropolitan areas. Table 2 lists all the IDAs, the Presidential Decrees that established their formation, and the year of approval. After the formal approval, IDAs were required to draft a local strategic plan (i.e., *Piano Regolatore*) that typically became fully operational after a minimum of 2 to a maximum of 5 years. My first identification strategy exploits variation in the allocation of funds across municipalities induced by the timing of IDAs' formation. Specifically, I restrict the sample to municipalities belonging to IDAs and compare the dynamics of CasMez's investments and labor market outcomes in municipalities belonging to early-approved IDAs versus municipalities belonging to late-approved IDAs, before and after 1961 (i.e., the closest Census year to 1960, when the first IDA was approved). Figure 6 shows the resulting treated and control municipalities located within CasMez's jurisdiction.

The advantage of this approach is that it effectively controls for unobservable characteristics constant across municipalities that determine selection as an IDA. The strategy relies on the intuition that municipalities belonging to an early-approved IDA received more funds throughout CasMez's activity. This occurred for two reasons. First, they became eligible for CasMez's co-financing of infrastructure projects earlier than their counterparts. Second, as a result of these early infrastructure investments, they were more likely to attract firms eligible for subsidies within CasMez's jurisdiction even in the following decades, when control municipalities also became eligible for CasMez's co-financing of infrastructure projects.

More formally, I estimate two-stage least squares (2SLS) coefficients from a dynamic fuzzy difference-in-differences design. The first-stage and reduced-form equations take the following form:

$$Y_{it} = \alpha_i + \delta_{rt} + \sum_{t \neq 1961}^{2011} \beta_t D_i + \mathbf{X}'_{i1951}\Gamma_t + \varepsilon_{it}, \tag{1}$$

where Y_{it} denotes the outcome variable in municipality i and period t, α_i denotes municipality fixed effects, δ_{rt} controls for region-specific trends, D_i is a dummy variable denoting municipalities belonging to IDAs approved between 1960 and 1965, and $\mathbf{X}'_{i1951}$ denotes a vector of 1951 municipal characteristics. These include log population, the share of manufacturing employment, the density of manufacturing employment, and the share of illiterate population, and are interacted with time dummies, Γ_t, to capture heterogeneous trends induced by differences in baseline size, industry mix, agglomeration potential, and education levels across municipalities. Identification requires conditional parallel trends for both the first-stage and reduced-form outcome variables in the pre-treatment period (i.e., between 1951 and 1961). Observations are weighted by 1961 population, and standard errors are clustered at the municipality level.

Figure 7 shows the dynamic coefficients of the first-stage regressions. In Panel (a), the outcome variable is decade-specific investments per capita – where investments comprise public infrastructure spending and firm grants divided by the 1961 municipal population – while, in Panel (b), the outcome variable is cumulative investments per capita. There is no evidence of differential pre-trends in investments between the treatment and the control group. As expected, municipalities belonging to early IDAs received more investments per capita in the 1962-1971 and 1972-1981 decades, while the share of municipalities belonging to IDAs was higher for the treatment than for the control group, but not in the 1982-1991 decade, about ten years later the approval of the last IDA. More specifically, the instrument induces an increase of about 6,000 Euros (2010) per capita in cumulative investments over the whole 1950-1992 period.

In response to the investments, manufacturing employment in treated municipalities increased by about 30% relative to control municipalities between 1961 and 1981, as shown by Figure 8, Panel (a). Manufacturing employment gains were highly persistent and remained unchanged between 1981 and 2011, almost 20 years after the end of the program in 1992. This persistence following the suppression of CasMez implies that the combination of infrastructure spending and firm grants induced higher manufacturing density and self-sustaining productivity gains in the targeted areas. One way in which the literature rationalizes this finding is through the presence of agglomeration economies (Ciccone and Hall, 1993). Specifically, demand externalities (Rosenstein-Rodan 1943, Murphy et al. 1989), knowledge spillovers (Moretti, 2004), and thick markets (Marshall, 1890), may explain a long-run increase in productivity following a temporary investment.

Manufacturing employment gains and positive spillovers to other sectors drive an increase in total employment of about 20% in treated vs. control municipalities, displayed in Figure 8, Panel (c). Importantly, the municipal population also increased as a result of additional investments, though to a lesser extent than total employment. Consequently, Panel (e) shows that employment rates increased by 4 percentage points in treated municipalities relative to control ones. This effect is large, persists up to 2011, and follows the same dynamic of the impact on manufacturing employment. In principle, higher municipal employment rates could result from either reduced slack in the local labor market or movers' higher propensity to work relative to stayers.

3.3 Industrial Development Areas vs. Matched Control

My second identification strategy exploits variation in the allocation of funds across municipalities within CasMez jurisdiction induced by the status of Industrial Development Area (IDA). Specifically, I match each municipality belonging to the 48 IDAs with one Southern municipality not belonging to any IDA using a set of 14 baseline characteristics and pre-treatment trends, including municipality-level measures of size, education, agglomeration potential, and industry mix. Table 3 shows the list of variables used for the matching procedure and the balance of characteristics between the treatment and the matched control group, while Figure 9 shows the map of the two groups.

Relative to the first identification strategy, this approach controls for selection into IDA status through a broader range of observable characteristics. Moreover, I leverage a distinct source of variation, as the treatment group only partially overlaps with the one used for the first empirical strategy, while the control group is different. Formally, I estimate 2SLS coefficients from a dynamic fuzzy difference-in-differences design before and after 1961 (i.e., the closest Census year to 1960, when the first IDA was approved). In practice, I restrict the sample to municipalities belonging to IDAs and their 1-to-1 matched counterparts and estimate the following specification:

$$Y_{it} = \alpha_i + \delta_t + \sum_{t \neq 1961}^{2011} \beta_t D_i + \varepsilon_{it}, \tag{2}$$

where α_i denotes municipality fixed effects, δ_t denotes time fixed effects, and D_i is a dummy variable taking value 1 for municipalities belonging to IDAs. As in Equation (1), Y_{it} denotes per-capita investments in the first-stage specification and employment and demographic outcomes in the reduced-form specification.

Intuitively, municipalities belonging to IDAs should receive more funds than their non-IDA counterparts because of their special status. Figure 10 shows the dynamic of decade-specific and cumulative per-capita investments for the treatment and the control group over the 1951-2011 period. Starting from the 1960s, municipalities belonging to IDAs received considerably more funds than their non-IDA counterparts up to the end of the program. Cumulatively, treated municipalities received around €10,000 (2010 Euros) per capita more than control municipalities. Identification requires that no municipality-level time-varying characteristic omitted from the ones used to match treated and control municipalities affects both the probability of obtaining the IDA status and the outcomes. Reassuringly, I detect no difference in investments in the 1951-1961 period, suggesting that CasMez's activity was not targeting eventually treated municipalities before the establishment of IDAs.

This alternative approach confirms that CasMez's investments substantially impacted municipal economic activity. Figure 11, Panel (a), shows that manufacturing employment increased markedly in the treatment group relative to the control group in the 1961-1991 period, with a gap expanding even after CasMez's suppression. By 2011, manufacturing employment was about 35% higher in municipalities belonging to IDAs. This result aligns with the evidence provided by the first identification strategy, confirming the presence of agglomeration economies that make industrial production and employment gains persistent and self-sustaining. Under the impulse of industrial production induced by CasMez's investments, total employment was about 25% higher in treated municipalities by 2011. Municipalities belonging to IDAs experienced similar, though quantitatively smaller, gains in population, which translated into a 1 percentage-point increase in the municipal employment rate in 2011.

3.4 Discontinuity at the Border

The last empirical strategy exploits plausibly exogenous variation in public infrastructure investments and grants across municipalities located just South vs. North of the sharp CasMez's jurisdiction border. Municipalities outside CasMez's jurisdiction were not eligible for public infrastructure investments or firm grants. However, geographical proximity to the border may control for numerous unobservable confounders that could correlate both with the probability of being included in CasMez's jurisdiction and the outcomes of interest.

Figure 12 shows the border of CasMez's jurisdiction and the municipalities included within a radius of 100 kilometers South and North of the border, which I use to define treated and control municipalities.[9] Some segments of CasMez's border coincided with administrative borders (e.g., regions, provinces, etc.) active at the time or with other historical borders separating the North and the South of Italy during the Nazi occupation or before unification. Importantly, unobserved variation across municipalities deter-

[9] My benchmark specification excludes Rome from the control sample, but results do not change when Rome is included.

mined by alternative historical borders could affect the outcomes of interest through channels different from CasMez's investments (Albanese et al., 2023). For this reason, I estimate the impact of CasMez's investments on the *growth rate* of the outcomes rather than on their *levels*. First differencing with respect to 1951 levels, allows me to control for all those time-invariant municipality-specific characteristics that might correlate with eligibility for the treatment and the outcomes.

Formally, I estimate 2SLS coefficients from a long difference-in-discontinuities design (Grembi et al., 2016) relative to the baseline period, 1951, at the border of CasMez's jurisdiction. The first-stage and reduced-form specifications take the following form:

$$Y_{it} - Y_{i1951} = \sum_{t=1961}^{2011} \left[\delta_t + \beta_t D_i + \sum_{j=1}^{3} \eta_{jt} R_i^j + \sum_{j=1}^{3} \gamma_{jt} R_i^j D_i + \mathbf{X}'_{i1951} \Gamma_t \right] + \varepsilon_{it} \quad (3)$$

where $(Y_{it} - Y_{i1951})$ denotes the long difference of the outcome variable relative to 1951, δ_t captures time fixed effects, D_i is a dummy variable taking value 1 if municipality i is located South of the border, and β_t are the dynamic coefficients of interest. R_i denotes the running variable (i.e., distance from the border). I control flexibly for the impact of R_i on $(Y_{it} - Y_{i1951})$, using a third-degree polynomial function, whose coefficients are allowed to change for observations located North or South of the border. Finally, I control for a vector of baseline municipal characteristics, $\mathbf{X}_{i1951}$, interacted with time dummies, Γ_t, to absorb heterogeneous trends induced by differences in 1951 size, industry mix, agglomeration potential, and education levels across municipalities that might correlate with the treatment and the outcomes.

To grasp the intuition behind the estimation procedure of the β_t coefficients in each period t, I provide a graphical representation of the static long difference-in-discontinuities in 1991 (i.e., the closest Census year to 1992, when CasMez was suppressed) in Figure 13. Panel (a) shows that cumulative CasMez's investments per capita in 1991 jump at CasMez's border from around €20,000 (2010 Euro) to almost zero, providing evidence of a strong first stage. Panel (b) shows that employment between 1951 and 1991 increased by about 50% more in municipalities located just South of the border relative to those located just North.

Figures 14 and 15 display the coefficient β_t for all outcome variables and years to capture the dynamic effects of CasMez's investments. Municipalities located South of the border received more funds over the 1951-1991 period, with a difference in cumulative investments of about €20,000 (2010 Euro). As a result, even 20 years after the end of the program, manufacturing employment increased 40% more in treated municipalities, as shown by Figure 15, Panel (a). Between 1951 and 2011, total employment and population increased 20% more South of the border. Panels (c) and (d) show that employment increased faster in the 1970s and 1980s, with population levels adjusting over time. The resulting employment rate dynamic, displayed in Panel (e), is characterized by substantial gains in the 1970s and 1980s, mitigated by population inflows in the following decades.

3.5 Summary of Municipal-Level Results

Municipality-level evidence on the impact of CasMez's investments points to substantial long-term partial equilibrium effects on labor-market outcomes. In particular, the combination of public infrastructure spending and firm grants has a particularly positive impact on manufacturing employment, with gains persisting even after the end of the program and suggesting the presence of robust agglomeration economies. These gains are accompanied by total employment and population gains. Municipal employment rates are positively affected by the program overall, although the strength and dynamics of these effects differ across specifications.

Table 4 summarizes the results across the three specifications. Following the 2SLS literature (Angrist et al., 1996), the ratio between the first-stage and the reduced-form coefficients estimates the impact of €1,000 (2010 Euro) per capita of cumulative CasMez's investments on the outcome variable of interest. Specifically, columns (1), (2), and (3) report the coefficients obtained from the static versions of Equations (1), (2), and (3), respectively, where the $\sum_{t\neq 1961}^{2011} \beta_t D_i$ terms are replaced by $(T_t \times D_i)$ and T_t denotes a dummy variable for the post-1961 period.

The first specification delivers the highest manufacturing employment, total employment, and employment rate responses to CasMez's investments. The coefficients displayed in column (1) imply that, over the 1961-2011 period, €1,000 (2010 Euro) worth of additional cumulative investments per capita caused municipal manufacturing employment, total employment, and employment rate to increase, on average, by 5.1%, 2.9%, and 0.72 percentage points, respectively. The impact on manufacturing employment decreases for the second and the third specifications. Columns (2) and (3) show that manufacturing employment increased by 3.1% and 2.4%, respectively, in response to €1,000 (2010 Euro) worth of additional cumulative investments per capita. Interestingly, the estimated coefficient is decreasing in the size of the first stage, suggesting that the magnitude of the effects is decreasing in the amount of cumulative investments per capita.

Simple back-of-the-envelope calculations recover two statistics of interest, namely the number of new jobs stemming from one new manufacturing job and the cost per new job created, for each of the three specifications, which I report in the top panel of Table 5. One additional manufacturing job created thanks to CasMez's investments increases employment in other sectors within the same municipality by 0.6-1.2 units, depending on the specifications. Since municipal employment in agriculture is not affected by CasMez's investments (Table 4), these new jobs are concentrated in the services sector. These estimates are somewhat lower than the 1.6 reported by Moretti (2010), arguably reflecting the relatively small size of Italian municipalities. The cost per new job created at the municipal level implied by my reduced-form analyses ranges between 6.5 and 12.1 times the 2010 GDP per capita in the South, depending on the specification.[10] Importantly, my analysis shows that municipal employment gains are persistent. Therefore, despite being high, these costs per new job created are still lower than the discounted flows of income gains they generate within the municipality.

3.6 Spillover Effects Within and Across Provinces

Three distinct identification strategies document the positive partial equilibrium effects of the big push on municipal manufacturing employment, total employment, population, and employment rates. However, assuming factors are to some extent mobile across municipalities, these gains may come, at least in part, at the expense of other areas. In this section, I extend the reduced-form analysis carried out at the municipal level to a more aggregated geographical level (i.e., provinces) with two objectives.[11] First, I obtain causally identified reduced-form parameters that account for *within-province* spillover effects. Second, I estimate the impact of CasMez's investments on cross-province migration flows, which in turn helps me quantify the *cross-province* spillover effects. In the subsequent sections of the paper, I use these estimates to recover the structural parameters of the model and perform simulations.

The intuition behind the spillover analysis follows Criscuolo et al. (2019) and is the following. If the impact of CasMez's investments on the outcomes of interest is lower at the province level than at the municipal level, then adverse spillover effects on neighboring municipalities (i.e., crowding-out effects) prevail over positive ones (i.e., crowding-in effects) within a province. Otherwise, positive spillovers outweigh the negative ones. In practice, this method tests for the presence of within-province cross-municipal spillover effects and delivers reduced-form estimates og the impact of CasMez's investments that absorb such spillovers.

To identify quasi-exogenous variation in investments across provinces in the South, I rely on province-

[10] These estimates are consistent with the firm-level estimates of cost per new job created provided by Cingano et al. (2022), who study the impact of a subsequent firm subsidy program in Italy (i.e., Law 488/1992).

[11] CasMez's jurisdiction counts 38 provinces, made of 62 municipalities each, on average.

level variation stemming from my first empirical strategy (i.e., early-approved vs. late-approved IDAs). Specifically, I instrument province-level cumulative investments per capita by an interaction of three variables. First, a dummy variable taking value 1 for provinces comprising early IDAs formed between 1960 and 1965. Second, a dummy variable taking value 1 for all periods after 1961, the closest Census year to 1960, when the first IDA was formed. Finally, I multiply this interaction by the baseline share of the provincial population residing in municipalities belonging to the IDA. Intuitively, provinces with a high population share residing in early-approved IDAs in 1951 should be exposed to more investments when the industrialization effort was implemented.

More formally, I estimate 2SLS coefficients from a static difference-in-differences design where the treatment dosage is increasing in the share of the province-level population residing in an IDA at baseline. The first-stage and reduced-form equations take the following form:

$$Y_{pt} = \alpha_p + \delta_{rt} + \beta(P_p \times D_p \times T_t) + \mathbf{X}'_{p1951}\Gamma_t + \varepsilon_{pt}, \tag{4}$$

where Y_{pt} denotes the outcome variable (i.e., decade-specific or cumulative CasMez's investments per capita for the first stage and labor market outcomes for the reduced form) in province p and period t, α_p denotes province fixed effects, δ_{rt} denotes region-specific trends, P_p is the share of the province-level population residing in a municipality that belongs to an IDA, D_p is a dummy variable for provinces comprising an early-approved IDA, and T_t is a dummy variable for the post-1961 period. As in the municipality-level specification, $\mathbf{X}'_{p1951}$ is a vector of baseline characteristics, including log population, the share of manufacturing employment, the manufacturing employment density, and the share of illiterate population, measured at the province level. These control variables interact with time dummies, Γ_t, to control for heterogeneous trends induced by differences in size, industry mix, agglomeration potential, and education levels across provinces. The identifying assumption requires that the fixed effects and control variables included in the specification absorb any variation across municipalities that correlates both with the instrument and the outcome variables.

Table 6 reports the 2SLS coefficients estimated at the municipality and province levels, revealing three critical findings. First, the percent effect of €1,000 (2010 Euro) cumulative investments per capita on manufacturing employment is lower at the province level than at the municipality level. This implies that some gains in manufacturing employment experienced at the municipal level crowd out manufacturing jobs in other municipalities within the same province. Second, CasMez's investments have a positive but not significant impact on province-level employment rates. This result suggests that higher employment rates at the municipality level might not result from reduced slack in the local labor market but from movers' higher propensity to work. Finally, total employment and population respond substantially to investments at the provincial level, revealing that crowding-out effects operate across province borders and significantly affect the rest of the country. Table 5, bottom panel, reports that one additional manufacturing job in the manufacturing sector induces an increase of 1.4 units of employment in other sectors, namely services, within the same province. This result is in line with estimates for the US reported by Moretti (2004). The cost per new job created at the provincial level is instead very similar to the one estimated at the municipal level.

In the context of post-WWII Italy, characterized by mass migratory waves from the lagging South to the industrialized Center-North, it is reasonable to hypothesize that a large part of province-level population gains induced by the regional big push program could stem from improved net migration flows. To test this hypothesis, I use data on province-to-province migration flows (Bonifazi and Heins, 2000) and estimate the contributions of changes in net migration flows to the rest of the South and to the Center-North to province-level population gains. Table 7, column (2), reports that 1.7% out of the 2.3% province-level increase in population induced by a €1,000 (2010 Euro) worth of additional cumulative investments per capita, about 3/4 of the effect, is due to improved domestic net migration flows. Columns (3) and (4) document that 0.9% and 0.8% of the 1.7% gain are due to improved net migration flows with the rest of the South and the Center-North, respectively.

Importantly, I further estimate that the improved net migration flows both with the rest of the South and the Center-North are explained by reduced out-migration rather than increased in-migration. Focusing on the impact on net migration flows to the Center-North, I document that CasMez's investments limited labor reallocation, particularly to the North-Western provinces of Milan (0.3%) and Turin (0.1%), the two most prominent industrial hubs of the country at the time and home of numerous firms that benefited from CasMez's grants to open new establishments in the South. To the extent that workers move across regions in response to changes in regional labor demand, these results document a shift in production across provinces within the South and from the Center-North to the South of the country. Therefore, to properly assess the national impact of the big push, I develop a general equilibrium model that accounts for these crowding-out effects.

4 Model

This section presents a multi-region growth model with public capital, factor mobility, and agglomeration economies. The model's objective is to quantify the long-run effects of a regional development program on national manufacturing output and regional labor productivity gaps, allowing for self-sustaining productivity gains and accounting for crowding-out effects induced by factor reallocation. The framework combines typical features of the growth (Solow 1956; Swan 1956) and economic geography (Roback 1982; Kleinman et al. 2023) literature.

4.1 Setup

The model features one sector (i.e., manufacturing) and N regions of endogenous size. In each region, there are three types of agents (i.e., workers, landlords, and a representative firm). Workers are homogeneous, supply one unit of labor inelastically to the representative firms, and choose where to live in every period. They derive their utility from consumption and amenities and are hand-to-mouth consumers. Landlords rent capital to the representative firms but do not supply labor. They maximize their lifetime utility by deciding how much to consume and save/invest in each period. Landlords are assumed to be immobile across regions but can invest in all regions at zero cost (i.e., capital is fully mobile, and the cost of capital is common across regions). The stock of private capital depreciates at a constant rate. The model allows for aggregate accumulation of capital. Its cross-regional allocation is instead determined by the period-by-period evolution of its regional demand curves.

The representative firm in each region produces a homogeneous good tradable at zero cost across regions using labor, capital, and a fixed factor. Productivity depends on a region-specific time-invariant component (e.g., geography, institutions), a time-specific region-invariant component (e.g., aggregate technological progress), regional public capital, and regional employment density (i.e., agglomeration economies). Public funds constituting the big push are exogenously allocated across regions and increase local productivity with diminishing returns. Agglomeration economies might stem from demand externalities, technology spillovers, and thick markets (Marshall 1890; Ciccone and Hall 1993; Glaeser and Gottlieb 2008; Kline and Moretti 2014), or even local state capacity. The model does not take a particular stance on the sources of agglomeration economies. Instead, it postulates a reduced-form positive relationship between local productivity and employment density to capture them.

Given this framework, a regional big push (i.e., an injection of public capital in one region) increases productivity in the targeted region. This, in turn, increases the local demand for private capital and labor. Private capital accumulation and agglomeration economies amplify the impact of the big push on local production, driving its persistent effect on the regional economy. However, higher local demand for capital and labor triggers crowding-out effects on the non-targeted regions. To approximate the long-run effects of a regional development program, I characterize the impact of changes in regional public capital on aggregate steady-state output, which depends on the direct effects of the big push on the targeted region and the crowding-out effects on the non-targeted regions.

4.2 Production

The model features one sector and N regions. A region indexed by i produces a homogeneous good, tradable at zero costs across regions, in any period t according to the following technology:

$$y_{it} = z_{it} k_{it}^{\alpha} F_i^{\beta} \ell_{it}^{1-\alpha-\beta}$$

where y_{it} denotes output, z_{it} denotes regional productivity, k_{it} denotes capital (i.e., buildings, structures, equipment), F_i denotes the fixed factor, and ℓ_{it} denotes labor.

To capture the impact of public investments in infrastructures and firm grants on regional productivity, as well as the persistence of this effect induced by agglomeration economies, I define $\ln(z_{it})$ as follows:

$$\ln(z_{it}) = z_i + \theta_t + \eta \ln(k_{it}^P) + \gamma_i \ln\left(\frac{\ell_{it-1}}{A_i}\right) + \varepsilon_{it},$$

where z_i captures region-specific time-invariant factors affecting productivity, θ_t denotes period-specific productivity shocks common across regions, k_{it}^P denotes public capital in region i and period t, and $\left(\frac{\ell_{it-1}}{A_i}\right)$ denotes employment density.[12] Employment density captures agglomeration economies and is assumed to affect productivity with a period lag. This ensures that the model delivers deterministic predictions in every period and prevents regions from achieving extremely different levels of manufacturing activity by chance in any given period (Krugman, 1991).

The parameter γ_i, the elasticity of productivity to employment density (i.e., the *agglomeration elasticity*), varies across regions to allow for the possibility that returns to scale are higher in regions targeted by the big push, or vice versa. The regularity condition $\beta > \gamma_i$ ensures that there is no equilibrium in which all workers are located in one region only. The intuition behind this condition is that the decreas-

[12]The term A_i denotes region i's area.

ing returns to the fixed factor act as a form of congestion force for regional production that counteracts agglomeration economies. Specifically, higher ℓ_{it} causes labor productivity in region i to fall because of the crowding of the fixed factor more than to increase thanks to agglomeration economies.

Combining the labor and capital demand equations stemming from profit maximization, I obtain the following expression for regional labor demand:

$$\ell_{it} = \left(\frac{1-\alpha-\beta}{w_{it}}\right)^{\frac{1-\alpha}{\beta}} \left(\frac{\alpha}{r_t}\right)^{\frac{\alpha}{\beta}} z_{it}^{\frac{1}{\beta}} F_i. \tag{5}$$

where w_{it} denotes the wage rate in region i and period t and r_t denotes the cost of capital in period t, common across regions. Intuitively, labor demanded in region i and period t is decreasing in the wage rate w_{it} and the cost of capital r_t and increasing in region-specific productivity z_{it} and the fixed factor F_i.

4.3 Labor Supply and Equilibrium Employment

Workers' utility in region i is defined as follows:

$$u_{it}^w = a_{it} c_{it}^w$$

where a_{it} denotes amenities and c_{it}^w denotes worker's consumption. Workers supply one unit of labor inelastically and are hand-to-mouth, i.e., they exhaust their budget in each period. Therefore, their indirect utility function can be expressed as follows: $u_{it}^w = a_{it} w_{it}$. Assuming that region-specific amenities are constant (i.e., $a_{it} = a_i$) and workers migrate to equalize utility across locations in any period t (i.e., $u_{it}^w = u_{jt}^w = \bar{u}_t^w$ for all regions i and j), I derive the following expression for the regional labor supply:

$$w_{it} = \frac{\bar{u}_t^w}{a_i} \tag{6}$$

Combining Equations (5) and (6), I obtain an expression for equilibrium employment:

$$\ell_{it} = \left[\frac{(1-\alpha-\beta)a_i}{\bar{u}_t^w}\right]^{\frac{1-\alpha}{\beta}} \left(\frac{\alpha}{r_t}\right)^{\frac{\alpha}{\beta}} z_{it}^{\frac{1}{\beta}} F_i. \tag{7}$$

Regional equilibrium employment is increasing in regional amenities, productivity, and fixed factor endowment and decreasing in the cost of capital and the indirect utility of all workers (i.e., wages and amenities in the other regions of the economy). The aggregate labor supply to the manufacturing sector takes the following form:

$$\sum_{i}^{N} \ell_{it} = L_t = L(\bar{u}_t^w).$$

This assumption implies that the aggregate labor supply to the manufacturing sector is not inelastic, and therefore increases in regional manufacturing productivity result in higher aggregate manufacturing employment.

4.4 Capital Accumulation

Landlords are geographically immobile and rent capital to representative firms. Capital consists of buildings and structures that are geographically immobile once installed and are assumed to depreciate at the constant rate δ. Landlords' intertemporal utility takes the following form:

$$\upsilon_{it}^k = E_t \sum_{s=0}^{\infty} \phi^{t+s} \frac{(c_{it+s}^k)^{1-\psi}}{1-\frac{1}{\psi}}$$

where c_{it}^k denotes landlords' consumption, ϕ the discount factor, and ψ the intertemporal elasticity of substitution. As landlords are assumed to be geographically immobile, amenities are omitted from their intertemporal utility. The intertemporal budget constraint requires that rental flows from the existing stock of capital equal the sum of landlords' consumption and the value of investments, net of depreciation, i.e., $r_t k_{it} = c_{it}^k + k_{it+1} - (1-\delta)k_{it}$.[13] Importantly, the term k_{it} denotes the stock of capital in the hands of landlords located in region i at period t and the cost of capital r_t is not region-specific, as landlords allocate capital to equalize returns across regions. After defining $R_t = r_t + 1 - \delta$, the gross return on capital, the landlords' problem takes the following form:

$$\max_{c_{it+s}^k, k_{it+s+1}} \frac{(c_{it}^k)^{1-\psi}}{1-\frac{1}{\psi}} + \phi E_t \upsilon(k_{it+1}, t+1)$$

subject to

$$c_{it}^k + k_{it+1} = R_t k_{it}$$

I follow Kleinman et al. (2023) to show that:

$$c_{it} = \xi_t R_t k_{it}$$

[13] I am implicitly assuming that the price of one unit of consumption c_{it}^k is the same as one unit of capital k_{it}.

$$k_{it+1} = (1-\xi_t)R_t k_{it} \tag{8}$$

where ξ_t is defined recursively as follows:

$$\xi_t^{-1} = 1 + \phi^{\psi}(E_t[R_{t+1}^{\frac{\psi-1}{\psi}}\xi_{t+1}^{-\frac{1}{\psi}}])^{\psi} \tag{9}$$

This result implies that landlords have a linear saving rate $(1-\xi_t)$ out of current period wealth $R_t k_{it}$. In general, landlords' saving rate $(1-\xi_t)$ is endogenous, forward-looking, and depends on the expectation of the sequence of future returns on capital R_{t+s}, the discount rate ϕ, and the intertemporal elasticity of substitution ψ. In the particular case of log-utility ($\psi = 1$), landlords have a constant saving rate ϕ, as in the Solow (1956) and Swan (1956) models.

Since I use steady-state approximations of the model to derive the long-term effects of the regional development program, I derive closed-form expressions for the steady-state saving rate and cost of capital. Combining Equations (8) and (9) with the definition of the gross return on capital R_t, I derive that the steady-state saving rate equals the discount rate (i.e., $1-\xi = \phi$) and the following expression for the steady-state cost of capital:

$$r = \frac{1-\phi(1-\delta)}{\phi}.$$

These derivations imply that the steady-state saving rate $(1-\xi)$ and cost of capital r are constant and depend solely on the discount rate, ϕ, and the depreciation rate, δ.

4.5 Regional Big Push and Aggregate Output

Combining Equation (5) with the expression for the labor share of income and taking logs, I derive the following expression for $\ln(y_{it})$:

$$\ln(y_{it}) = \frac{\alpha}{1-\alpha}\ln(\alpha) + \frac{1}{1-\alpha}\ln(z_{it}) - \frac{\alpha}{1-\alpha}\ln(r_t) + \frac{\beta}{1-\alpha}\ln(F_i) + \frac{1-\alpha-\beta}{1-\alpha}\ln(\ell_{it}).$$

Given the definition of regional productivity, I derive the following expression for region i's steady-state output:

$$\ln(y_i) = C_{1i} + \frac{\eta}{1-\alpha}\ln(k_i^P) + \frac{1-\alpha-\beta+\gamma_i}{1-\alpha}\ln(\ell_i),$$

where C_{1i} is a region-specific exogenous term.[14] Region i's steady-state output is increasing in regional public capital and employment. To evaluate the impact of a change in k_i^P, public capital in region i, on aggregate manufacturing output, Y, I use steady-state approximations of the model. I start by deriving an expression for the impact of a change in k_i^P on region i's steady-state output:

$$\frac{\mathrm{d}y_i}{\mathrm{d}k_i^P} = \frac{1}{1-\alpha}\left[\frac{\eta}{k_i^P}y_i + (1-\alpha-\beta-\gamma_i)\frac{y_i}{\ell_i}\frac{\mathrm{d}\ell_i}{\mathrm{d}k_i^P}\right]. \tag{10}$$

The impact of a change in k_i^P on aggregate steady-state output is the sum of Equation (10) across all regions in the economy. If output per worker and the agglomeration elasticities are assumed to be constant within two macro-regions (i.e., $y_{iS}/\ell_{iS} = y_{jS}/\ell_{jS}$, $\gamma_{iS} = \gamma_{jS}$, and $\gamma_{iN} = \gamma_{jN}$ for all regions $i \neq j$ within the Center-North and the South of the economy) and the big push is implemented only in one macro-region (i.e., the South), then the expression for the impact of a change in k_i^P on aggregate output Y reduces to the following straightforward expression:

$$\underbrace{\frac{\mathrm{d}Y}{\mathrm{d}k_S^P}}_{\text{Aggregate effect}} = \underbrace{\frac{\eta}{1-\alpha}\frac{y_S}{k_S^P} + \frac{1}{1-\alpha}\frac{\mathrm{d}\ell_S}{\mathrm{d}k_S^P}\left[\frac{y_S}{\ell_S}(1-\alpha-\beta+\gamma_S)\right]}_{\text{Direct effect on targeted region}} + \underbrace{\frac{1}{1-\alpha}\frac{\mathrm{d}\ell_N}{\mathrm{d}k_S^P}\left[\frac{y_N}{\ell_N}(1-\alpha-\beta+\gamma_N)\right]}_{\text{Crowding-out effect on non-targeted region}}. \tag{11}$$

This expression decomposes the total impact of a change in k_S^P on aggregate output Y into a direct effect on the targeted region and a crowding-out effect on the non-targeted region.

The direct effect on the targeted region can be further decomposed into a first-order productivity effect and a second-order crowding-in effect. The first-order productivity effect is increasing in the parameter $\eta/(1-\alpha)$ and the inverse of the regional public capital-to-output ratio, i.e., (y_S/k_S^P). The parameter η denotes the elasticity of regional productivity to regional public capital, the parameter $(1-\alpha)$ governs the amplification of the impact of public capital on productivity due to regional private capital accumulation, and the inverse of the public capital-to-output ratio captures diminishing returns to public capital. The second-order crowding-in effect is increasing in the regional employment gains induced by the big push program, $\mathrm{d}\ell_S/\mathrm{d}k_S^P$, the baseline regional output per worker, (y_S/ℓ_S), and the regional agglomeration elasticity, γ_S. The regional employment gains, $(\mathrm{d}\ell_S/\mathrm{d}k_S^P)$, capture the number of individuals working in the Southern manufacturing sector as a result of CasMez's investments that would have otherwise migrated or not worked in the manufacturing sector.

Finally, the crowding-out effect on the non-targeted region is increasing in the regional employment

[14] See the Appendix for the derivation and the full expression.

losses induced by the big push program, $(\mathrm{d}\ell_N/\mathrm{d}k_S^P)$, the baseline regional output per worker (y_N/ℓ_N), and the regional agglomeration elasticity, γ_N. The regional employment losses, $(\mathrm{d}\ell_N/\mathrm{d}k_S^P)$, capture the number of manufacturing jobs lost in the Center-North, which correspond to the number of individuals staying in the South as a result of CasMez's investments that would have otherwise migrated to the Center-North and worked in the manufacturing sector.

5 CasMez's Impact on the Regional and National Economies

This section quantifies the impact of CasMez's investments on regional and aggregate industrial production and manufacturing employment, as well as on the Center-North vs. South labor productivity gap in manufacturing. I recover the structural parameters of the model by combining calibration techniques with my province-level reduced-form estimates. Then, I discuss the results of the model-based analysis and perform two counterfactual exercises. With the first exercise, I evaluate the role of regional differentials in the manufacturing employment rate, output per worker, and agglomeration elasticities in explaining the program's national impact. With the second exercise, I assess the program's effects under an alternative allocation of resources.

5.1 Estimating Agglomeration Elasticities in the Center-North and the South

The first step to quantify the impact of CasMez's investments on national industrial production is to estimate the region-specific agglomeration elasticities, γ_N and γ_S. To do that, I follow the methodology developed by Kline and Moretti (2014). I start by considering Equation (7). Taking logs, I derive the following expression for the equilibrium level of employment in region i and period t:

$$\ln(\ell_{it}) = \kappa_i + \delta_t + \frac{\eta}{\beta}\ln(k_{it}^P) + \frac{\gamma_i}{\beta}\ln\left(\frac{\ell_{it-1}}{A_i}\right) + \omega_{it},$$

where κ_i denotes a region-specific constant term, δ_t denotes a time-specific constant term, and $\omega_{it} = (1/\beta)\varepsilon_{it}$. I estimate this structural equation using a two-way fixed effects regression of period-t manufacturing employment on the lag of manufacturing employment density and recover the parameter (γ/β) separately for the Center-North and the South. Conveniently, κ_i is absorbed by unit fixed effects, and δ_t is absorbed by time fixed effects. Formally, I estimate the following specification separately for the Center-North and the South:

$$\ln(\ell_{it}) = \kappa_i + \delta_{rt} + \frac{\gamma}{\beta}\ln\left(\frac{\ell_{it-1}}{A_i}\right) + \mathbf{X}'_{i1951}\Gamma_t + \nu_{it}, \tag{12}$$

where ℓ_{it} is manufacturing employment, κ_i denotes unit fixed effects, δ_{rt} controls for region-specific trends, (γ/β) is the coefficient of interest, allowed to be heterogeneous between the two macro-regions N and S. (ℓ_{it-1}/A_i) measures lagged manufacturing employment density, $\mathbf{X}'_{i1951}$ is a vector of baseline characteristics interacted with time dummies, Γ_t, to control for heterogeneous trends induced by differences in size, industry mix, agglomeration potential, education levels, and IDA status across units, and ν_{it} is the error term.

A threat to identification is that the error term $\nu_{it} = (\eta/\beta)\ln(k^P_{it}) + (1/\beta)\varepsilon_{it}$ is likely correlated with lagged manufacturing employment density and the outcome of interest. For instance, contemporaneous CasMez's investments are more likely to be channeled in areas characterized by high manufacturing density and affect current manufacturing employment at the same time. In addition, if local productivity is serially correlated (e.g., follows an AR(1) process), the impact of past agglomeration on current employment might be either understated or overstated, depending on the sign of the autocorrelation coefficient.

Some of these concerns should be attenuated by the inclusion of $\mathbf{X}'_{i1951}\Gamma_t$. To the extent that the evolution of CasMez's investments and productivity over time is fully captured by baseline characteristics, including the IDA status, even a simple OLS regression recovers the parameter of interest. However, it could still be the case that local productivity shocks are serially correlated. This would imply that municipalities with higher manufacturing density are characterized by heterogeneous productivity trends that affect manufacturing employment independently of agglomeration economies. To address this concern, I instrument the one-decade lag of manufacturing employment density with its two-decade lag. My instrument is uncorrelated with present and one-decade lag productivity shocks by construction. Therefore, the identifying assumption is that, after conditioning on all the control variables included in Equation (12), productivity shocks are independent over a 20-year horizon. This assumption is pretty conservative in light of theories that describe local growth as the result of random productivity processes (Eeckhout, 2004).

Table 8 reports the 2SLS estimated coefficients for the Center-North and the South, as well as the difference between the two. Assuming a common β between the two regions, the agglomeration elasticity is about 24% higher in the Center-North than in the South. In contrast to the previous literature, this result empirically documents that the agglomeration elasticities are not constant across regions and, in my context, increasing in regional manufacturing density. A higher agglomeration elasticity in the non-targeted region than the targeted one lowers the aggregate output gains from the regional big push, as it amplifies crowding-out effects relative to crowding-in effects.

5.2 Calibration

To quantify the regional and aggregate impact of the regional development program on industrial production, migration flows, and labor productivity differentials over the 1951-2011 period, I use steady-state approximations of the model. Recall Equation (11):

$$\frac{\mathrm{d}Y}{\mathrm{d}k_S^P} = \frac{\eta}{k_S^P}\frac{y_S}{1-\alpha} + \frac{1}{1-\alpha}\frac{\mathrm{d}\ell_S}{\mathrm{d}k_S^P}\left[\frac{y_S}{\ell_S}(1-\alpha-\beta+\gamma_S)\right] + \frac{1}{1-\alpha}\frac{\mathrm{d}\ell_N}{\mathrm{d}k_S^P}\left[\frac{y_N}{\ell_N}(1-\alpha-\beta+\gamma_N)\right]$$

To perform this exercise, it is necessary to calibrate the parameters η, α, β, γ_S, and γ_N and measure the quantities $\mathrm{d}k_S^P$, k_S^P, $(\mathrm{d}\ell_S/\mathrm{d}k_S^P)$, $(\mathrm{d}\ell_N/\mathrm{d}k_S^P)$, y_S, y_N, ℓ_S, and ℓ_N. Table 9 lists these parameters and quantities and reports the value used for the model-based analysis, the methodology followed to compute them, and the source.

I start by calibrating the capital share of income $\alpha = 0.3$ (Griliches, 1967) and the regional labor supply elasticity $\frac{1-\alpha}{\beta} = 1.5$ (Kline and Moretti, 2014). These values imply that $\beta = 0.47$. Now, I use the estimates of $(\hat{\gamma/\beta})$ reported in Table 8 to recover $\gamma_S = 0.15$ and $\gamma_N = 0.19$. Reassuringly, these estimates are in line with values reported in the literature on agglomeration elasticities. The quantities $\mathrm{d}k_S^P$, y_S, (y_S/ℓ_S), and (y_N/ℓ_N) can be directly measured from original data sources. Specifically, I measure $\mathrm{d}k_S^P$, the time series of CasMez's investments, by aggregating the municipality-level data, and y_S, (y_S/ℓ_S), and (y_N/ℓ_N) from SVIMEZ (2011). This volume reports the time series of industrial production and the number of manufacturing workers starting from 1950 for both the Center-North and the South. I convert all monetary values to 2010 Euros to make them comparable across years.

The parameter η still needs to be recovered, and k_S^P, the time series of Southern public capital stock, cannot be reliably measured. Therefore, η and the k_S^P cannot be separately identified. However, the ratio of the two, (η/k_S^P), is sufficient to perform the model-based analysis and can be obtained by combining estimation and calibration techniques. Specifically, consider the equation for the steady-state regional manufacturing employment:

$$\ln(\ell_i) = C_{2i} + \frac{\eta}{\beta - \gamma_i} \ln(k_i^P),$$

where C_{2i} is a region-specific exogenous term. From the elasticity of steady-state regional manufacturing employment to public capital, I derive a closed-form expression for the parameter of interest (η/k_i^P) as a function of the semi-elasticity of regional manufacturing employment to CasMez's investments:

$$\frac{\partial \ln(\ell_i)}{\partial \ln(k_i^P)} = \frac{\mathrm{d}\ell_i}{\ell_i} \frac{k_i^P}{\mathrm{d}k_i^P} = \frac{\eta}{\beta - \gamma_i} \implies \frac{\eta}{k_i^P} = \frac{\mathrm{d}\ell_i}{\ell_i} \frac{1}{\mathrm{d}k_i^P} (\beta - \gamma_i).$$

Notice that Table 6 reports the reduced-form estimate for $\frac{\mathrm{d}\ell_i}{\ell_i} \frac{1}{\mathrm{d}k_i^P} = 0.037$, while Table 8 reports the estimate for the agglomeration elasticity $\gamma_S = 0.15$. Combining these two results with the calibration of $\beta = 0.47$, it follows that $(\eta/k_S^P) = 0.037 \times (0.47 - 0.15) = 0.012$.

This derivation is consistent with the intuition that the response of regional employment to public investments is informative about the regional gains in industrial production induced by the program. However, the crowding of the fixed factor and regional agglomeration economies also contribute to the long-run impact of investments on output, and their contribution is accounted for by the crowding-in and crowding-out terms in Equation (11). Therefore, to recover (η/k_i^P), the semi-elasticity of regional manufacturing employment to public investments needs to be re-scaled by $(\beta - \gamma_i)$.

Finally, combining estimates in Tables 6 and 7, I quantify $(\mathrm{d}\ell_S/\mathrm{d}k_S^P)$ and $(\mathrm{d}\ell_N/\mathrm{d}k_S^P)$. Recall that the quantity $(\mathrm{d}\ell_S/\mathrm{d}k_S^P)$ denotes the difference between the total number of manufacturing jobs created thanks to CasMez's investments and the number of manufacturing jobs crowded out within the South, while the quantity $(\mathrm{d}\ell_N/\mathrm{d}k_S^P)$ captures the number of manufacturing jobs crowded out from the Center-North. To obtain the total increase in Southern manufacturing jobs due to CasMez's investments, I calculate the manufacturing job gains implied by the province-level reduced-form parameter 0.037 reported in Table 6 and the time series of cumulative CasMez's investments.

To compute manufacturing employment crowded out within the South and in the Center-North, I first calculate the population losses implied by the province-level reduced-form parameters reported in Table 7. Specifically, I multiply the parameter 0.008 (0.009) by the baseline Southern population and the time series of CasMez's investments to recover the number of individuals who did not migrate to the Center-North (to other areas of the South) as a result of the program. Then, I assume that those who did not migrate as a result of the cross-regional shift in manufacturing production would have been employed in manufacturing with the same probability of an individual living in their counterfactual destination region. This assumption is verified if the ratio between regional manufacturing employment and population (i.e., the manufacturing employment rate) in the Center-North and in the South did not change in response to CasMez's investments. In practice, I multiply regional population losses due to CasMez's investments by the regional manufacturing employment rate. An implication of this assumption is that one less migrant from the South to the Center-North increases crowding-out effects more than one less migrant to other areas within the South, as the Center-North manufacturing employment rate, output per worker, and agglomeration elasticity are higher than the Southern ones.

5.3 Regional and Aggregate Effects

According to the model-based analysis displayed in Figure 16, 2011 industrial production in the South was 55% higher than what it would have been without CasMez's activity (i.e., €60.6 billion vs. €38.9 billion). The streams of gains accruing to the South over the 1951-2011 period in terms of increased industrial production translate into an average increase of 35.3% per year relative to the counterfactual. However, crowding-out effects are sizeable. In 2011, industrial production in the Center-North was 4.1% lower than in the counterfactual (i.e., €286.6 billion vs. €295.9 billion). Over the whole 1951-2011 period, the Center-North lost an average of 2.6% per year of industrial production due to CasMez's activity. Summing the direct effects on the targeted region and the crowding-out effects on the non-targeted region, I conclude that industrial production in Italy was 3.7% higher than what it would have been in the absence of CasMez's investments (€347.2 billion vs. €334.9 billion) and it increased by an average of 2.7% per year over the whole 1951-2011 period thanks to CasMez's activity.

To evaluate the cost-effectiveness of the program, I implement the following methodology. First, I compute the yearly national gains in terms of industrial production. Then, I discount them and the costs associated with CasMez's investments to 1951, applying a real annual discount rate of 3%. Figure 17 displays the discounted gains in terms of industrial production for the South (blue bar), the Center-North (red bar), and Italy as a whole (green bar), as well as the discounted CasMez's expenditures (gray bar). I divide the discounted aggregate industrial production gains by the discounted CasMez's expenditures and define the resulting statistic as the *long-run aggregate multiplier* of CasMez's investments. This summarizes the impact of the big push on national industrial production.

I find that the long-run aggregate multiplier of CasMez's investments was 1.3, implying that the gains in terms of aggregate industrial production accrued up to 2011 outweighed the program's costs.

However, when performing the same calculation focusing only on the South, I compute a long-run regional multiplier of 2.2. Therefore, the regional big push program had substantially positive long-term effects on the targeted region, as well as sizeable crowding-out effects on the non-targeted region, which lowered by 41% the manufacturing output gains implied by the partial equilibrium analysis. One important caveat of this analysis is that it accounts only for the operating costs of the program, ignoring the potentially conspicuous costs of funds and the overhead costs related to CasMez's activity.

The model-based analysis also allows me to examine the impact of the program on population and manufacturing employment dynamics in the South and in the Center-North. The simulation indicates that, without the program, about 1.6 million additional individuals would have migrated from the South to the Center-North of the country ($>$ 40% relative to the counterfactual), of which about 309,000 would have worked in the manufacturing sector. Figure 18 displays the evolution of manufacturing employment in the South, the Center-North, and the whole country with and without CasMez's activity. Interestingly, manufacturing employment levels would now be even lower than the 1951 ones in the South and substantially higher in the Center-North in the absence of CasMez's investments. These regional dynamics reflect the decreased outmigration from the South to the Center-North following CasMez's activity. Overall, the Italian manufacturing sector added around 137,000 jobs relative to the counterfactual.

The dynamics of manufacturing output and employment in the South relative to the Center-North determine the impact of CasMez's investments on the manufacturing labor productivity gap between the two regions. Figure 19 shows the time series of the ratio between the Center-North and the South manufacturing output per worker from 1951 to 2011 with and without CasMez's investments. Perhaps surprisingly, more than 80% of the observed convergence in labor productivity would have occurred even in the absence of the program. The intuition behind this result is that, without CasMez's investments, the migration flows from the South to the Center-North would have been considerably larger. In turn, larger migration flows would have exacerbated the crowding of the fixed factor of production in the Center-North, causing regional labor productivity to fall. The reverse dynamic would have occurred in the South, with sizeable mitigating effects on the Center-North vs. South manufacturing labor productivity gap. Atalay et al. (2023) make a similar argument in contemporaneous work studying the impact of a place-based industrial policy in Turkey. In contexts characterized by high factor mobility, regional development programs affect the relative size of the regional manufacturing sectors rather than their relative labor productivity.

5.4 Two Counterfactuals

The goal of this subsection is twofold. First, I intend to quantify the contribution of regional differentials in the manufacturing employment rate, output per worker, and agglomeration elasticities in amplifying the crowding-out effects induced by CasMez's investments. Second, I perform a counterfactual exercise to clearly illustrate the distinction between cost-effectiveness and optimality of CasMez's investments. Specifically, I simulate the impact of a program of the same size as CasMez without any regional target (i.e., a *place-blind* program) and show that the implied long-run effects on national industrial production would have been larger.

For the first exercise, I simulate the model removing South vs. Center-North differentials in the manufacturing employment rate, the manufacturing output per worker, and the agglomeration elasticities once at a time, recording the response of the long-run aggregate multiplier to quantify the contribution to each differential to the crowding-out effects. Intuitively, the larger the response of the long-run aggregate multiplier to the removal of one specific regional differential, the larger the contribution of that regional differential to the crowding-out effects. Table 10 shows the results of 8 simulations, indicating which parameter or quantity of the Center-North was set at the level of the South for each simulation. The fourth column shows how the long-run aggregate multiplier changes when any given regional differential is removed, with the first row representing the baseline scenario.

The long-run aggregate multiplier is exceptionally responsive to removing regional differentials in the manufacturing employment rate, increasing from its baseline value of 1.3 to 1.8. This results from the crowding-out effects being particularly amplified by the differential incidence of the manufacturing sector in the Center-North relative to the South. Instead, the multiplier is only marginally responsive to the removal of regional differentials in manufacturing output per worker and agglomeration elasticity. When removing all the differentials, the long-run aggregate multiplier increases to 1.9. Therefore, regional differentials in fundamentals reduce the long-run aggregate multiplier by 37% (i.e., from 1.9 to 1.3) and explain 70% of the crowding-out effects induced by CasMez's investments. A natural implication of these findings is that in a context with less marked differentials in regional fundamentals, the regional big push program would have increased aggregate manufacturing output much more substantially.

For the second exercise, I used the structural model to simulate the impact of a program of the same size as CasMez but place-blind (i.e., not targeting the South nor the Center-North specifically). Performing this exercise requires an assumption regarding the direct impact of public investments on the productivity of the Center-North (i.e., η/k_N^P). Decreasing returns of regional productivity to public capital imply that an additional Euro spent in the Center-North, if already endowed with a stock of functioning infrastructures, should increase regional productivity less than in the South. Since I do not observe the evolution of the public capital stock in the Center-North and the South, I assume that the stock of public capital per capita in the Center-North was half the one in the South (i.e., $k_N^P = 2 \times k_S^P$) for the whole 1951-2011 period. Then, $\eta/k_N^P = 1/2 \times \eta/k_S^P$.

The model simulation indicates the long-run aggregate multiplier of such a program would have been 1.7. Comparing the aggregate multiplier with the corresponding 1.3 estimated for CasMez, I conclude that, even under extremely conservative assumptions regarding the relative stock of public capital in the two macro-regions, channeling the same amount of resources equally across regions would have resulted in larger aggregate gains in terms of industrial production. These results emphasize that regional big push programs can be cost-effective but they are unlikely to be optimal.

6 Conclusion

Regional disparities in many countries often motivate large-scale regional development programs to foster economic activity in distressed areas. However, the effects of these policies are *ex ante* ambiguous. Their desirability depends on their costs, the presence of long-term self-sustained productivity gains induced by public investments, and the size of crowding-out effects on the more productive areas of the country.

In this paper, I study the regional and aggregate long-term effects of one of the largest regional development programs in history, which devoted around $450 billion (2010 USD) between 1950 and 1992 to fostering the industrialization of the Italian South. To do so, I combine reduced-form evidence consistent across three distinct identification strategies with model-based analysis to account for cross-regional crowding out effects induced by factor mobility. I find that the program substantially boosted manufacturing activity in the South, with productivity gains persisting up to 20 years after the end of the program. I interpret this result as evidence of agglomeration economies in the manufacturing sector.

At the same time, the program diverted industrial production from the highly productive Center-North, thus limiting the ongoing mass migratory waves from the South. In the context of my model, distorting the spatial allocation of capital and labor toward less productive regions induces crowding-out effects. Calibration exercises reveal that these effects were sizeable and reduced the national industrial production gains induced by the program by about 41%. Nevertheless, these gains are positive and larger than its costs. Interestingly, most of the South vs. Center-North convergence in manufacturing output per worker observed between 1951 and 2011 would have occurred even in the absence of the program. This follows the intuition that larger migration flows from the South to the Center-North, rather than productivity-enhancing investments and capital flows, would have spurred convergence in the counterfactual scenario.

In conclusion, I document that regional big push programs can promote structural change in distressed regions, considerably increase the relative size of their economies, and be cost-effective in the long run. In contexts characterized by high factor mobility and large regional productivity differentials, general equilibrium effects substantially mitigate the programs' impact on aggregate output and regional convergence. Importantly, cost-effectiveness does not imply optimality. A counterfactual exercise reveals that if the same amount of resources were invested equally across regions, the impact of the program on national industrial production would have been higher.

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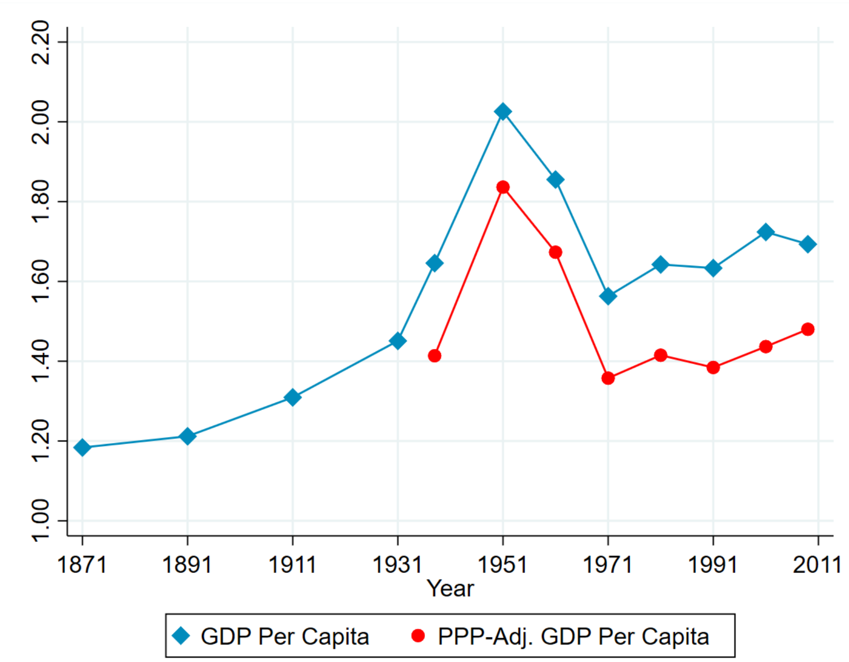
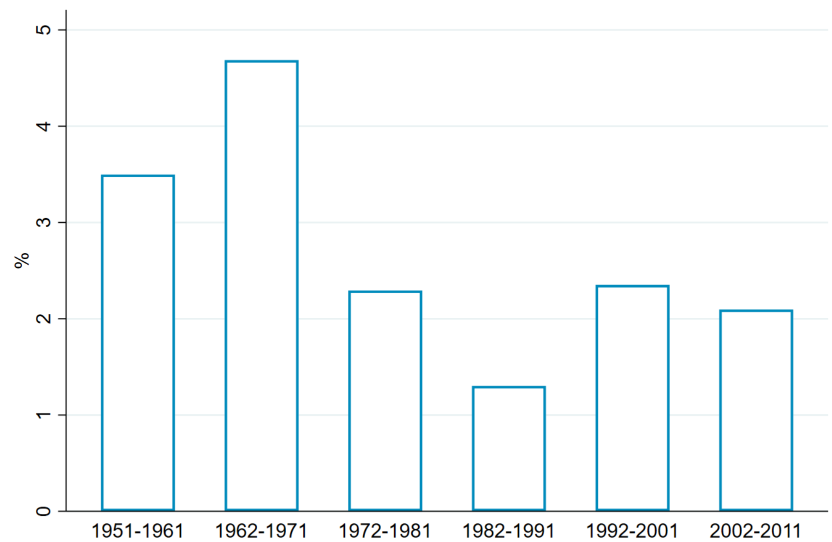
Main Figures and Tables

Figure 1: Center-North vs. South per-capita GDP Ratio



Notes. The figure shows the time series of the Center-North vs. South per-capita GDP ratio for the 1871-2011 period. A ratio of 1 implies no gap. The light blue line displays the ratio not adjusted for regional PPP, while the red line displays the ratio adjusted by regional purchasing power. Data source: Vecchi et al. (2011).

Figure 2: South → Center-North Net Outmigration Rates, by Decade

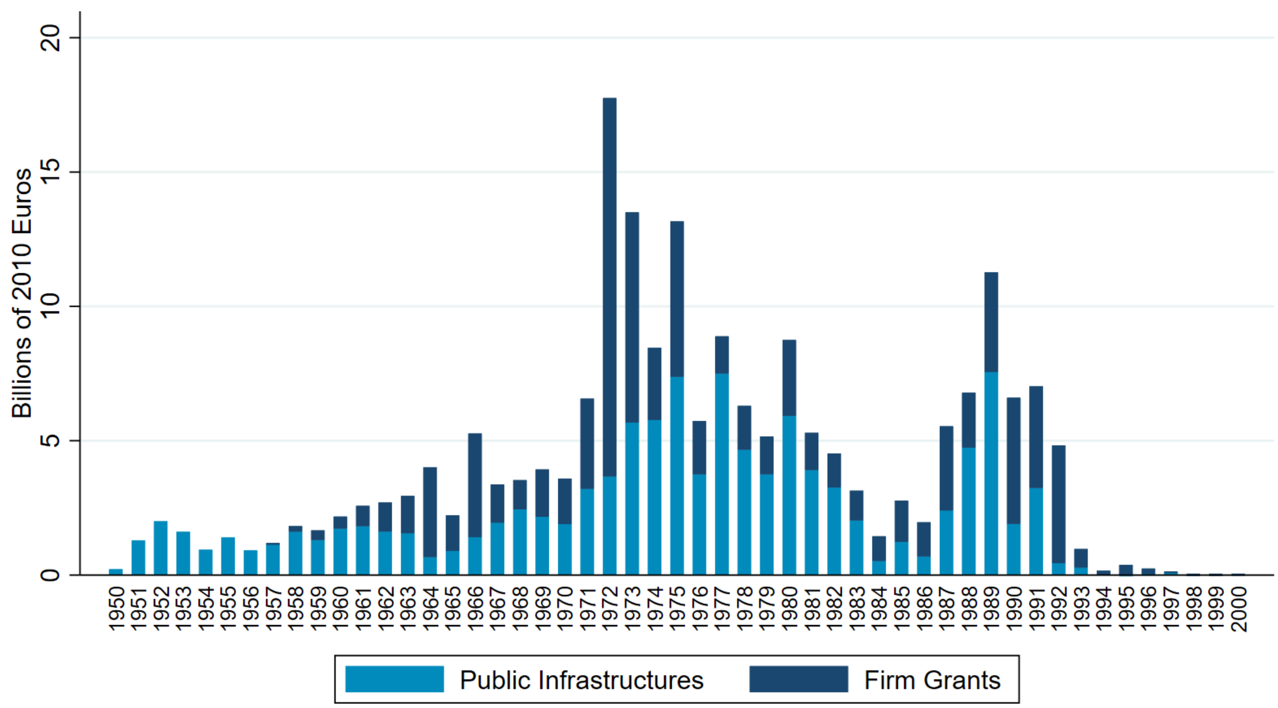


Notes. The figure shows South to Center-North net outmigration rates, by decade. Net outmigration is computed as the difference between the number of individuals moving from the South to the Center-North and the number of individuals moving from the Center-North to the South. It is converted into a rate by dividing this difference by the total Southern population in 1951. The number computed for the 1951-1961 period is obtained by extrapolating to the 1951-1954 period the average annual outmigration rate computed for the period 1955-1961, for which the data are available. Province-to-province data on migration flows come from Bonifazi and Heins (2000), while population data come from the 1951 population Census.

Figure 3: CasMez's Jurisdiction

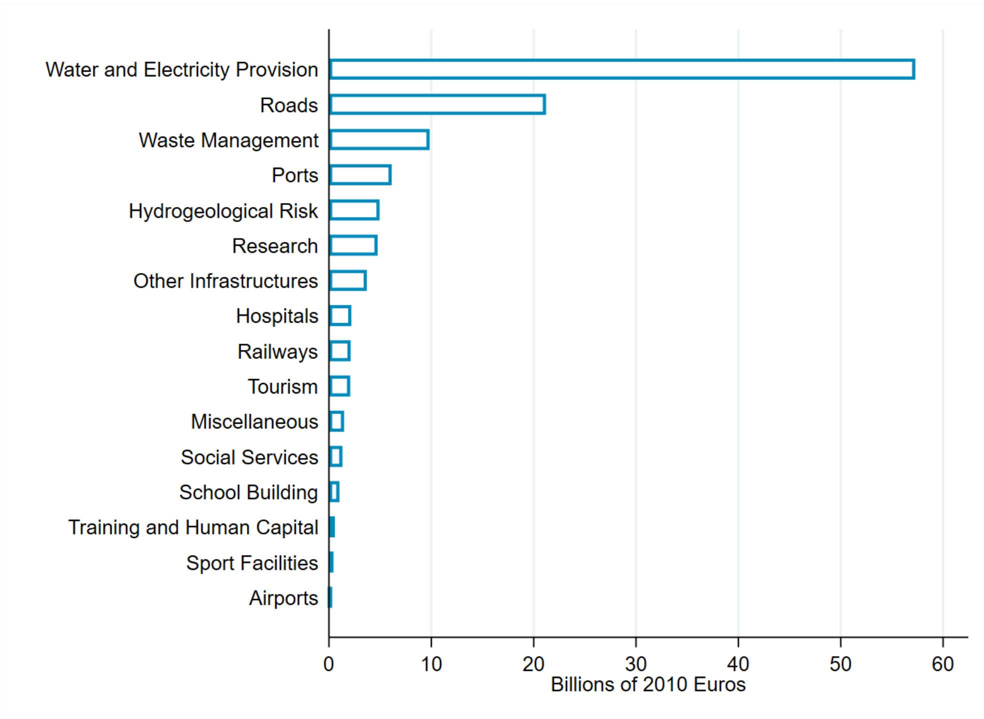
Notes. This figure shows a map of Italy divided into municipal territories. The dark blue areas denote municipalities belonging to CasMez's jurisdiction. CasMez's jurisdiction includes the regions of Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria, Sicily, and Sardinia, the provinces of Latina and Frosinone and parts of the provinces of Rieti and Roma in Lazio, parts of the provinces of Ascoli Piceno in Marche, and the municipalities belonging to the Elba, Giglio, and Capraia Islands in Tuscany.

Figure 4: Time Series of CasMez's Investments, by Type



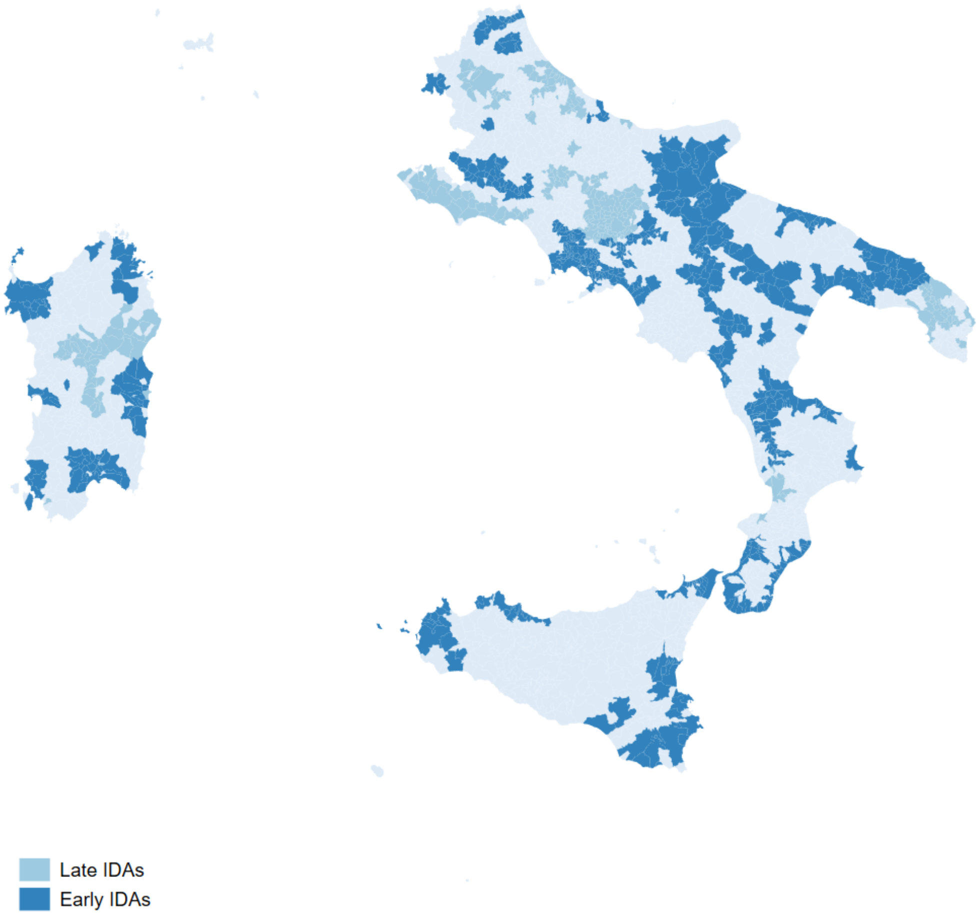
Notes. The figure shows the time series of CasMez's investments, decomposed between "Public Infrastructures" and "Firm Grants/Loans". The time series covers the whole period of CasMez's activity (i.e., 1950-1992) and the years after, up to 2000. For each year, the bar indicates the billions of 2010 USD spent by CasMez. The dark blue portion of the bar measures firm grants and loans, while the light blue portion of the bar measures investments in public infrastructures. Firm grants started in 1957, after the approval of Law 634/1957 which shifted the prerogatives of CasMez toward industrialization. Investments drastically decreased after 1992, the end of the program. Data on CasMez's investments come from the *Archivi dello Sviluppo Economico Territoriale* (ASET). Website: https://aset.acs.beniculturali.it/aset-web/.

Figure 5: Time Series of CasMez's Investments, by Type



Notes. The figure shows how CasMez's spending in "Public Infrastructures" is allocated across different types of projects over the whole 1950-1992 period. Each light blue bar indicates the billions of 2010 Euros approved by CasMez for each public infrastructure category. Data on CasMez's investments come from the *Archivi dello Sviluppo Economico Territoriale* (ASET). Website: https://aset.acs.beniculturali.it/aset-web/.

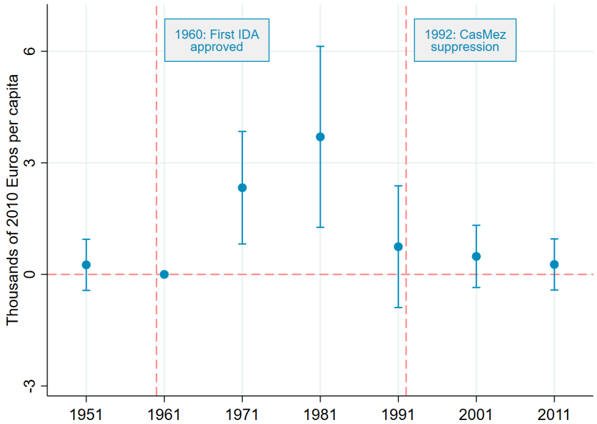
Figure 6: Early vs. Late Industrial Development Areas (IDAs)



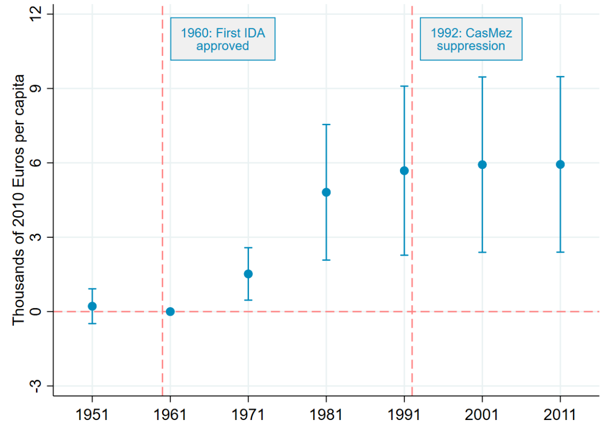
Notes. The figure shows a map of CasMez's jurisdiction. The dark blue areas indicate municipalities belonging to early-approved IDAs (i.e., formed between 1960 and 1965), while the light blue areas indicate municipalities belonging to late-approved IDAs (i.e., formed between 1966 and 1974).

Figure 7: Early IDAs vs. Late IDAs - First Stage

(a) Decade-Specific Investments



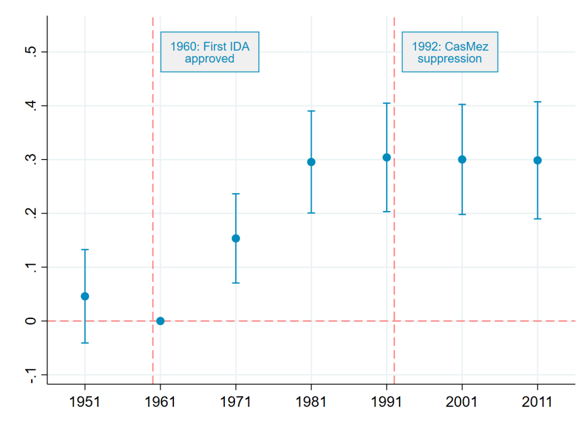
(b) Cumulative Investments



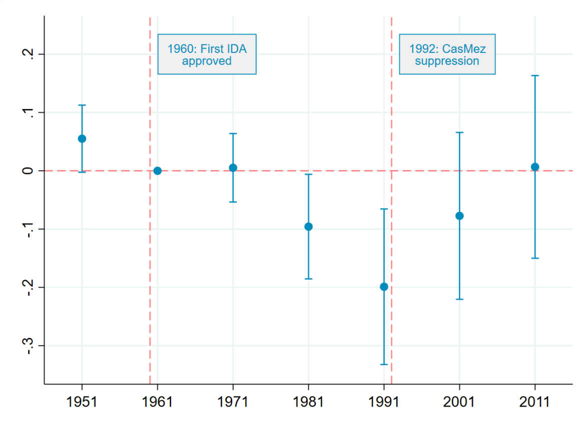
Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (1). Recall that the unit of observation is a municipality and this dynamic difference-in-differences design compares municipalities belonging to early-approved IDAs (1960-1965) with municipalities belonging to late-approved IDAs (1966-1974). The outcome variable in Panel (a) is decade-specific per-capita investments. while the outcome variable in Panel (b) is cumulative per-capita investments. Investments comprise public infrastructure spending and firm grants and they are converted in per-capita terms by dividing for 1961 municipal population. The period assigned to each investment is the year in which the project was approved by CasMez. Observations are weighted by 1961 population and standard errors are clustered at the municipality level.

Figure 8: Early IDAs vs. Late IDAs - Reduced Form

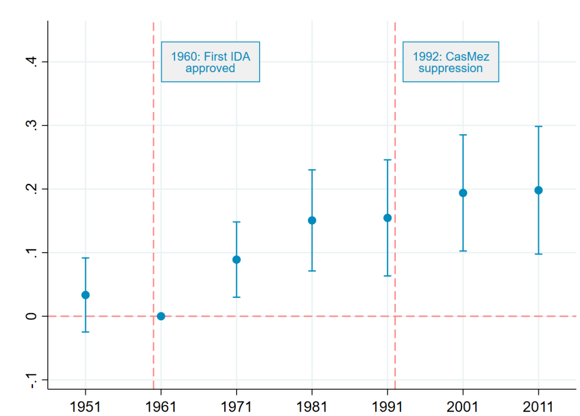
(a) Log Manufacturing Employment



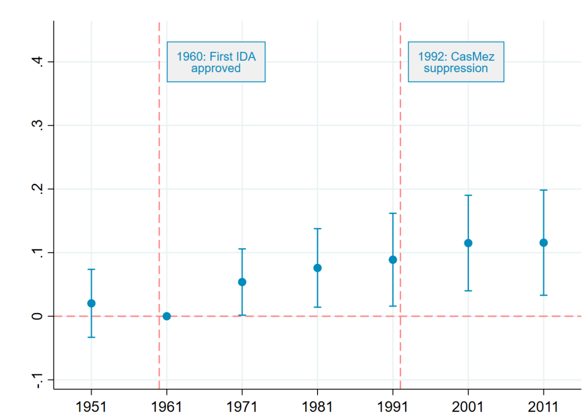
(b) Log Agriculture Employment



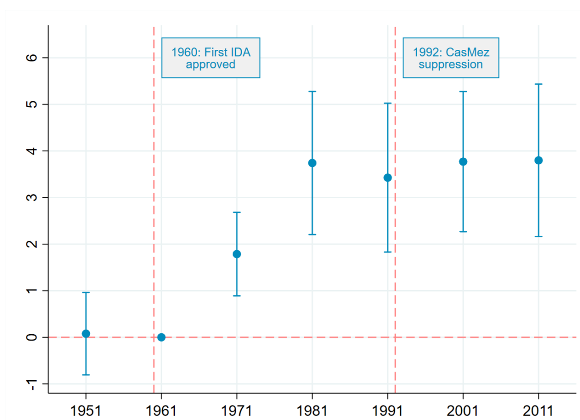
(c) Log Employment



(d) Log Population

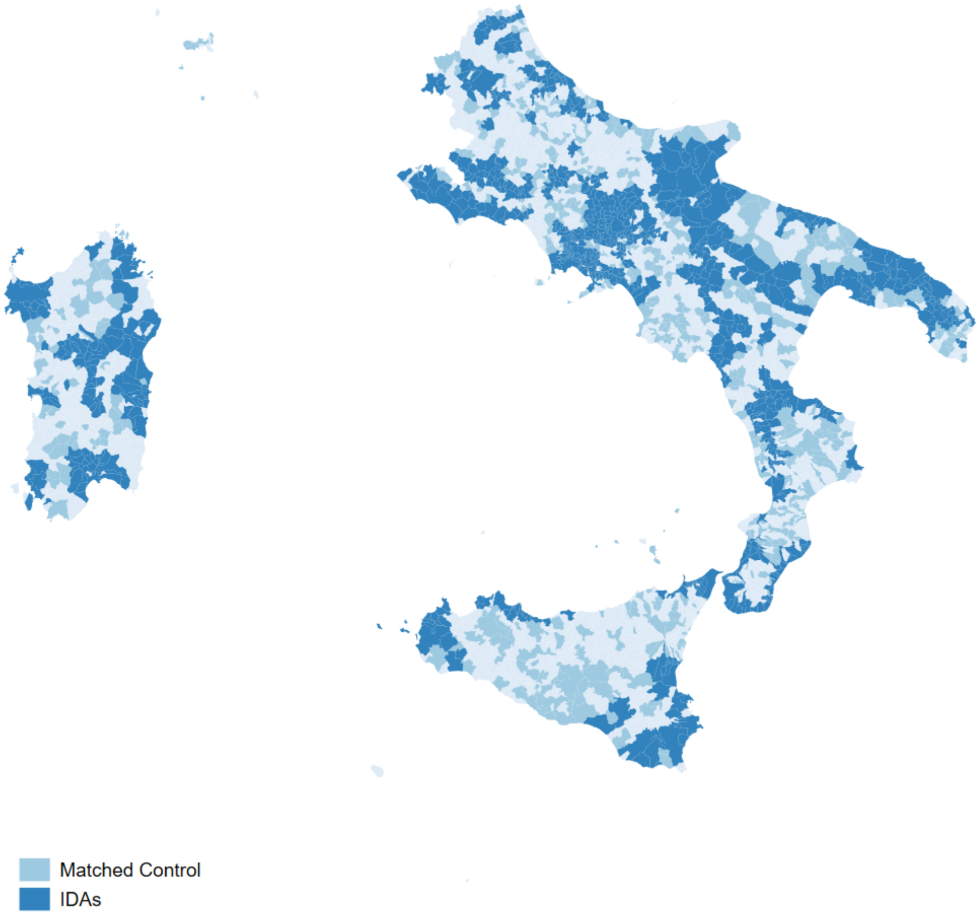


(e) Employment Rate



Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (1) for five different outcome variables. Panel (a): log manufacturing employment; Panel (b): log agriculture employment; Panel (c): log total employment; Panel (d): log population; Panel (e): employment rate. Recall that the unit of observation is a municipality and this dynamic difference-in-differences design compares municipalities belonging to early-approved IDAs (1960-1965) with municipalities belonging to late-approved IDAs (1966-1974). Observations are weighted by 1961 population and standard errors are clustered at the municipality level.

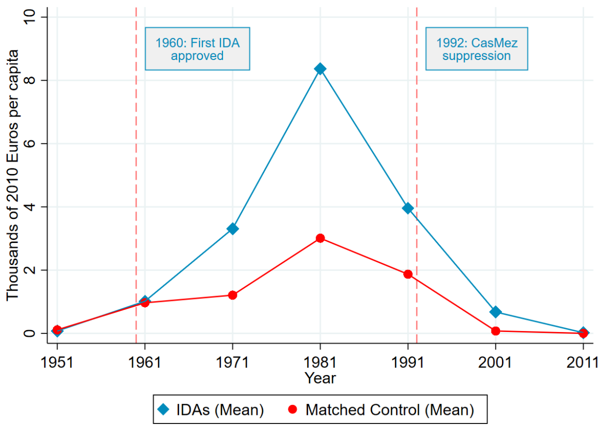
Figure 9: IDA Municipalities vs. Matched Non-IDA Municipalities



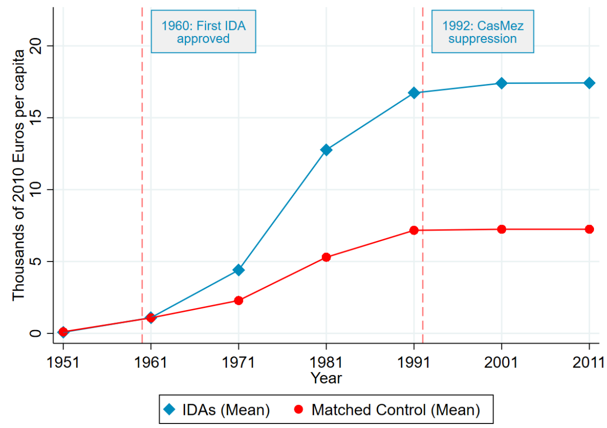
Notes. The figure shows a map of CasMez's jurisdiction. The dark blue areas indicate municipalities belonging to IDAs, while light blue areas indicate 1-to-1 matched control municipalities not belonging to any IDA. Treated and control municipalities are matched on a set of 1951 characteristics and 1951-1961 trends.

Figure 10: 1-to-1 Match - First Stage

(a) Decade-Specific Investments



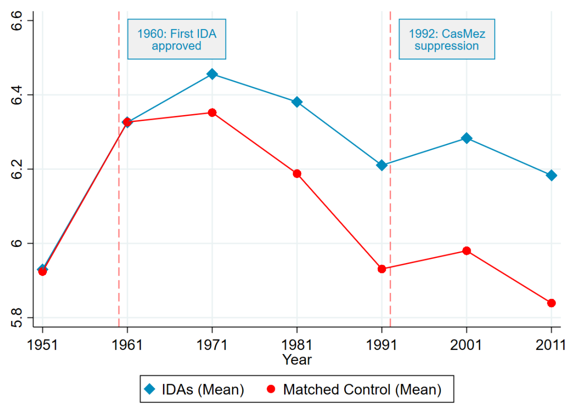
(b) Cumulative Investments



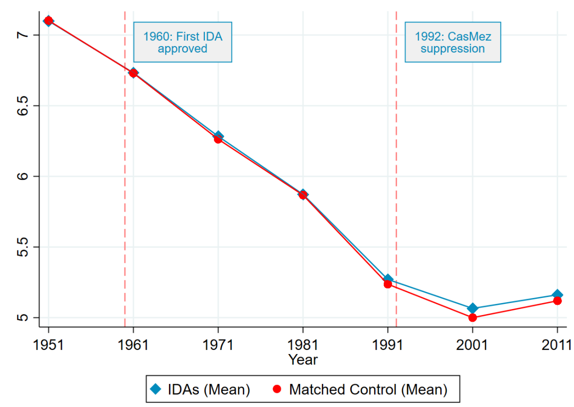
Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (2). Recall that the unit of observation is a municipality and this dynamic difference-in-differences design compares each municipality belonging to IDAs with one municipality not belonging to IDAs, matched on 1951 characteristics and 1951-1961 trends. The outcome variable in Panel (a) is decade-specific per-capita investments, while the outcome variable in Panel (b) is cumulative per-capita investments. Investments comprise public infrastructure spending and firm grants and they are converted in per-capita terms by dividing for 1961 municipal population. The period assigned to each investment is the year in which the project was approved by CasMez.

Figure 11: 1-to-1 Match - Reduced Form

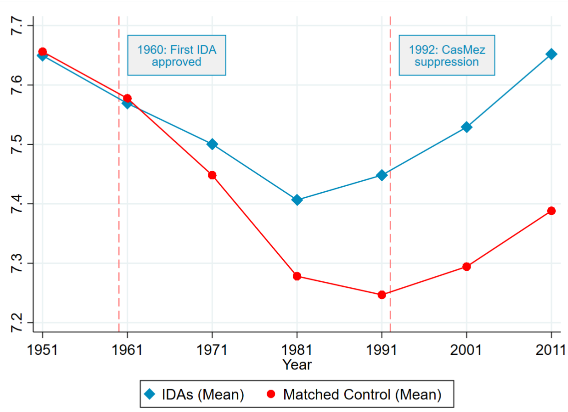
(a) Log Manufacturing Employment



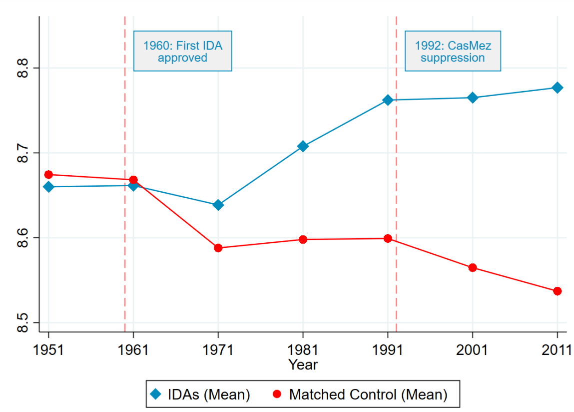
(b) Log Agriculture Employment



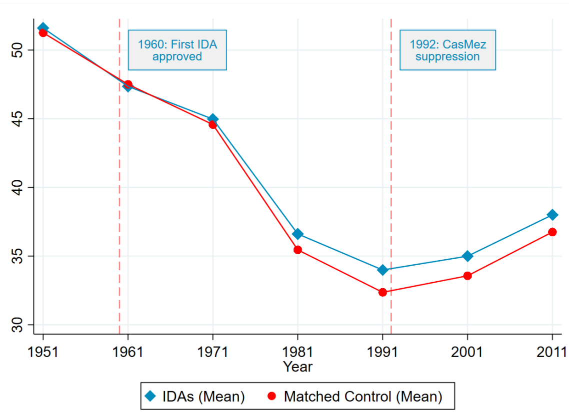
(c) Log Employment



(d) Log Population



(e) Employment Rate



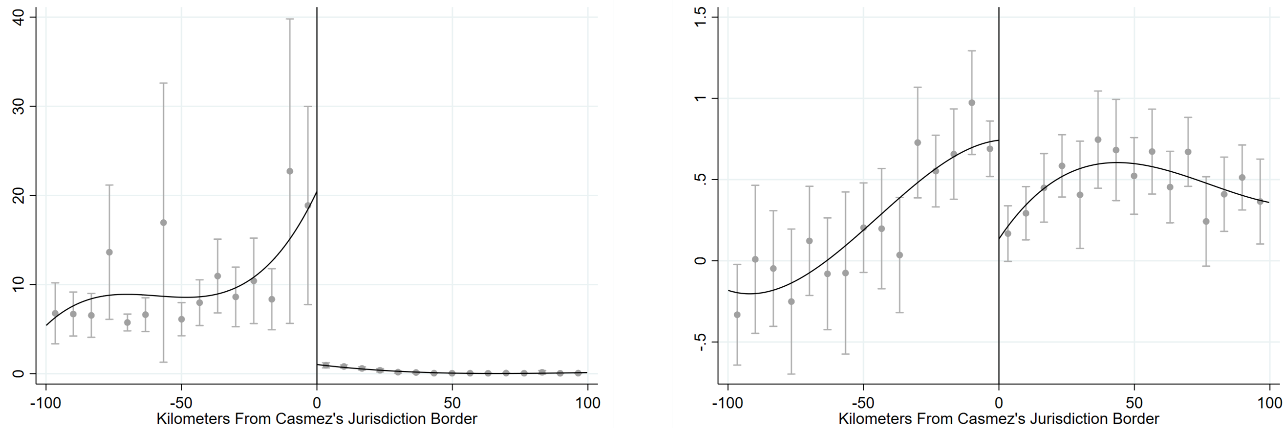
Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (2) for five different outcome variables. Panel (a): log manufacturing employment; Panel (b): log agriculture employment; Panel (c): log employment; Panel (d): log population; Panel (e): employment rate. Recall that the unit of observation is a municipality and this dynamic difference-in-differences design compares each municipality belonging to IDAs with one municipality not belonging to IDAs, matched on 1951 characteristics and 1951-1961 trends.

Figure 12: Municipalities North vs. South of CasMez's Jurisdiction Border

Notes. The figure shows a map of the municipalities 100 km North vs. South of CasMez's jurisdiction border. The light blue areas indicate municipalities located North of the border, while the dark blue areas indicate municipalities located South of the border.

Figure 13: Static Long Difference-in-Discontinuities (1991)

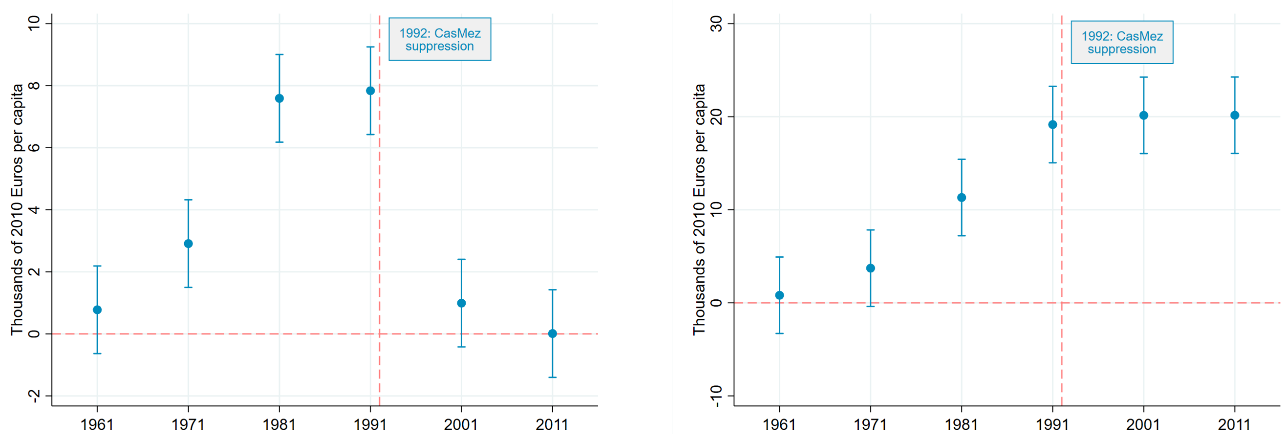
(a) Cumulative Investments (b) Δ Log Manufacturing Employment (1991-1951)



Notes. The figure shows the coefficients $\hat{\beta}_{1991}$ estimated from Equation (3). Recall that the unit of observation is a municipality, and this static long difference-in-discontinuities design compares municipalities just South vs. North of CasMez's jurisdiction border. The two continuous lines fit polynomial functions of degree 3 of distance from the border, separately for the South vs. North sample. The outcome variable in Panel (a) is cumulative investments per capita, while in Panel (b) is the percent change in log manufacturing employment from 1951. Cumulative investments per capita comprise public infrastructures and firm grants divided by the 1961 municipal population.

Figure 14: Dynamic Long Difference-in-Discontinuities - First Stage

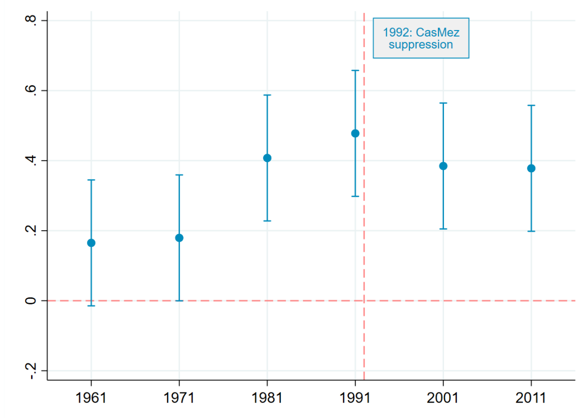
(a) Decade-Specific Investments (b) Cumulative Investments



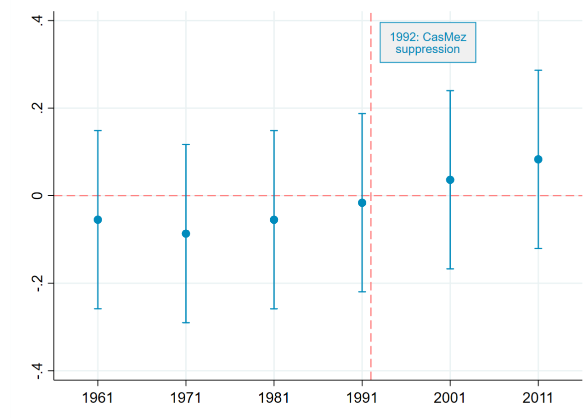
Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (3). Recall that the unit of observation is a municipality, and this dynamic long difference-in-discontinuities design compares municipalities just South vs. North of CasMez's jurisdiction border. The outcome variable in Panel (a) is decade-specific investments per capita, while in Panel (b) is cumulative investments per capita. Measures of investments per capita comprise public infrastructures and firm grants divided by the 1961 municipal population.

Figure 15: Dynamic Long Difference-in-Discontinuities - Reduced Form

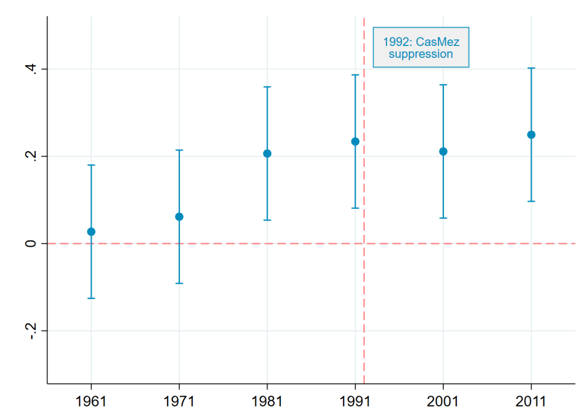
(a) Log Manufacturing Employment



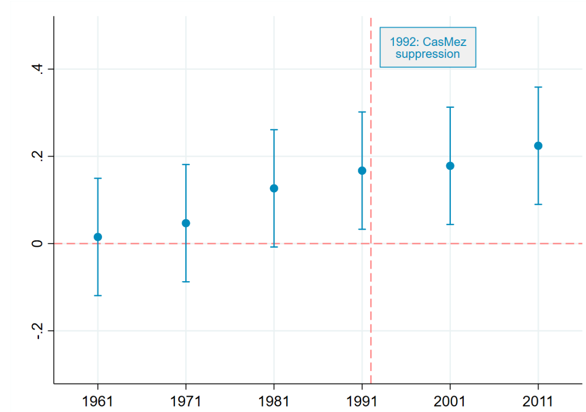
(b) Log Agriculture Employment



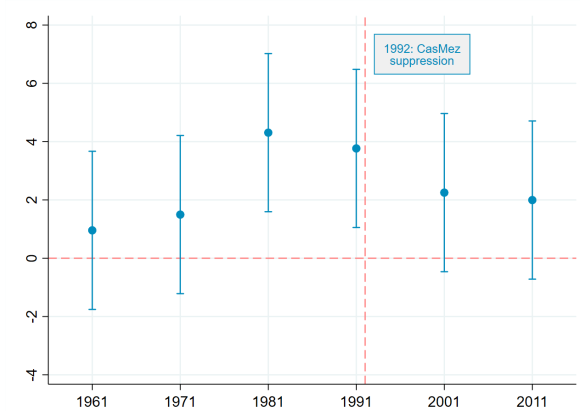
(c) Log Employment



(d) Log Population



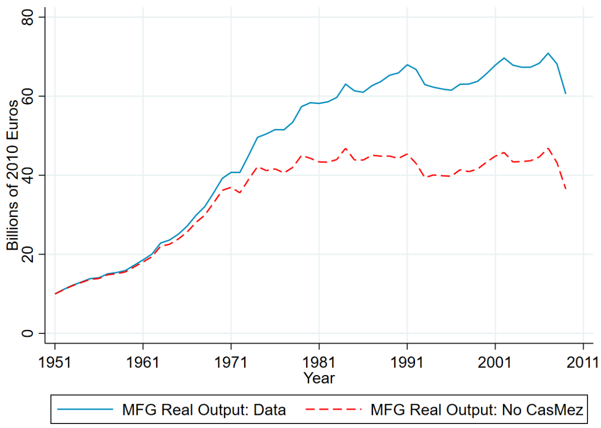
(e) Employment Rate



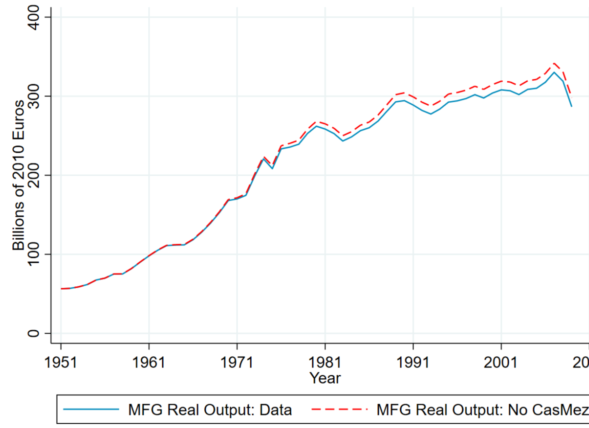
Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (3). Recall that the unit of observation is a municipality, and this dynamic long difference-in-discontinuities design compares municipalities just South vs. North of CasMez's jurisdiction border. Results are reported for five different outcome variables. Panel (a): log manufacturing employment; Panel (b): log agriculture employment; Panel (c): log employment; Panel (d): log population; Panel (e): employment rate.

Figure 16: Industrial Production: Data vs. Counterfactual (No CasMez)

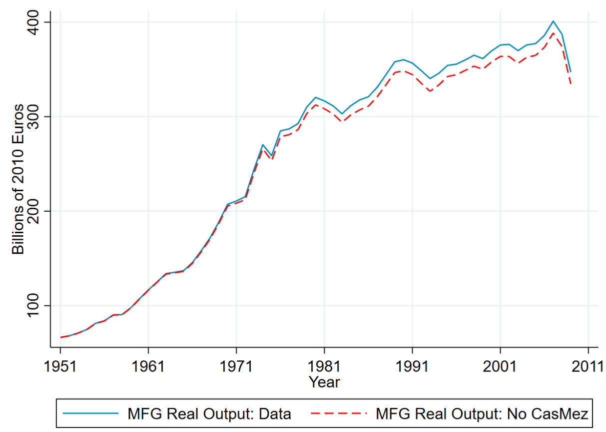
(a) South



(b) Center-North

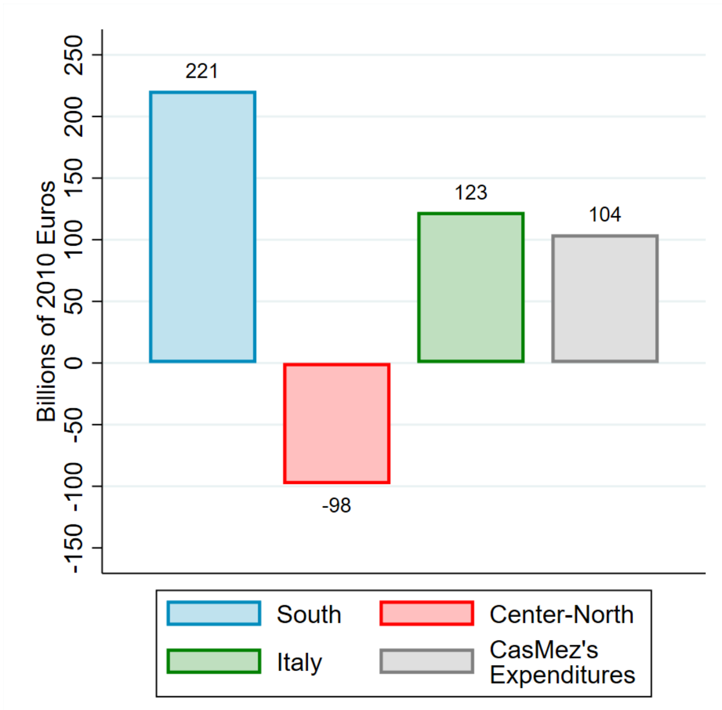


(c) Italy



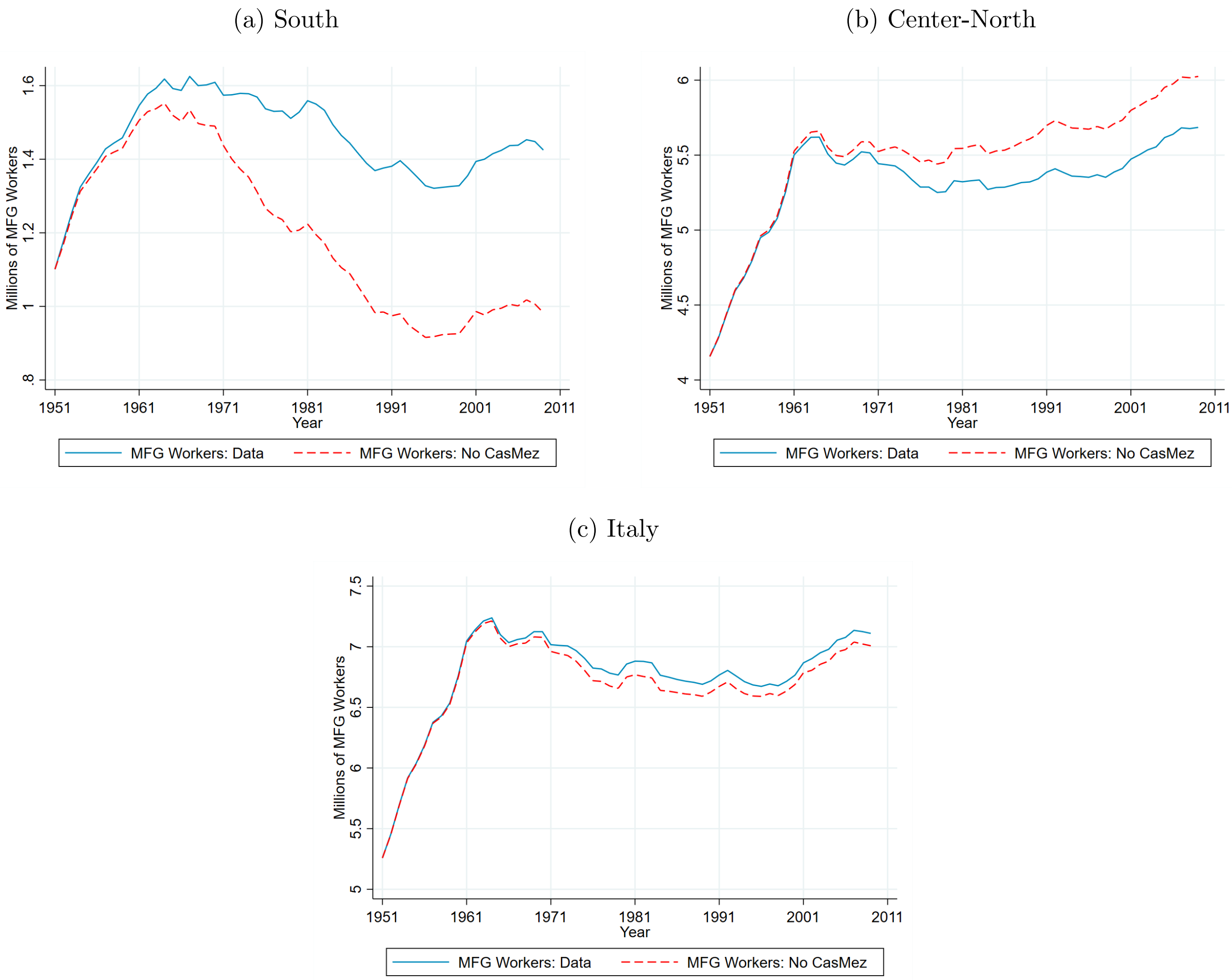
Notes. The figure shows the dynamic of industrial production in the South, the Center-North, and the country as a whole (light blue lines) and the simulated counterfactual dynamic in the absence of CasMez's investments. Panel (a) shows the results of the model-based analysis for the South, Panel (b) for the Center-North, and Panel (c) for the whole country. The unit of measure is billions of 2010 Euro. The data used for the simulation come from SVIMEZ (2011). The parameters used for the simulation are listed in Table 9.

Figure 17: PDV of Industrial Production Gains and CasMez's Spending



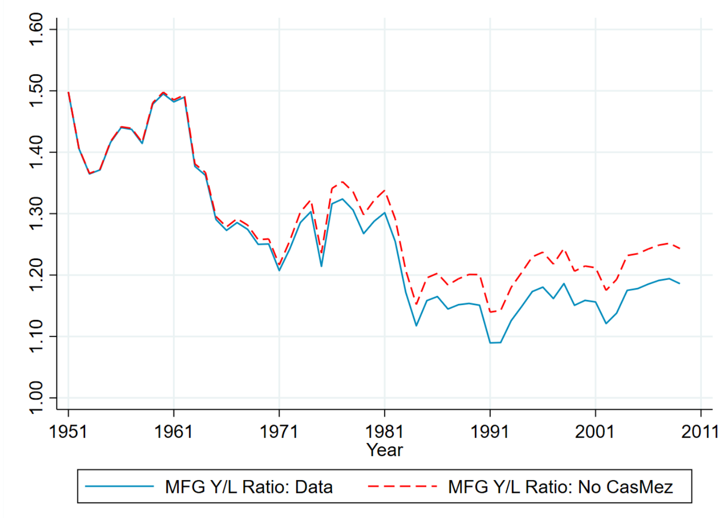
Notes. The first three bars indicate the net present value, discounted to 1951 with a real annual discount rate of 3%, of the stream of realized gains/losses accrued to the South, the Center-North, and the whole country. The last bar displays the net present value, discounted to 1951 with a real annual discount rate of 3%, of CasMez's investments. The calculation ignores all costs other than the operating costs related to the investments, as well as any cost of funds. The unit of measure is billions of 2010 Euros.

Figure 18: MFG Employment: Data vs. Counterfactual (No CasMez)



Notes. The figure shows the dynamic of manufacturing employment in the South, the Center-North, and the country as a whole (light blue lines) and the simulated counterfactual dynamic in the absence of CasMez's investments. Panel (a) shows the results of the model-based analysis for the South, Panel (b) for the Center-North, and Panel (c) for the whole country. The unit of measure is million of workers. The data used for the simulation come from SVIMEZ (2011). The parameters used for the simulation are listed in Table 9.

Figure 19: Center-North vs. South Manufacturing Labor Productivity Ratio



Notes. The figure shows the dynamic of the Center-North vs. South manufacturing output per worker ratio. The light blue line reports the time series of this ratio. The red dashed line reports the evolution of the ratio in the absence of CasMez's investments, as simulated through the model. The data used for the simulation come from SVIMEZ (2011). The parameters used for the simulation are listed in Table 9.

Table 1: CasMez Endowment Over Time

Law n.	Date	Thousands of Euros (2010)	Thousands of USD (2010)
646/1950	August 10th, 1950	€17,500,601	$23,384,303
949/1952	July 25th, 1952	€4,284,333	$5,724,726
634/1957	July 29th, 1957	€10,097,702	$13,492,549
1349/1957	December 28th, 1959	€112,935	$150,904
622/1959	July 24th, 1959	€369,234	$493,371
454/1961	June 2nd, 1961	€361,518	$483,061
28/1962	January 30th, 1962	€48,730	$65,113
588/1962	June 11th, 1962	€30,590	$40,875
608/1964	July 6th, 1964	€805,388	$1,076,160
221/1965	March 30th, 1965	€28,945	$38,676
717/1965	June 26th, 1965	€15,823,029	$21,142,731
498/1967	June 21st, 1967	€2,411,085	$3,221,692
160/1969	April 8th, 1969	€8,015,985	$10,710,959
1034/1970	December 18th, 1970	€847,570	$1,132,523
205/1971	April 15th, 1971	€2,114,880	$2,825,903
853/1971	October 6th, 1971	€55,397,355	$74,021,946
868/1973	December 27th, 1973	€865,570	$1,156,575
371/1974	August 12th, 1974	€5,797,304	$7,746,357
493/1975	October 16th, 1975	€4,947,869	$6,611,342
183/1976	May 2nd, 1976	€68,792,273	$91,920,235
843/1978	December 21st, 1978	€12,470,382	$16,662,925
218/1978	March 6th, 1978	€789,650	$1,055,130
146/1980	April 24th, 1980	€4,561,039	$6,094,460
874/1980	December 22nd, 1980	€233,108	$311,479
119/1981	March 30th, 1981	€3,712,659	$4,960,855
13/1982	January 26th, 1982	€2,145,126	$2,866,318
546/1982	August 12th, 1982	€6,588,957	$8,804,165
132/1983	April 30th, 1983	€4,737,704	$6,330,520
651/1983	December 1st, 1983	€20,885,965	$27,907,826
64/1986	March 1st, 1986	€82,459,237	$110,182,033
113/1986	April 11th, 1986	€701,057	$936,753
Total:		€337,937,783	$451,552,465

Notes. The table reports all the laws that provided CasMez with resource endowments over the period 1950-1992. The first column indicates the law that was passed to confer transfers to CasMez and the second column reports the exact date in which the law was passed. The third and fourth columns report the amount of resources devolved to CasMez by each law in 2010 Euros and US dollars, respectively. At the bottom of the table, the total amount of resources devoted to CasMez over the whole period is reported. Source: SVIMEZ (2011).

Table 2: IDA Approvals Over Time

Decree	Year	Type	IDA
DPR 804/1960	1960	Area di Sviluppo Industriale	Bari
DPR 805/1960	1960	Area di Sviluppo Industriale	Brindisi
DPR 806/1960	1960	Area di Sviluppo Industriale	Taranto
DPR 1013/1961	1961	Nucleo di Industrializzazione	Potenza
DPR 1314/1961	1961	Area di Sviluppo Industriale	Salerno
DPR 1410/1961	1961	Area di Sviluppo Industriale	Cagliari
DPR 50/1962	1962	Nucleo di Industrializzazione	Valle del Basento
DPR 235/1962	1962	Nucleo di Industrializzazione	Trapani
DPR 235/1962	1962	Nucleo di Industrializzazione	Golfo di Policastro
DPR 236/1962	1962	Nucleo di Industrializzazione	Avellino
DPR 238/1962	1962	Nucleo di Industrializzazione	Foggia
DPR 293/1962	1962	Nucleo di Industrializzazione	Piana di Sibari
DPR 574/1962	1962	Nucleo di Industrializzazione	Messina
DPR 575/1962	1962	Area di Sviluppo Industriale	Caserta
DPR 770/1962	1962	Nucleo di Industrializzazione	Gela
DPR 1374/1962	1962	Nucleo di Industrializzazione	Avezzano
DPR 1554/1962	1962	Nucleo di Industrializzazione	Sassari
DPR 1589/1962	1962	Nucleo di Industrializzazione	Vasto
DPR 1601/1962	1962	Nucleo di Industrializzazione	Tortoli-Arbatax
DPR 1872/1962	1962	Area di Sviluppo Industriale	Napoli
DPR 2048/1962	1962	Nucleo di Industrializzazione	Teramo
DPR 2054/1962	1962	Nucleo di Industrializzazione	Crotone
DPR 791/1963	1963	Nucleo di Industrializzazione	Ragusa
DPR 808/1963	1963	Nucleo di Industrializzazione	Oristano
DPR 1016/1963	1963	Nucleo di Industrializzazione	Reggio Calabria
DPR 1328/1963	1963	Nucleo di Industrializzazione	Sulcis-Iglesias
DPR 1526/1963	1963	Nucleo di Industrializzazione	Frosinone
DPR 2390/1963	1963	Area di Sviluppo Industriale	Catania
DPR 75/1964	1964	Area di Sviluppo Industriale	Palermo
DPR 103/1964	1964	Nucleo di Industrializzazione	Ascoli Piceno
DPR 596/1964	1964	Area di Sviluppo Industriale	Siracusa
DPR 890/1964	1964	Nucleo di Industrializzazione	Olbia
DPR 1480/1964	1964	Nucleo di Industrializzazione	Caltagirone
DPR 1383/1965	1965	Nucleo di Industrializzazione	Rieti

Table 2: IDA Approvals Over Time (cont.)

Decree	Year	Type	IDA
DPR 562/1966	1966	Area di Sviluppo Industriale	Latina
DPR 609/1966	1966	Nucleo di Industrializzazione	Lecce
DPR 719/1967	1967	Nucleo di Industrializzazione	Gaeta-Formia
DPR 1019/1967	1967	Nucleo di Industrializzazione	Valle del Biferno
DPR 320/1968	1968	Nucleo di Industrializzazione	Santa Eufemia-Lamezia
DPR 657/1968	1968	Nucleo di Industrializzazione	Benevento
DPR 468/1969	1969	Area di Sviluppo Industriale	Valle del Pescara
DPR 15/1970	1970	Nucleo di Industrializzazione	Sulmona
DPR 88/1970	1970	Area di Sviluppo Industriale	L'Aquila
DPR 299/1970	1970	Nucleo di Industrializzazione	Sangro Aventino
DPR 1447/1970	1970	Nucleo di Industrializzazione	Vibo Valentia
DPR 205/1972	1972	Nucleo di Industrializzazione	Sardegna Centrale
DPR 153/1974	1974	Nucleo di Industrializzazione	Isernia-Venafro
DPR 414/1974	1974	Nucleo di Industrializzazione	Campobasso-Boiano

Notes. The table reports a comprehensive list of the approved Industrial Development Areas (IDAs) within CasMez's jurisdiction between 1960 and 1974. The first column indicates the Presidential Decree (*Decreto del Presidente della Repubblica*) that formally approves the IDA. The second column reports the year of IDA approval. The third column indicates the type of IDA (*Area di Sviluppo Industriale* or *Nucleo di Industrializzazione*). The last column reports the name of the IDA. The data to produce this table were collected by the author.

Table 3: 1-to-1 Matching Balance Table

	(1) Treated	(2) Matched Control	(3) Difference
1951 Sh. of Illiterate Pop.	25.12	25.51	-0.38
	(7.28)	(8.42)	(10.88)
1951 Employment Rate	51.60	51.26	0.34
	(10.53)	(11.68)	(14.97)
1951 Sh. Manufacturing Emp.	21.47	21.20	0.27
	(12.96)	(12.80)	(15.01)
1951 Log Population	8.66	8.67	-0.01
	(1.02)	(1.03)	(0.80)
1951 Log Employment	7.65	7.66	-0.01
	(0.98)	(0.96)	(0.81)
1951 Log Manufacturing Emp.	5.93	5.92	0.01
	(1.32)	(1.30)	(0.92)
1951 Log Agriculture Emp.	7.10	7.10	-0.00
	(0.87)	(0.89)	(1.06)
1951-1961 Change Sh. of Illiterate Pop.	-8.05	-8.30	0.25
	(3.43)	(3.47)	(4.91)
1951-1961 Change Employment Rate	-4.25	-3.76	-0.49
	(6.11)	(6.40)	(8.86)
1951-1961 Change Sh. Manufacturing Emp.	10.31	10.27	0.04
	(8.24)	(8.59)	(11.53)
1951-1961 Change Log Population	0.00	-0.01	0.01
	(0.15)	(0.13)	(0.15)
1951-1961 Change Log Employment	-0.08	-0.08	-0.00
	(0.20)	(0.18)	(0.22)
1951-1961 Change Log Manufacturing Emp.	0.40	0.40	-0.01
	(0.39)	(0.41)	(0.55)
1951-1961 Change Log Agriculture Emp.	-0.37	-0.37	0.01
	(0.31)	(0.29)	(0.41)
Observations	879	879	879

Notes. The table reports the means and standard deviations of all variables used to match each municipality belonging to IDAs with one municipality not belonging to an IDA, for both the treatment and the matched control group. The third column reports the difference between the means and its standard deviation. * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table 4: Effect of €1,000 Investments Per Capita - 2SLS Estimates

Outcome Variables	(1) Identification I	(2) Identification II	(3) Identification III
Log MFG Employment	.051***	.031***	.024***
	(.014)	(.008)	(.003)
Log Agr. Employment	-.023	.004	-.002
	(.015)	(.005)	(.003)
Log Employment	.029***	.023***	.012***
	(.010)	(.007)	(.002)
Log Population	.016**	.021***	.009***
	(.007)	(.006)	(.002)
Employment Rate	.721***	.135	.170***
	(.257)	(.093)	(.046)
Observations	6,153	12,194	4,656
Municipalities	879	1,414	776
First Stage F-Stat	10.56	55.90	211.63
Municipality FE	✓		✓
Region × Time FE	✓		✓
Baseline Controls × Time FE	✓		✓

Notes. The table displays two-stage least squares (2SLS) coefficients obtained from regressions with different variables as outcomes and cumulative per-capita CasMez's investments as the main regressor. In all columns, an observation is a municipality-year. The first-stage and reduced-form regressions correspond to the static versions of the dynamic specifications described by Equation (1) for column (1) and Equation (2) for column (2), and Equation (3) for column (3), respectively. Each column reports the semi-elasticity of the municipality-level outcome variables to €1,000 (2010 Euro) additional CasMez's investments per capita. The table reports the number of observations, the number of unique units of observations, and the Kleibergen-Paap F-statistic for weak identification, for all three specifications. Controls include unit fixed effects, region-specific trends, and the interaction of baseline unit-level characteristics (i.e., log population, the manufacturing share of employment, manufacturing employment density, and the share of illiterate population) with time dummies. Controls are not present in the specification corresponding to column (2) because the sample is restricted to treated and control municipalities, already matched on baseline characteristics and trends. Standard errors in parentheses are clustered at the municipality level. * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table 5: Cost Per Job and Manufacturing Job Multiplier

	(1) Identification I	(2) Identification II	(3) Identification III
Municipality-level			
Additional jobs per MFG job	0.6	1.2	1.2
Cost per job (in terms of 2010 Southern GDP per capita)	6.5	7.9	12.1
Province-level			
Additional jobs per MFG job	1.4		
Cost per job (in terms of 2010 Southern GDP per capita)	6.2		

Notes. The table reports the municipal and province-level manufacturing job multiplier and cost per job implied by the results in Table 4. The manufacturing job multiplier indicates the total number of new jobs stemming from a new manufacturing job and it is calculated as follows: (semi-elasticity of total employment to CasMez's cumulative investments × 1961 municipal total employment)/(semi-elasticity of manufacturing employment to CasMez's cumulative investments × 1961 municipal manufacturing employment)-1. A manufacturing job multiplier of 0.6 implies that one manufacturing job creates 0.6 additional non-manufacturing jobs in the same municipality. The cost per job is expressed in terms of 2010 Southern real GDP per capita and is calculated as follows: (€1,000 × 1961 municipal population)/(semi-elasticity of total employment to CasMez's cumulative investments × 1961 municipal total employment). This quantity is then normalized by the 2010 Southern real GDP per capita. A cost per job (in terms of 2010 Southern GDP per capita) of 6.5 means that the cost per new job created at the municipal level is equivalent to 6.5 times the 2010 GDP per capita in the South.

Table 6: Effect of €1,000 Investments Per Capita - 2SLS Estimates

Outcome Variables	(1) Municipality-Level	(2) Province-Level
Log MFG Employment	.051***	.037**
	(.014)	(.014)
Log Agr. Employment	-.023	.024
	(.015)	(.023)
Log Employment	.029***	.028**
	(.010)	(.011)
Log Population	.016**	.023**
	(.007)	(.009)
Employment Rate	.721***	.212
	(.257)	(.224)
Observations	6,153	266
Units	879	38
First Stage F-Stat	10.56	9.91
Unit FE	✓	✓
Region × Time FE	✓	✓
Baseline Controls × Time FE	✓	✓

Notes. The table displays two-stage least squares (2SLS) coefficients obtained from regressions with different variables as outcomes and cumulative per-capita CasMez's investments as the main regressor. In column (1), an observation is a municipality-year, while in column (2) an observation is a province-year. The first-stage and reduced-form regressions correspond to the static versions of the dynamic specifications described by Equation (1) for column (1) and Equation (4) for column (2), respectively. Column (1) and column (2) report the semi-elasticity of the municipality-level and province-level outcome variables to €1,000 (2010 Euro) additional CasMez's investments per capita, respectively. The table reports the number of observations, the number of unique units of observations, and the Kleibergen-Paap F-statistic for weak identification. Controls include unit fixed effects, region-specific trends, and the interaction of baseline unit-level characteristics (i.e., log population, the manufacturing share of employment, manufacturing employment density, and the share of illiterate population) with time dummies. Standard errors in parentheses in column (1) are clustered at the municipality level. * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table 7: Effect of €1,000 Investments Per Capita - 2SLS Estimates

	(1) Log Pop.	(2) Net Mig.	(3) South	(4) Center-North
Investments Per Capita	.023***	.017**	.009*	.008**
	(.009)	(.007)	(.005)	(.004)
Observations	266	266	266	266
Units	38	38	38	38
First Stage F-Stat	9.91	9.91	9.91	9.91
Province FE	✓	✓	✓	✓
Region × Time FE	✓	✓	✓	✓
Baseline Controls × Time FE	✓	✓	✓	✓

Notes. The table displays two-stage least squares (2SLS) coefficients obtained from four regressions with different variables as outcomes and cumulative per-capita CasMez's investments as the main regressor. An observation is a province-year. Cumulative per-capita investments are instrumented by a triple interaction of the share of province-level population at baseline residing in a municipality that belongs to an IDA with a dummy for early-approved IDAs, and a dummy for the post-1961 periods. The first-stage and reduced-form regressions are described by Equation (1). Column (1) reports the semi-elasticity of the province-level population to €1,000 (2010 Euro) additional CasMez's investments per capita. Column (2) captures the percent population gains due to favorable internal net migration flows. Column (3) and column (4) decompose the effect estimated in column (2). Column (3) reports the percent population gains due to favorable net migration flows within the South. Column (4) reports the percent population gains due to favorable net migration flows between the South and the Center-North. The table reports the number of observations, the number of unique provinces, and the Kleibergen-Paap F-statistic for weak identification. Controls include province fixed effects and region-specific trends, and the interaction of baseline province-level characteristics (i.e., log population, the manufacturing share of employment, manufacturing employment density, and share of illiterate population) with time dummies. * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table 8: IV Estimates of Agglomeration Elasticities

	(1) South	(2) Center-North	(3) Difference
$(\widehat{\gamma/\beta})$	0.317***	0.394***	-0.077***
	(0.022)	(0.021)	(0.026)
Observations	13,155	25,555	38,710
Units	2,631	5,111	7,742
First Stage F-Stat	746.8	1032.7	
Municipality FE	✓	✓	✓
Region × Time FE	✓	✓	✓
Baseline Controls × Time FE	✓	✓	✓

Notes. The table displays the 2SLS coefficient obtained by estimating Equation (12), allowing the coefficient γ/β to differ between the Center-North and the South. An observation is a municipality-year and the panel covers the period 1971-2011. The dependent variable is municipal manufacturing employment. The main regressor is one-decade-lagged manufacturing employment density. The main regressor is instrumented with two-decade-lagged manufacturing employment density. The table reports the number of observations, the number of unique provinces, and the Kleibergen-Paap F-statistic for weak identification. Baseline controls include log population, the share of manufacturing employment, manufacturing employment density, the share of the illiterate population, and a dummy variable taking value 1 if the municipality belongs to an IDA. Observations are weighted by 1951 municipal population. Standard errors are clustered at the province level. * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table 9: Structural Parameters and Measured Quantities

	Parameter	Value	Method	Source
	α	0.3	Calibration	Griliches (1967)
	$(1-\alpha)/\beta$	1.5	Calibration	Kline and Moretti (2014)
$\rightarrow$	β	0.47	Calibration	-
	γ_S/β	0.32	Estimation	Table 8
$\rightarrow$	γ_S	0.15	Estimation/Calibration	-
	γ_N/β	0.39	Estimation	Table 8
$\rightarrow$	γ_N	0.19	Estimation/Calibration	-
	$\eta/k_S^P(\beta-\gamma_S)$	0.037	Estimation	Table 6
$\rightarrow$	η/k_S^P	0.012	Estimation/Calibration	-
	Quantity		**Method**	**Source**
	$\mathrm{d}k_S^P$		Measurement	ASET
	y_S		Measurement	SVIMEZ (2011)
	y_N		Measurement	SVIMEZ (2011)
	ℓ_S		Measurement	SVIMEZ (2011)
	ℓ_N		Measurement	SVIMEZ (2011)
	$(\mathrm{d}\ell_S/\mathrm{d}k_S^P)$		Estimation/Calibration	Tables 6 and 7
	$(\mathrm{d}\ell_N/\mathrm{d}k_S^P)$		Estimation/Calibration	Tables 6 and 7

Notes. The table lists the structural parameters and quantities present in Equation (11). A parameter value is attached to each parameter in the second column. The third column specifies the methodology followed to retrieve the parameter or quantity of interest. The methodology is a "Calibration" if the parameter value is calibrated taking a value from an external source. In that case, the source is listed in the fourth column. The methodology is "Estimation" if the parameter value is estimated in the empirical analysis of the paper. In that case, the Table with the relevant result is listed in the fourth column. When the parameter value is obtained by combining calibration and estimation, the table reports "Estimation/Calibration". For quantities measured directly from primary sources the table reports "Measurement" in the third column and the source in the last column.

Table 10: Contributions to Crowding-Out Effects

	Quantities/Parameters			
	MFG ℓ_i/P_i	MFG y_i/ℓ_i	γ_i	**Multiplier**
Baseline	$\neq$	$\neq$	$\neq$	1.3
	$=$	$\neq$	$\neq$	1.8
	$\neq$	$=$	$\neq$	1.4
	$\neq$	$\neq$	$=$	1.4
	$=$	$=$	$\neq$	1.9
	$=$	$\neq$	$=$	1.9
	$\neq$	$=$	$=$	1.5
	$=$	$=$	$=$	1.9

Notes. The table shows how the *long-run aggregate multiplier* changes when South vs. Center-North differences in three key quantities/parameters are removed. the long-run aggregate multiplier is the ratio between the stream of the national industrial production gains accrued up to 2011 and CasMez's expenditures discounted to 1951. The 3 quantities/parameters determining the size of the crowding-out effects are the manufacturing employment rate, MFG ℓ_i/P_i, the manufacturing output per worker, MFG y_i/ℓ_i, and the agglomeration elasticities, γ_i. The symbol "$\neq$" means that the South to Center-North regional differentials are not removed. The symbol "$=$" means that the value of the Center-North quantity/parameter is set at the level of the South.

Appendix

A Raw Data

One of the contributions of this study is to construct a panel dataset of CasMez's investments at the municipality level. This Appendix section describes the data sources and the procedure followed to construct this dataset in detail, as well as providing basic descriptive statistics. Data covering the universe of projects financed by CasMez were collected from historical archives, digitized, and made available at https://aset.acs.beniculturali.it/aset-web/. Figure A.1 provides an example of a public infrastructure project in the data. Specifically, it reports information about the majestic Flumendosa dam, built between 1953 and 1958 in Sardinia. The dam forms a large water basin (17 km $\times$ 0.5 km) containing 317 million cubic meters of water, useful for energy production in the region.

Figure A.1: Flumendosa Dam (1952-1958)

intervento n. 010-00001483

settore: BONIFICA INTEGRALE

categoria opera: DIGHE E GRANDI GALLERIE

descrizione: DIGA FLUMENDOSA / ESTERZILI, NURRI, ORROLI, VILLANOVA TULO ED ESCLAPLANO

concessionario: EAF, ENTE AUTONOMO FLUMENDOSA - CAGLIARI

importo approvato: 4.421.388 di cui a carico Cassa: 4.421.388 in data 01/04/1953

primo appalto: 4.266.695 di cui a carico Cassa: 4.266.695

modifiche concessione: 0 di cui a carico Cassa: 0
-.154.692 di cui a carico Cassa: -.154.692

perizie suppletive: 93.347 di cui a carico Cassa: 93.347

revisione prezzi: 524.925 di cui a carico Cassa: 524.925

contributo CEE: 0

data di inizio lavori: 08/06/1953

data di fine lavori: 10/06/1958

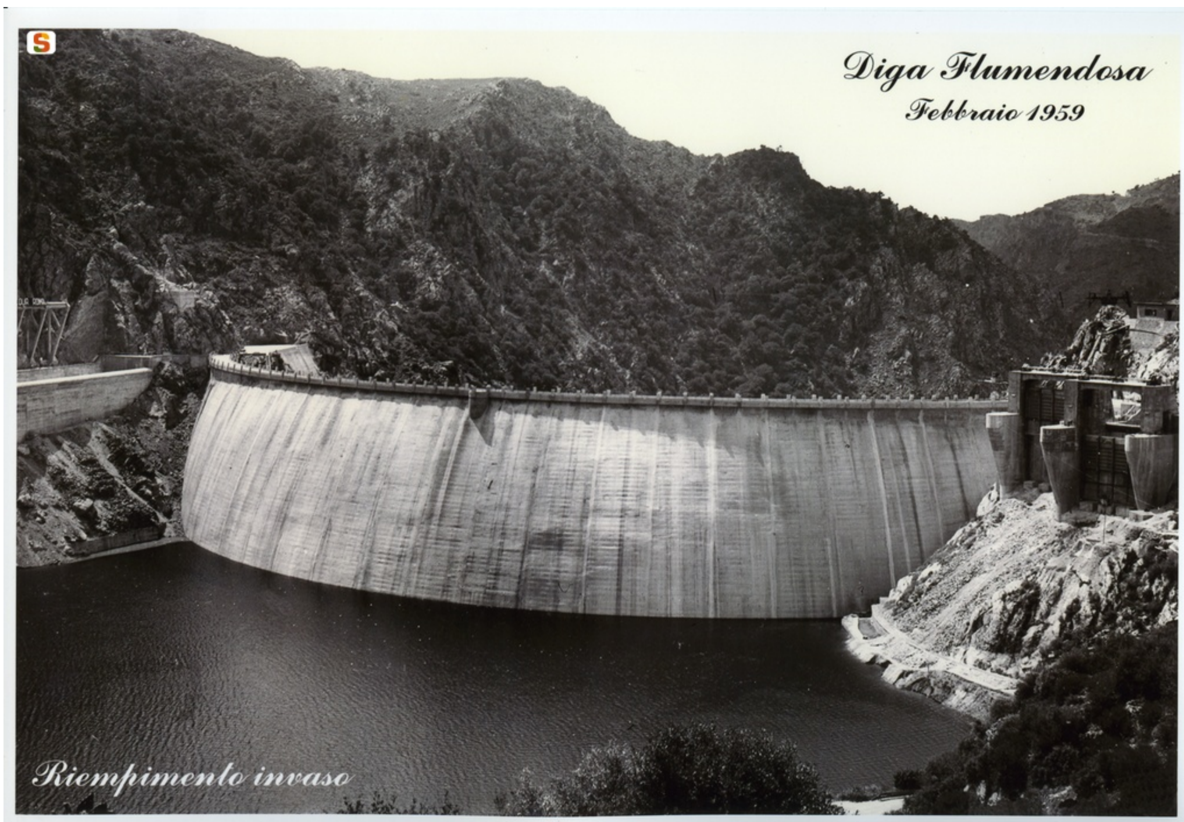
collaudo: PZ in data 20/03/1964 per un importo di 2.759.895 di cui a carico Cassa: 2.759.895

trasferito alla Regione in data 16/10/1980 (TR.RG.DP66552)

Notes. The figure provides an example of raw data available at https://aset.acs.beniculturali.it/aset-web/. Specifically, the picture summarizes the information regarding the financing of the Flumendosa dam project, carried out in the region of Sardinia between 1952 and 1958.

The descriptive information provided comprises the project's identification number (i.e., *intervento n.*), a broad sector in which the project is classified (i.e., *settore*), the location (i.e., *ubicazione*), the specific project category (i.e., *categoria*), a brief description of the project (i.e., *descrizione*), the agency responsible for executing the project (i.e., *concessionario*). Importantly, the dataset provides information on the amount approved by CasMez's (i.e., *importo approvato*), as well as subsequent changes to the amount of financial resources deployed by CasMez for the project (i.e., *modifiche concessione*, *perizie suppletive*). Finally, the start date (i.e., *data di inizio lavori*) and the end date (i.e., *data di fine lavori*) of the projects are provided. Figure A.1 inform us that the construction of the Flumendosa dam started in 1953 and ended in 1958. Figure A.2 below displays a picture of the dam in 1959.

Figure A.2: Picture of Flumendosa Dam (Sardinia, 1959)



Notes. The figure provides an example of raw data available at https://aset.acs.beniculturali.it/aset-web/. Specifically, the picture shows the Flumendosa dam (Sardinia) in 1959, just after its construction carried out between 1952 and 1958.

The information provided by the dataset is different when it comes to firm grants and financial concessions. Figure A.3 shows the raw information provided regarding each firm grant or financial concession approved by CasMez. Specifically, the figure refers to funds granted (i.e., *contributi a fondo perduto*) to the firm Alfa Romeo Avio, operating in the industry of motor vehicles, for the expansion of the establishment in Pomigliano d'Arco (Naples). This information comprises the identification number and name of the beneficiary (i.e., *beneficiario*), a description of the beneficiary's activity (i.e., *descrizione attività*), the location of the establishment (i.e., *sede*). Importantly, the raw data contain information regarding the amount of funds granted by CasMez (i.e., *finanziamento concesso*), as well as the date in which the grant was approved.

Figure A.3: Raw Data: Grants to Alfa Romeo in Pomigliano d'Arco (1967)

Beneficiario: 0017800 - ALFA ROMEO AVIO - SOCIETA' AEROMOTORISTICA PER AZIONI -

Descrizione attività: MECCANICHE AVIO-MOTORI

Sede: POMIGLIANO D'ARCO (Campania, provincia di Napoli)

AREA NAPOLI

Contributi a fondo perduto

01 del 01/01/1967 per ampliamento

- Istituto istruttore: ISVEIMER
- Investimento: 377.013 di cui 290.248 in impianti
- Spese per opere murarie: 0 di cui ammesse 0
- Spese per macchinari (Centro-Nord): 0 di cui ammesse 645.771
- Spese per macchinari (Sud): 0 di cui ammesse 193.224
- Finanziamento concesso = 1.239.496

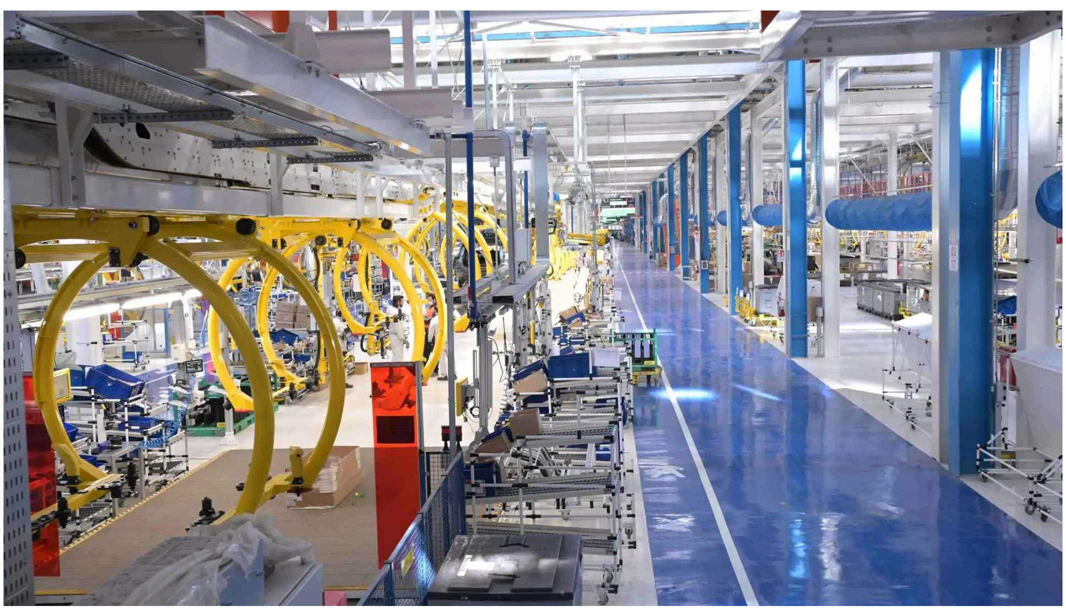
Notes. The figure provides an example of raw data available at https://aset.acs.beniculturali.it/aset-web/. Specifically, the figure summarizes the information regarding CasMez's co-financing of an Alfa Romeo Avio establishment expansion in Pomigliano d'Arco (Naples).

Figure A.3 reports that the grant for the establishment expansion was approved in 1967. Figure A.4 shows a picture of the establishment in 1969. The fact that this establishment is still active today constitutes an interesting piece of anecdotal evidence of the persistent effects of CasMez's investments on Southern industrial production. Figure A.5 indeed, shows the interior of the same establishment in 2022. Other examples of successful industrial clusters in the South of Italy that received funds from CasMez are the aerospace district around Brindisi (Apulia) and the semiconductors district around Catania (Sicily).

Figure A.4: Picture of Alfa Romeo Avio Establishment (Pomigliano d'Arco, 1969)

Notes. The figure provides an example of raw data available at https://aset.acs.beniculturali.it/aset-web/. Specifically, it displays the Alfa Romeo establishment in Pomigliano d'Arco (Naples) that received CasMez's funds listed in Figure A.3 in 1969, two years after the grant.

Figure A.5: Picture of Stellantis Establishment (Pomigliano d'Arco, 2022)



Notes. The figure provides an example of raw data available at https://aset.acs.beniculturali.it/aset-web/. pecifically, it displays the Alfa Romeo establishment in Pomigliano d'Arco (Naples) that received CasMez's funds listed in Figure A.3 in 2022.

B Additional Reduced-Form Results and Robustness Checks

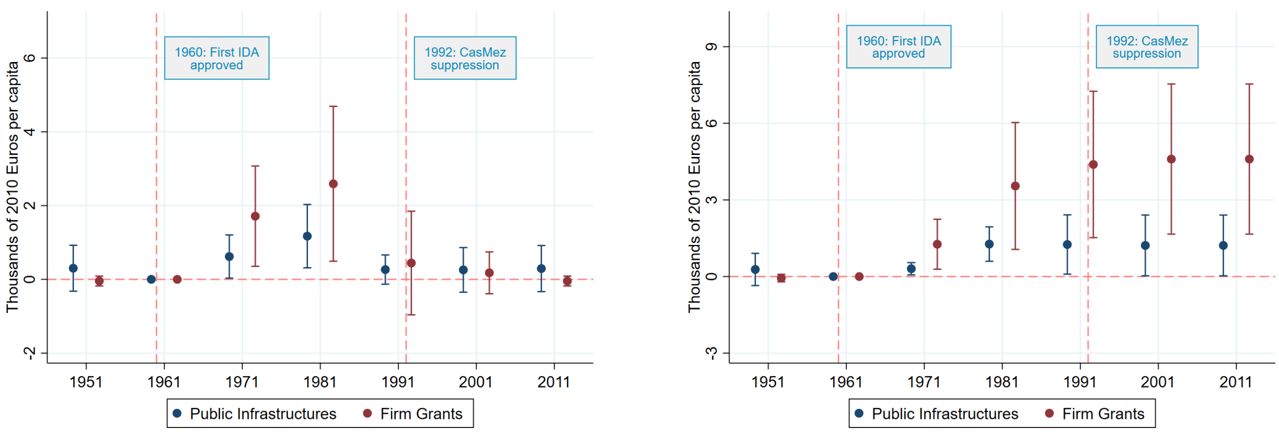
This Appendix section provides additional empirical results and robustness checks at the municipality level.

B.1 First-Stage Composition

Recall that CasMez's investments comprise public infrastructure spending and firm grants. Therefore, the first-stage coefficients shown in the main figures are the combination of both types of spending. In this subsection, I show the composition of the first-stage coefficients displayed in Figures 7, 10, and 14. Figure B.1 shows the composition of decade-specific investments and cumulative investments received by municipalities belonging to early IDAs (i.e., treatment group in my first identification strategy) relative to municipalities belonging to late IDAs (i.e., control group in my first identification strategy). About 1/4 of the first-stage coefficient is explained by public infrastructure investments, while 3/4 is explained by firm grants.

Figure B.1: Early IDAs vs. Late IDAs - First Stage Composition

(a) Decade-Specific Investments (b) Cumulative Investments

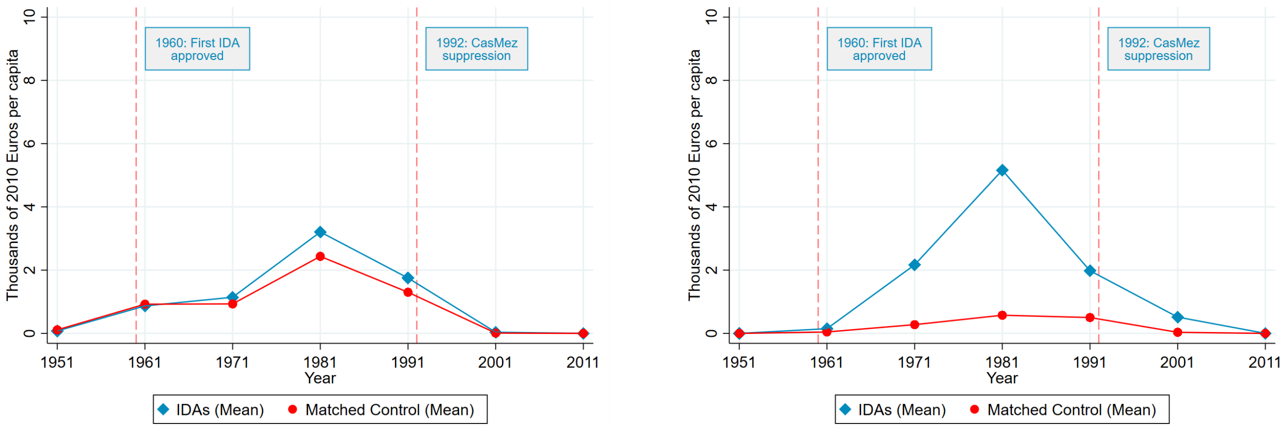


Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (1). Recall that the unit of observation is a municipality and this dynamic difference-in-differences design compares municipalities belonging to early-approved IDAs (1960-1965) with municipalities belonging to late-approved IDAs (1966-1974). The outcome variable in Panel (a) is decade-specific per-capita investments. while the outcome variable in Panel (b) is cumulative per-capita investments. Investments comprise public infrastructure spending and firm grants and they are converted in per-capita terms by dividing for 1961 municipal population. The blue dots denote the first-stage coefficients on public infrastructure investments. The red dots denote the first-stage coefficients on firm grants. The period assigned to each investment is the year in which the project was approved by CasMez. Observations are weighted by 1961 population and standard errors are clustered at the municipality level.

Figure B.2 below displays the composition of decade-specific investments received by municipalities belonging to an IDA (i.e., treatment group in my second identification strategy) relative to 1-to-1 matched municipalities (i.e., control group in my second identification strategy). Panel (a) displays group means in public infrastructure investments, while Panel (b) shows group means in firm grants. In this case, the first stage is almost totally driven by firm grants, with public infrastructure investments accounting for small differences in the 1980s and 1990s.

Figure B.2: 1-to-1 Match - Decade-Specific Investments Composition

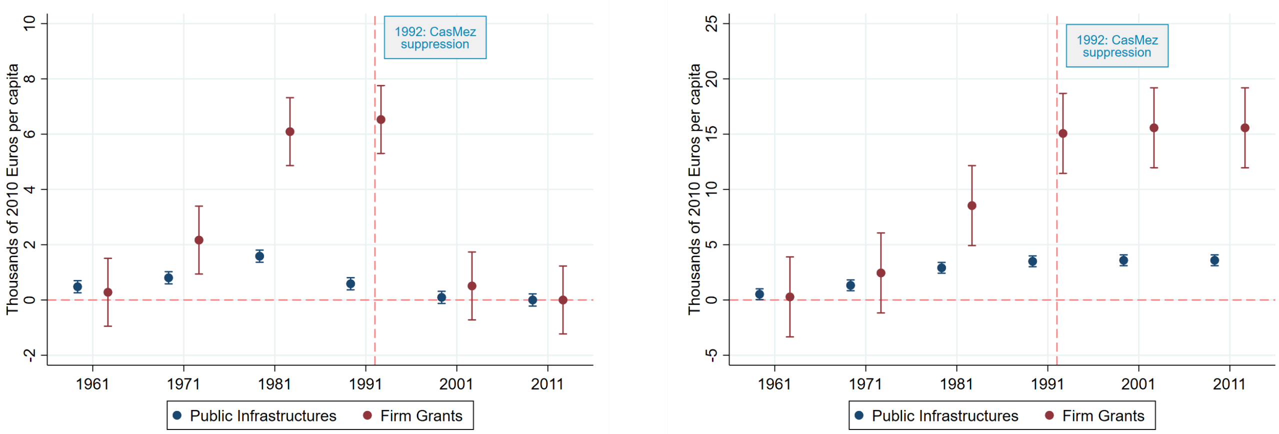
(a) Public Infrastructures (b) Firm Grants



Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (2). Recall that the unit of observation is a municipality and this dynamic difference-in-differences design compares each municipality belonging to IDAs with one municipality not belonging to IDAs, matched on 1951 characteristics and 1951-1961 trends. The outcome variable in Panel (a) is decade-specific per-capita investments in public infrastructures, while the outcome variable in Panel (b) is decade-specific per-capita firm grants. Investments are converted in per-capita terms by dividing for 1961 municipal population. The period assigned to each investment is the year in which the project was approved by CasMez.

Figure B.3: Dynamic Long Difference-in-Discontinuities - First Stage Composition

(a) Decade-Specific Investments (b) Cumulative Investments



Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (3). Recall that the unit of observation is a municipality, and this dynamic long difference-in-discontinuities design compares municipalities just South vs. North of CasMez's jurisdiction border. The outcome variable in Panel (a) is decade-specific public infrastructure investments per capita, while in Panel (b) is firm grants per capita. Measures of investments are divided by the 1961 municipal population.

Finally, Figure B.3 shows the composition of decade-specific investments and cumulative investments received by municipalities located just South of CasMez's jurisdiction border (i.e., treatment group in my third identification strategy) relative to municipalities located just North (i.e., control group in my third identification strategy). As in the cause of the first identification strategy, about 1/4 of the first-stage coefficient is explained by public infrastructure investments, while 3/4 is explained by firm grants.

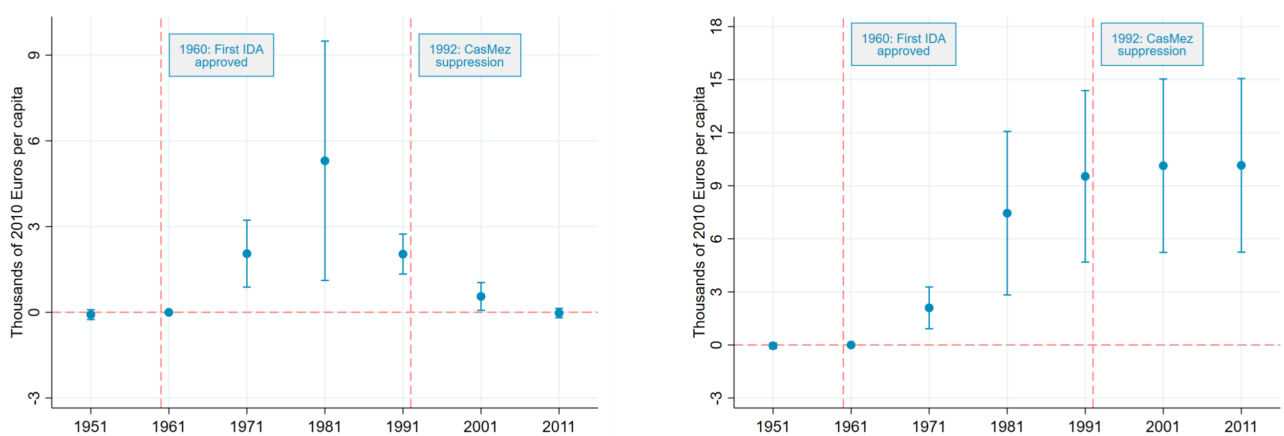
To summarize, the estimated effects of CasMez's investments on local economic activity in two of my three identification strategies identify the joint impact of infrastructure and firm grants, while in the 1-to-1 matched sample, they mostly identify the impact of firm grants. It is important to keep in mind that agglomeration economies influence the amount of resources a municipality receives, as it is a function of firms' investment decisions. Therefore, to the extent that public infrastructure investments increase local productivity, firm grants endogenously increase.

B.2 1-to-1 Matched Sample: Estimated Coefficients Plots

In this section, I plot the difference-in-differences coefficients already displayed in Figures 10 and 11. The main figures report only the simple means of the treatment and the control groups. The advantage of reporting means is that the time trends acting on both groups can be observed, therefore noticing the decrease in manufacturing employment affecting both groups, especially from the 1990s onward. However, plotting the difference-in-differences coefficients has the advantage of showing standard errors, thus providing a sense of the statistical uncertainty around the estimated coefficients. Figure B.4 and B.5 and plots the difference-in-differences coefficients from Equation (2). Both first-stage and reduced-form coefficients are statistically significant.

Figure B.4: 1-to-1 Match - First Stage

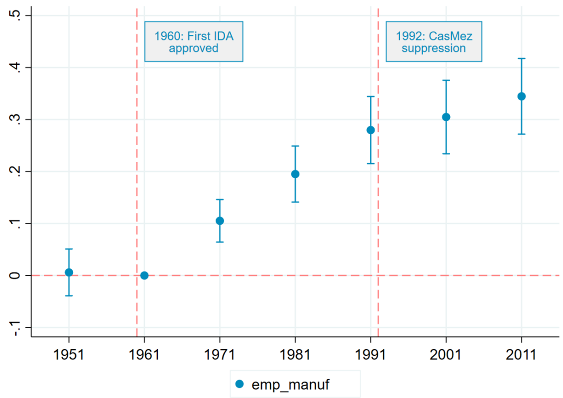
(a) Decade-Specific Investments　　　(b) Cumulative Investments



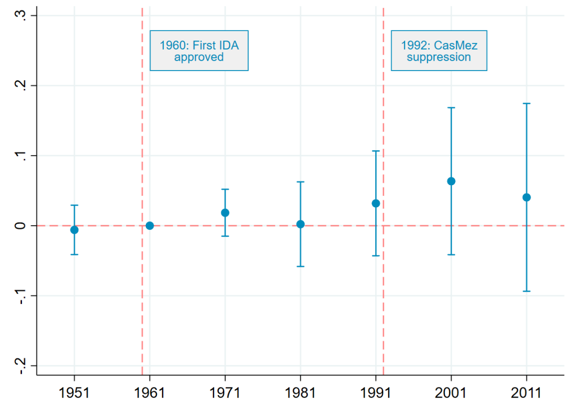
Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (2). Recall that the unit of observation is a municipality and this dynamic difference-in-differences design compares each municipality belonging to IDAs with one municipality not belonging to IDAs, matched on 1951 characteristics and 1951-1961 trends. The outcome variable in Panel (a) is decade-specific per-capita investments, while the outcome variable in Panel (b) is cumulative per-capita investments. Investments comprise public infrastructure spending and firm grants and they are converted in per-capita terms by dividing for 1961 municipal population. The period assigned to each investment is the year in which the project was approved by CasMez. Observations are weighted by 1961 population and standard errors are clustered at the municipality level.

Figure B.5: 1-to-1 Match - Reduced Form

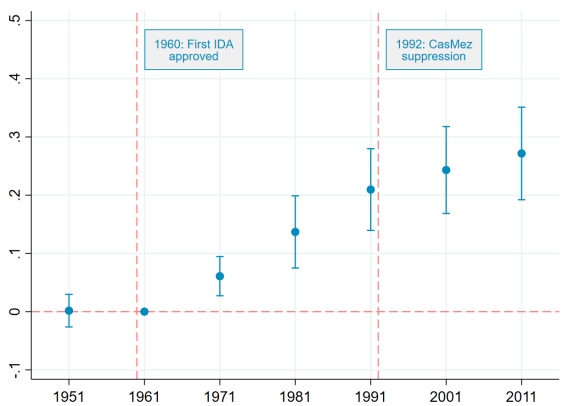
(a) Log Manufacturing Employment



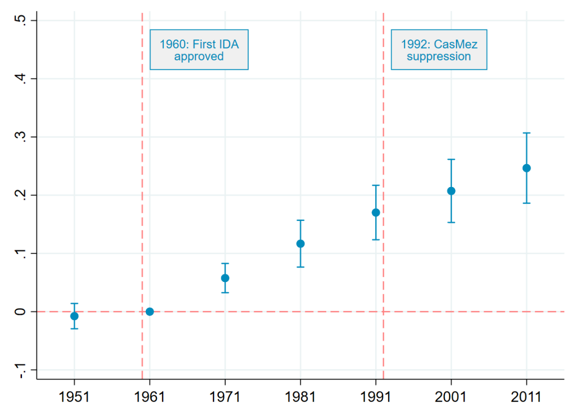
(b) Log Agriculture Employment



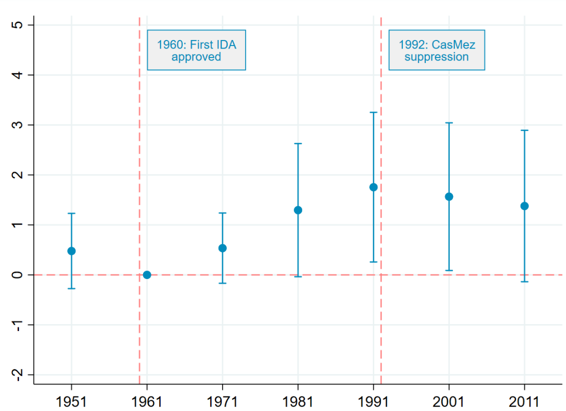
(c) Log Employment



(d) Log Population



(e) Employment Rate



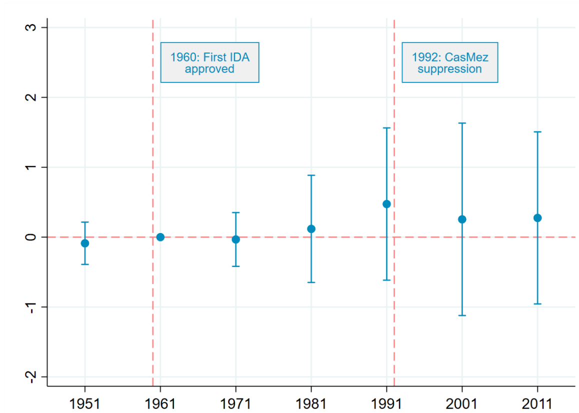
Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equation (2) for five different outcome variables. Panel (a): log manufacturing employment; Panel (b): log agriculture employment; Panel (c): log employment; Panel (d): log population; Panel (e): employment rate. Recall that the unit of observation is a municipality and this dynamic difference-in-differences design compares each municipality belonging to IDAs with one municipality not belonging to IDAs, matched on 1951 characteristics and 1951-1961 trends.

B.3 Results on Municipality-Level Human Capital

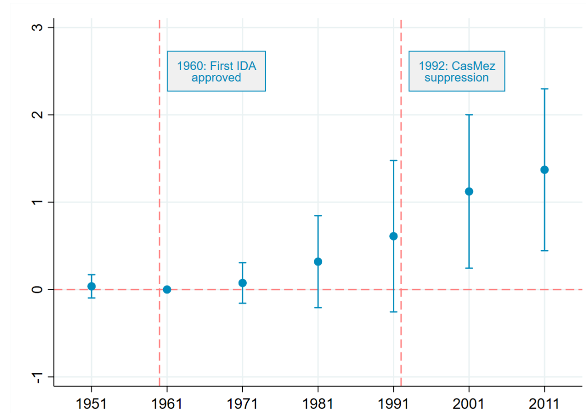
Some theories of agglomeration economies involve knowledge spillovers, the idea that a higher density of workers increases the productivity of all workers because of social interactions and knowledge transfers (Moretti, 2004). This channel could be at play, especially when agglomeration increases the density of highly qualified workers. Since my main results point to the presence of agglomeration economies, I test this hypothesis by examining the impact of CasMez's investments on the concentration of college-educated individuals in municipalities more exposed to investments. Specifically, I estimate the reduced-form coefficients from Equations (1), (2), and (3) with the college-educated share of the population as the dependent variable.

Figure B.6: Reduced-Form Coefficients - Share of College-Educated Population

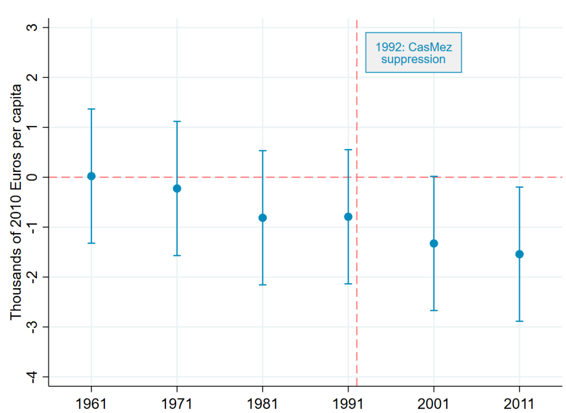
(a) Early IDAs vs. Late IDAs



(b) 1-to-1 Matched Sample



(c) Long Difference-in-Discontinuities



Notes. The figure shows the coefficients $\hat{\beta}_t$ estimated from Equations (1), (2), and (3) with the college-educated share of the population as an independent variable. Each panel reports the coefficient from a distinct empirical strategy. Panel (a): Early vs. Late IDAs; Panel (b): 1-to-1 Matched Sample; Panel (c): Long difference-in-discontinuities. Recall that the unit of observation is a municipality.

As shown by Figure B.6, I do not find unequivocal support for a long-term effect of CasMez's investments on municipality-level human capital, as measured by the share of the college-educated population. Panel (a) shows that comparing municipalities belonging to early IDAs with municipalities belonging to late IDAs I find null coefficients. Panel (b) instead shows that comparing municipalities belonging to IDAs to matched municipalities not belonging to IDAs I find a positive long-term effect on the share of the college-educated population. Specifically, this share increased 1.5 percentage points more in IDA municipalities relative to non-IDA municipalities from 1951 to 2011. Finally, Panel (c) shows that the long difference-in-discontinuities design at the border of CasMez's jurisdiction delivers negative long-term effects of CasMez's investments on the share of the college-educated population.

Different hypotheses could be made about the impact of manufacturing-oriented public investments on local human capital both in the short and in the long run. On the one hand, relatively high-paying manufacturing jobs could increase the demand for education from families. Also, manufacturing density could increase the local demand for knowledge-intensive services. This would translate into a positive effect on the share of the college-educated population which, in turn, could drive agglomeration economies in the long run. On the other hand, the specialization of the local economy in manufacturing could increase the demand for non-college-educated workers and crowd out investments in human capital accumulation. This would translate into a negative effect on the share of the college-educated population. The evidence provided does not shed light on which mechanism prevails. However, it casts doubt on the possibility that the persistent effects on manufacturing and total employment estimated consistently across the three identification strategies could be driven by local human capital accumulation.

B.4 Cross-Sectoral Agglomeration Elasticities

The reduced-form analysis provides robust evidence of substantial long-run effects of CasMez's investments on manufacturing activity at the local level. Manufacturing employment gains in turn increase employment in other sectors, mainly services. However, the model-based counterfactual analysis reveals that a place-blind allocation of CasMez's investments would have generated larger gains in national manufacturing output. This happens mostly because reallocating factors of production from high-productivity to low-productivity regions exacerbates crowding-out effects and decreases the aggregate gains from the policy. Moreover, I have shown that the Center-North is characterized by stronger agglomeration elasticities in the manufacturing sector than the South.

Expanding the perspective to take into account cross-sectoral spillovers, one could argue that the *within-manufacturing* agglomeration elasticity is lower in the South than in the Center-North but the *cross-sectoral* agglomeration elasticity (i.e., the percent increase in the service sector productivity due to a 1% increase in manufacturing density) might still be stronger in the South than in the Center-North. This would imply that the larger crowding-out effects within the manufacturing sector might be more than compensated by stronger cross-sectoral agglomeration economies in the targeted regions. This in turn would induce aggregate gains.

To test this hypothesis, I estimate Equation (B.1):

$$\ln(\ell^S_{it}) = \kappa_i + \delta_{rt} + \frac{\gamma^{MS}}{\beta} \ln\left(\frac{\ell^M_{it-1}}{A_i}\right) + \mathbf{X}'_{i1951}\Gamma_t + \nu_{it}, \tag{B.1}$$

where $\ln(\ell^S_{it})$ denotes municipal employment in the services sector, κ_i denotes unit fixed effects, δ_{rt} controls for regional trends, γ^{MS} is the cross-sectoral agglomeration elasticity, $\frac{\ell^M_{it-1}}{A_i}$ is the municipality-level manufacturing employment density, and $\mathbf{X}_{i1951}$ denotes a vector of baseline control variables interacted with time dummies to control for heterogeneous trends induced by differences in size, baseline agglomeration, education levels, and manufacturing concentration across municipalities. I estimate (γ^{MS}/β) separately for the Center-North and the South to test for heterogeneous agglomeration elasticities.

Table B.1: IV Estimates of Cross-Sectoral Agglomeration Elasticities

	(1) South	(2) Center-North	(3) Difference
$(\gamma^{\hat{MS}}/\beta)$	0.583***	0.638***	-0.055
	(0.034)	(0.032)	(0.070)
Observations	13,155	25,555	38,710
Units	2,631	5,111	7,742
First Stage F-Stat	217.81	582.53	
Municipality FE	✓	✓	✓
Region × Time FE	✓	✓	✓
Baseline Controls × Time FE	✓	✓	✓

Notes. The table displays the 2SLS coefficient obtained by estimating Equation (B.1), allowing the coefficient γ^{MS}/β to differ between the Center-North and the South. An observation is a municipality-year and the panel covers the period 1971-2011. The dependent variable is municipal services employment. The main regressor is one-decade-lagged manufacturing employment density. The main regressor is instrumented with two-decade-lagged manufacturing employment density. The table reports the number of observations, the number of unique provinces, and the Kleibergen-Paap F-statistic for weak identification. Baseline controls include log population, the share of manufacturing employment, manufacturing employment density, the share of the illiterate population, and a dummy variable taking value 1 if the municipality belongs to an IDA. Observations are weighted by the 1951 municipal population. Standard errors are clustered at the province level. * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

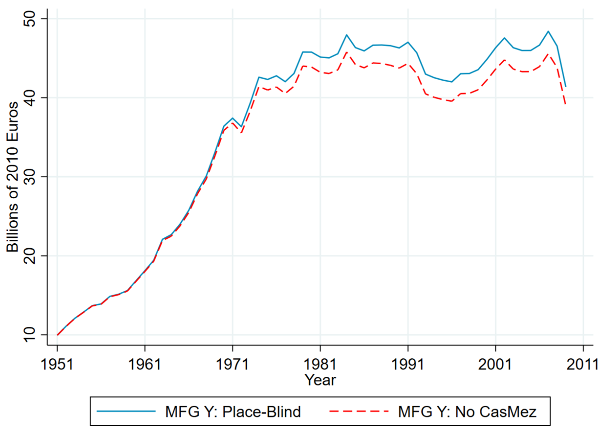
Table B.1 reports the results. Strong cross-sectoral agglomeration economies are present in the South, confirming my reduced-form analysis of positive spillover effects from manufacturing density to services employment. However, agglomeration economies of similar strength are detected in the rest of the country. I estimate a non-significant difference in cross-sectoral agglomeration elasticities between the Center-North and the South. A natural implication of this finding is that heterogeneous cross-sectoral elasticities between the South and the Center-North hardly provide efficiency grounds to motivate regional development programs.

C Alternative Allocation: Place-Blind Program

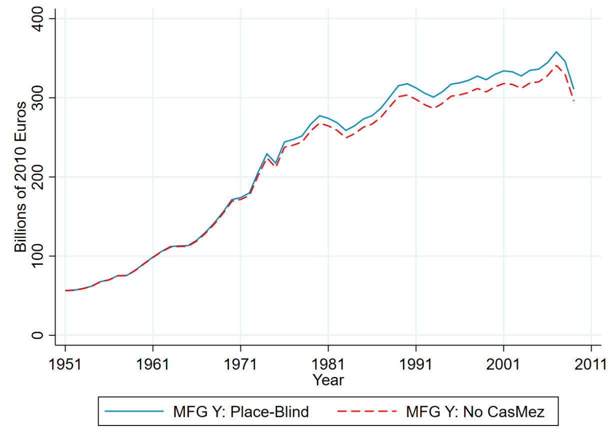
This section summarizes the results from the model-based analysis simulating the long-run impact of a public investment program of the same size as CasMez but place-blind (i.e., assigning the same investments per capita across regions). To perform this counterfactual analysis, I need to take a stance on the impact of public investments on regional productivity in the Center-North (i.e., η/k_N^P). Since I do not observe k_N^P and k_S^P and I only estimate η/k_S^P, I conservatively assume that $\eta/k_N^P = 1/2 \times \eta/k_S^P$. In practice, this means that the first-order impact of one Euro spent in the Center-North on regional productivity is 50% smaller than in the South, capturing the idea that the Center-North may be more endowed with public capital at baseline.

Figure C.1: MFG Output: Place-Blind Program vs. No CasMez

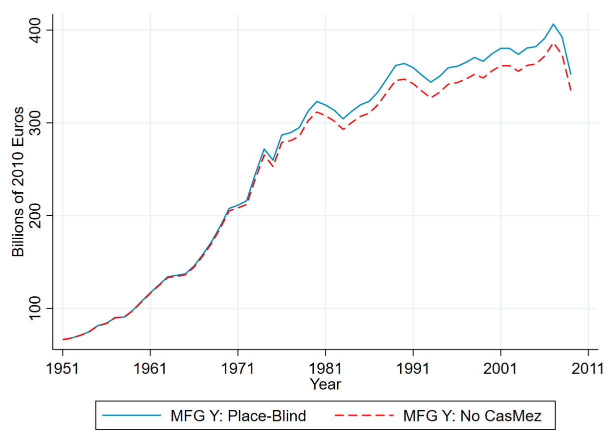
(a) South



(b) Center-North



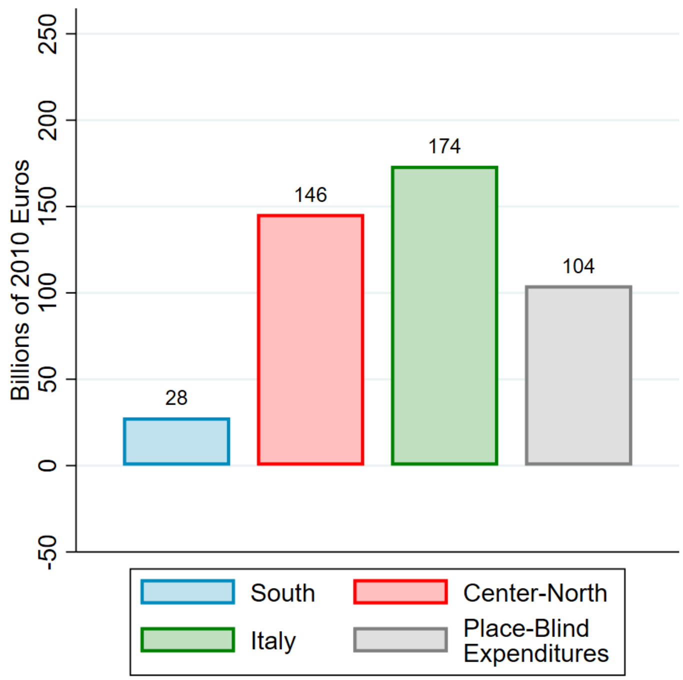
(c) Italy



Notes. The figure shows the simulated counterfactual dynamic of manufacturing employment in the South, the Center-North, and the country as a whole (light blue lines) in response to a place-blind program of the same size as CasMez and the simulated counterfactual dynamic in the absence of CasMez's investments. Panel (a) shows the results of the model-based analysis for the South, Panel (b) for the Center-North, and Panel (c) for the whole country. The unit of measure is millions of workers. The data used for the simulation come from SVIMEZ (2011). The parameters used for the simulation are listed in Table 9. These simulations assume that $\eta/k_N^P = 1/2 \times \eta/k_S^P$.

Figure C.1 compares industrial production under the place-blind program and with no investment. Contrary to the results in Figure 16, industrial production increases much less in the South, more in the Center-North, and more in aggregate. The intuition for this result is that by concentrating investments evenly across regions, the program limits crowding-out effects stemming from the reallocation of factors from the Center-North (i.e., the more productive region) to the South (i.e., the less productive region). Figure C.2 shows the present discounted value of industrial production gains accrued between 1951 and 2011 to the South (blue bar), the Center-North (red bar), and the country as a whole (green bar). The figure compares these gains to the present discounted value of the program's costs.

Figure C.2: PDV of Industrial Production Gains and Place-Blind Program's Spending



Notes. The first three bars indicate the net present value, discounted to 1951 with a real annual discount rate of 3%, of the stream of realized gains/losses accrued to the South, the Center-North, and the whole country from a counterfactual, place-blind program, of the same size as CasMez. The last bar displays the net present value, discounted to 1951 with a real annual discount rate of 3%, of CasMez's investments. The calculation ignores all costs other than the operating costs related to the investments, as well as any cost of funds. The unit of measure is billions of 2010 Euros. These simulations assume that $\eta/k_N^P = 1/2 \times \eta/k_S^P$.

The simulation shows that the long-run aggregate industrial production gains from the program would have been larger (i.e., €174 vs. €134 billion). As a consequence, the long-run aggregate multiplier of the program would have been 1.7 instead of 1.3.