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The Effects of Italy's Unification on Its Dual Development: A Synthetic Control Approach

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There is a long-standing debate on the effect of Italian unification (1861) on the country's dual development. We estimate the causal impact of unification on agricultural share, literacy and railway density for the South and the Centre-North by analyzing a newly assembled panel of countries/regions with the synthetic control method. Our findings suggest that over the 50 years following the birth of the unified state, neither area drew generalized benefits from unification. Consolidation delayed industrialization in both macro areas. However, the South benefited from a strong spread of rail infrastructure, while the Centre-North enjoyed a pronounced increase in literacy.

1. Introduction

Italy was unified in 1861. The country's unification was the result of the Italian Risorgimento, the political and social movement that developed in the aftermath of the Napoleonic era and culminated in the consolidation of the existing states into the Kingdom of Italy (Banti and Ginsborg 2007). Unification led to a large domestic market regulated by shared institutions, as well as public investments in transport and education. Since soon after the inception of the new nation-state, historians, economists, intellectuals, and the ruling class have been debating if Italian unification contributed to the subsequent country's dual development—which saw the South increasingly lagging behind the Centre-North—but the debate is still unsettled.

This paper contributes to this debate by estimating the impact of unification on standard indicators of development, agricultural shares of the labor force, railways density and literacy rates, with a well-established counterfactual methodology: the synthetic control method (SCM henceforth; Abadie, Diamond, and Hainmueller 2010). We draw on a newly compiled cross-country historical database covering the decades before and after unification (from 1840 to 1911). We consider two separate series for Italy's South and Centre-North,[1] and other

[1] We consider South the territory of the Kingdom of the Two Sicilies and the Sardinian isle. The rest of Italy at 1871 borders is our Centre-North. Excluding Latium from the Centre-North, as done by Malanima (2011), has a negligible effect on trends in our outcome variables.

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twelve European countries. Our sources include several collections of historical statistics (e.g. Flora et al. 1983 and the Federico and Tena-Junguito's 2023 database), as well as a range of recent quantitative studies on Italy's regional development in the nineteenth century (e.g. Felice 2019; Chilosi and Ciccarelli 2022).

Our results suggest that neither the South nor the Centre-North gained generalized benefits from the unified state. According to the SCM's analysis, unification delayed industrialization not only in the South, but also in the Centre-North. At the same time, we also document asymmetric beneficial effects of public investments: unification increased the diffusion of railways only in the South, while it resulted in increased literacy only in the Centre-North. Overall, we fail to detect significant effects of unification on the South vs Centre-North regional divide.

This paper adds to the literature on the consequences of Italian unification on the subsequent dual development (Toniolo 2013, Felice 2015). The traditional, but still influential, pessimist view holds that post-unification economic policies favored industrialization and development in the North at the expense of the South (Gramsci 1975; Nitti 1900; Romeo 1959). In contrast, part of the more recent literature has highlighted that unification benefited the Southern economy as it brought market integration (A'Hearn and Rueda 2023), free trade (Ciccarelli and Fenoaltea 2013; Lupo 1990), and public investments in infrastructure and education (Felice 2019, Pescosolido 2019). In all cases, the literature has almost exclusively relied on (descriptive) empirical approaches based on post-unification trends. A handful of studies carry out before–after unification comparisons of Italy's macro-areas (Daniele and Malanima 2007; de Oliveira and Guerriero 2018; Ciccarelli and Weisdorf 2019). To better understand the impact of unification, it is important to consider what the trajectory of economic development in both areas might have been if unification had not occurred. Our paper addresses this question by discussing post-unification development trajectories within a rigorous counterfactual framework.

Our findings are in line with the recent literature on the Risorgimento that sees Italian unification as determined by cultural movements rather than economic convenience (Banti 2020; Patriarca and Riall 2011) and the historical literature that downplays the role of the country's unification on the dualism characterizing the Italian economy (Lupo 2011, 2015). They also fit the view that there were only relatively small gains from a larger market because the two areas had both a comparative advantage in the production of primary commodities for the industrializing countries of Northern Europe (Cafagna 1989). Thus, the reduction of protectionism that followed consolidation seems to have favored agricultural exports while delaying the process of structural transformation. Our findings also highlight that substantial (though asymmetric) effects of the consolidation on public investments in railways and education were not matched by contemporaneous gains in industrialization. This dissonance is consistent with the argument that Italian nation-building diverted public investments from where they were most efficient to where they were politically necessary to secure the consent of local populations (Cafagna 1989).

This paper also contributes to a growing literature that applies the SCM to comparative economic history, as recently advocated by Gilchrist et al. (2023). Notable examples, among others, include Kedrosky and Palma (2025) and Charrotti, Palma, and Pereira dos Santos (2022) who examine the Dutch disease in Portugal and Spain, respectively, both related to the inflow of precious materials from the colonies. Lambais and Palma (2023) use a synthetic difference-in-differences approach to analyze the impact of the slave trade on inequality in Brazil. Other studies focus on communism. Korolev (2021) predicts how Russia might have developed without the 1917 revolution and finds that without the revolution Russia would

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have performed better during the 1920s while the evidence for the 1930s is less clear. As to the Fidel Castro's revolution in 1959, the available evidence points to long-term decline in the GDP per capita (Jales et al. 2018) and an increase in infant mortality, which partially reverted to trend after the introduction of Soviet subsidies (Geloso and Bologna Pavlick 2021).[2]

The paper is structured as follows. Section 2 describes the historical background, with a focus on how unification represented a potentially different treatment for Central-Northern and Southern regions. Section 3 is devoted to the review of the historical debate on the economic consequences of Italy's unification. Section 4 presents the data and empirical approach. Section 5 turns to the results. Section 6 concludes and illustrates some areas of interest for future historical and economic research.

2. The unification treatment

At the end of the Napoleonic era, in 1815, the Italian territory was divided into seven states, with heterogeneous institutions and levels of economic development (Cafagna 1973; Cainelli, Ciccarelli, and Ganau 2023; Cipolla 1956-1971; Cohen and Federico 2001; Meriggi 2014; Postigliola and Rota 2021).[3] Their geographical extension and position are illustrated in figure 1. Borders between them disappeared between 1861 and 1871 with the political unification of the country (see A'Hearn and Rueda 2023).

Italy's unification in 1861 was the culmination of the Risorgimento, a nationalist movement opposed to absolutism that gained prominence after 1815. After an ill-fated "first independence war" (1848–1849), most territorial changes took place between 1859 and 1860, thanks to two military campaigns. The "second independence war" (1859–1860) led to the Kingdom of Sardinia's annexation, sanctioned by plebiscites, of Lombardy, the Duchies of Parma and Modena and the Grand Duchy of Tuscany (but also to the losses of Nice and Savoy, ceded to France in exchange for her military support). Its main architect was Cavour, prime minister of the Kingdom of Sardinia since 1852. Southern Italy was "liberated" by the freedom fighter Garibaldi in 1860, who, against Cavour's will, led an expedition of volunteers, but eventually ceded control of the territory to the king of Sardinia Victor Emanuel II.[4]

Turin, the seat of Victor Emanuel II, was the first capital of the new Italian Kingdom, proclaimed by the Subalpine parliament on March 17, 1861. In the aftermath of unification, the laws of the Sardinian kingdom were extended to the rest of Italy (Mack Smith 1971 is the classical reference, but see also, among others, the more recent Riall 2002 and Banti 2020).

Table 1 provides a quantitative summary of the socioeconomic situation on the eve of the country's unification. The table includes the seven preunification states and the two macro-area (Centre-North and South) we consider in this paper.[5] The indicators include

[2] Other scholars look at more recent times. Campos, Coricelli, and Moretti (2019) use data for the period 1973–2004 to estimate the EU membership premium, which turns out to be large and positive (with the exception of Greece). Grier and Maynard (2016) estimate a negative impact of Hugo Chavez on the Venezuelan economy. Funke, Schularick, and Trebesch (2023), who study a large number of countries over the period 1900–2020 to estimate that populist leaders reduce GDP per capita over the medium term (15 years).

[3] The source Cipolla (1956-1971) refers to a set of volumes published by several authors during the period 1956–1971, working on a research project on the Italian economy before the country's unification and coordinated by Cipolla.

[4] Umbria and Marche, which were part of the Papal Sates, were conquered by the Sardinian army in 1860. Venetia and Latium were annexed later, in 1866 and 1870, respectively. In the analysis, we ignore these differences in the timing of the treatment, as we do not expect our outcome variables to be significantly affected.

[5] In table 1 the South corresponds to the Kingdom of the Two Sicilies plus the region of Sardinia.

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Figure 1. Preunification states (1815–1860 ca). *Notes:* The map serves purely illustrative purposes. Different colors denote different preunification states. The external borders are those prevailing in the period 1861–1913. The northwestern regions of Savoy and Nice, annexed to France in 1860, are not included. Additional details, such as for instance the territory of the Duchy of Lucca (1815–1847) or the little enclaves of San Marino in the North, and Pontecorvo, and Benevento in the South are also not included.

estimates of the literacy rates of the adult population, of the share of labor force in agriculture, and of railway density.[6] As stressed by Zamagni (2012) these indicators, which represent the outcome variables of the empirical section, are closely related to the growth potential of agricultural economies, such as Italy in the mid-nineteenth century, and represent thus valuable predictors of future development and growth, possibly superior to per capita GDP.

The whole country was mostly agricultural in the mid-nineteenth century. However, this feature was particularly marked in the South, where the agricultural employment share was over four-fifths, as compared to less than two thirds in the rest of the country. A comparatively high agricultural employment share in the South was already visible as early as 1400 and can be traced back to the "commercial revolution" of the high Middle Ages, which was concentrated in the city-states of the Centre-North (Chilosi and Ciccarelli 2022).

[6] Additional indicators are reported in Eckaus (1961), Zamagni (2012) and Federico and Tena-Junguito (2014).

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Table 1. *The regional divide in Italy in 1860 ca.*

	(1) Population (millions) 1848–1856	(2) Literacy rate 1861	(3) Agricultural shares 1853	(4) Rail density (1000 km/km^2) 1861
Kingdom of Sardinia	4.34	0.49	0.64	12.65
Kingdom of Lombardy-Venetia	5.51	0.47	0.65	15.50
Duchy of Parma and Piacenza	0.51	0.27	0.66	15.99
Duchy of Modena and Reggio	0.61	0.30	—	10.15
Grand Duchy of Tuscany	1.78	0.35	0.56	15.40
Papal States	3.02	0.29	0.67	8.08
Kingdom of the Two Sicilies	9.07	0.19	0.77	1.46
Center-North	15.22	0.42	0.63	14.70
South	9.62	0.19	0.76	1.46
Italy	24.84	0.33	0.68	8.84

Notes: Authors' elaborations on the various sources. Column (1): Correnti and Maestri (1864), p. 4; column (2): literacy rates of the adult population based on Ciccarelli and Weisdorf (2019); column (3): based on Chilosi and Ciccarelli (2022); column (4) based on Ciccarelli and Groote (2017). In column 2, the population data for Veneto and Latium refers to 1871. Chilosi and Ciccarelli (2022) had to disregard occupational censuses from Modena, as labor participation rates were greater than one, since statisticians allocated individuals to multiple occupational groups, like clerks and military (Roncaglia 1850: 10).

Considerable differences in the development of Centre-North and South at the time of unification are confirmed both by literacy rates and, even more, by railway endowment.

Figure 2 depicts the evolution of the Italian railway network during 1851 to 1881 to highlight how unification was followed by a massive acceleration in the pace of construction. In 1861, the network was particularly dense in the continental part of the Kingdom of Sardinia, where Cavour had played a pivotal role in supporting railway developments. The main North-Western cities, Genoa, Turin, and Milan, were already connected. Milan was also connected to Venice (then part of the Habsburg Empire) and Ancona, on the Adriatic Sea. There was also a local network in Tuscany and a few kilometers of lines in Latium and Campania, connecting Rome (still part of the Papal States) and Naples with nearby localities.

Railway construction was a top priority of the liberal elite after unification. In 1871, the North and the South were connected for the first time after the construction of the coastal lines along the Mediterranean and Adriatic Sea. These are the infrastructures that, for instance, Romeo (1959) considered "essential" to unify the market and foster Italy's industrial development. In 1871, Eastern and Western Italy were also connected, with railway lines crossing the Apennines both in the Center (Rome-Ancona) and in the South (Naples-Foggia). By 1881, most of the network, including the part in the major islands of Sardinia and Sicily, had been built.

Uneven development of literacy at the time of unification was associated with uneven development of schooling (Zamagni 2012). As shown by Chilosi (2007), while in 1861, over four-fifths of children were enrolled in primary schools in Lombardy and Piedmont, in the rest of the peninsula, with the only and partial exception of Veneto, most children did not receive any schooling at all, a point reinforced also by Bozzano, Cappelli, and Vasta's (2024) recent analysis. The turn to mass schooling in Lombardy can be traced back to the Theresian

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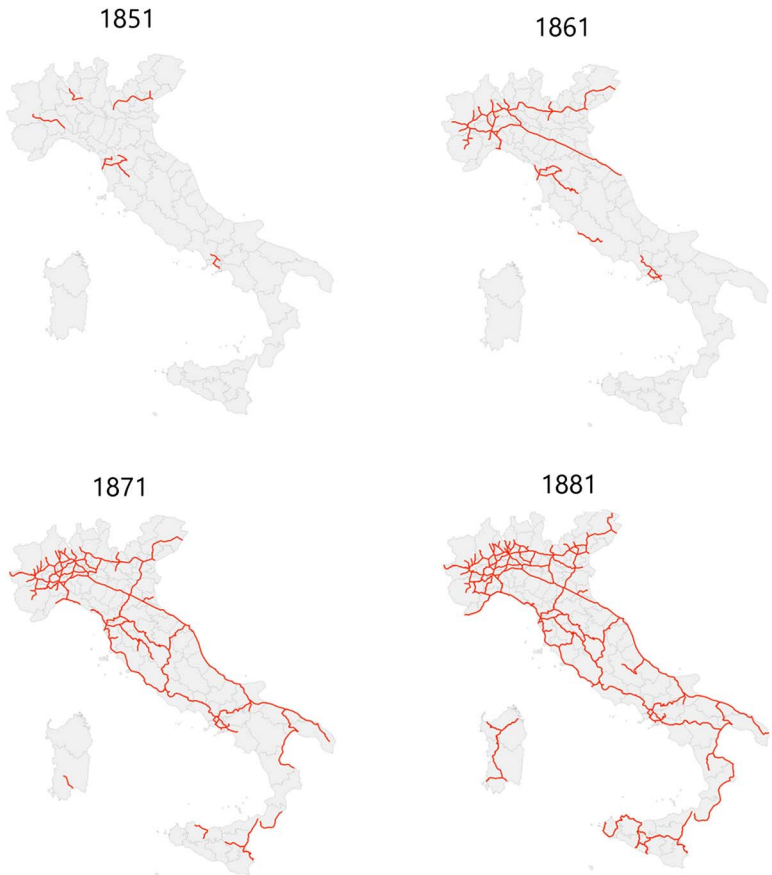

Figure 2. The expansion of the Italian railway, 1851–1881. *Source*: author's elaboration on Ciccarelli and Groote (2017). Geodatabase available at https://data.mendeley.com/datasets/rjwccjgy7z, last accessed January 2023.

reforms, which introduced compulsory schooling as early as 1774. Piedmont saw rapid growth of popular schooling from the 1840s, in strict correlation with its embrace of Italian nationalism. The Casati Law introduced compulsory education in the Kingdom of Sardinia in 1859 and was extended to the rest of the country with unification. After unification, too, public investment in schooling was intimately linked to nation-building objectives (Soldani and Turi 1993). Among them linguistic unification was a particularly pressing one: in 1861 at most 10 percent of the population was habitually speaking Italian (Berruto 1983). More broadly, the problems of legitimacy faced by the newly unified state in the South in particular found a visible manifestation in the phenomenon of "brigandage," widespread criminal activities through which old elite and local population expressed resistance to the new regime in the first decade after unification (see e.g. recent analyses by Ciocca 2013; Accetturo, Bugamelli, and Lamorgese 2017; Lecce, Ogliari, and Orlando 2022). However, the growth of schooling remained remarkably uneven: by the turn of the twentieth century, 90 percent of children were enrolled in primary schools in the North-West, as compared to 76 percent in the North-East, 60 percent in the Centre, and only 43 percent in the continental South and 45 percent in

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the Isles (Vigo 1971: 138–9, 160–1, 184–5; see also Cappelli and Quiroga Valle's 2021 on-line database).

Public investments after unification were financed with increased taxation, which in nominal per capita terms shot up from c. 100 grams of silver in 1862 to c. 800 in 1913.[7] The real increase was nearly as large as the nominal one: the consumer price index increased by only 11 percent between 1862 and 1913 (Malanima 2011: table in Appendix 2). An eight-fold nominal increase was very large by European standards: for example, in the Austro-Hungarian Empire taxation per capita was at a very similar level to the Italian one in 1862, but the subsequent increase was less than three-fold. Nominal fiscal pressure in 1913's Italy was much greater than the levels seen across pre-unification states, either in the South or the Centre-North. Although on the eve of unification taxation was on average higher in the Centre-North than in the South, as highlighted by Dincecco and Federico's (2021) statistics, this was a recent development, rather than a legacy of Bourbon chronic under-investment in public goods. In the decades before unification, differences were more marked within than between macro-areas. After the end of Napoleonic rule, taxation levels had declined in the Centre-North but stayed high in the South, with the result that fiscal revenues were on average of c. 45 g of silver per capita in both macro-areas. However, in the Kingdom of Sardinia, taxation started being comparatively high in the 1830s, reaching a level of c. 80 g of silver by the end of the decade. Subsequently, it nearly doubled in the lead up to the "second independence war," during the 1850s. While all states saw increases in nominal per capita taxation in the 1850s, the only other state seeing a comparable change was the Papacy, where nevertheless taxation levels remained about one third lower. Levels remained particularly low in Lombardy-Venetia, where per capita taxation always remained well below 40 g of silver before 1861.

Just before unification, the Kingdom of Sardinia and the Grand Duchy of Tuscany were the most commercially liberal states in Italy, while protection was comparatively high in the Kingdom of the Two Sicilies (Federico and Tena-Junguito 1998: 78). With unification, the mild Piedmontese tariffs (those prevailing in the Kingdom of Sardinia) were extended to the rest of the country. Three years after the approval of the Cobden-Chevalier trade treaty between Britain and France (1860)—who had both supported the Risorgimento—Italy, too, introduced a regime of even lower tariffs (Coppa 1970; Federico and Vasta 2015). Table 2 illustrates, for selected products, the import duties applied before 1861 in the Kingdom of the Two Sicilies (column 1), in the Kingdom of Sardinia (column 2), and those applied to the whole country after the ratification of the trade agreement with France in 1863 (column 3). The most favorite nation clause implied then that the new regime of low tariffs was applied to other countries as well. On the eve of unification, with the sole exception of wool cloth, our sample of tariffs were significantly higher in the Kingdom of the Two Sicilies than they were in the Kingdom of Sardinia. In both places, however, they were comparatively low on cereals. In the restoration years, duties on agricultural products were generally very low across all Italian states, with the sole exception of the Kingdom of Sardinia, which imposed a heavy duty until the mid-1840s, when it was at first halved and then nearly abolished. A consequence was that wheat price convergence between Italian cities– a measure of domestic market integration—was more rapid before rather than after unification (Federico 2007). Yet, our tariff data indicates that the segmentation of Italian markets of manufactures before unification and their

[7] Per capita revenues are from Dincecco's (2009) (since 1862) and Dincecco and Federico's (2021) (before unification) databases, converted from gold into silver.

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Table 2. *Import duties on selected products before and after Unification (lire per 100 kg).*

	(1) Kingdom of the Two Sicilies[a]	(2) Kingdom of Sardinia[b]	(3) Italy[c]	(4) Italy/Sicilies	(5) Italy/Sardinia
bar iron	18	0	0	0.00	*d
cereals	8	2.48	0	0.00	0.00
raw sugar	40	17.85	18	0.45	1.01
coffee	47	34.96	30	0.64	0.86
TEXTILES:					
cotton:					
yarn	28	20	10	0.36	0.50
cloth	90	75	40	0.44	0.53
wool:					
fiber	21	0	0	0.00	*d
yarn	193	60	40	0.21	0.67
cloth	0	300	140	**e	0.47

Notes: [a]Import duties according to the *tariffa napolitana*, that is import duties applied in the Kingdom of the Two Sicilies. [b]Import duties according to the *tariffa piemontese*, that is the import duties applied in the Kingdom of Sardinia. [c]"Italy" denotes the import duties in force in Italy after the 1863 Franco-Italian trade agreement. *[d] = No import duties in both columns 2 and 3, so that the resulting ratio in column 5 is not defined; **[e] = No import duties in column 1, so that the resulting ratio in column 4 is not defined. Authors elaborations on Ciccarelli and Proietti (2013).

domestic integration in the aftermath of 1861 had to be more pronounced than for cereals. As the industrialist Alessandro Rossi pointed out about 10 years after unification: "a sufficiently large internal market … [like those] of industrial foreign countries … has still not emerged here, as we have only been united for a few years" (Comitato dell'inchiesta industriale 1874). Nearly all goods in our sample saw further significant tariff reductions with the 1863 trade agreement. The upshot was that unification led to a particularly marked trade policy shock for Southern industry, which was suddenly exposed to competition both from the Centre-North and Europe. Although both agricultural and industrial tariffs were increased starting from the end of the 1870s, the actual extent to which they protected the Italian economy from foreign competition has been questioned by Federico and Tena-Junguito (1998).

3. Historical debates

Having presented some background information on the regional divide in around 1861, we now turn to the historical debates on the consequences of unification for Italy's dual development. The interpretations that have been proposed over some 160 years have mostly focused on the consequences for the South. Scholars can be classified into those that are more pessimistic about the implications for the South, those that are neutral, and those that are optimistic.[8]

[8] The approach is not new. Already Graziani (1989: p. 317) classifies the interpretations proposed in the literature into the very same two categories (the optimists and the pessimists). Interestingly, Graziani notices that most of

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The pessimist perspective holds that unification exacerbated Italy's dual development and is almost as old as the nation-state itself. The dust had barely settled on the completion of the unification project, when the politician and later prime minister Francesco Saverio Nitti (1900: p. 198), in his famous *North and South*, argued that the North, relatively to the South, obtained far more out of the public budget than it contributed to, and that while "the general conditions of Southern Italy are undoubtedly much improved ....Southern Italy was much closer economically to northern Italy in 1860 than it is now [in 1900]".[9] A few decades later, the idea that the policies of the newly unified kingdom were geared towards the interests of the North was also at the center of two highly influential accounts. The Marxist theorist and politician Antonio Gramsci (1975), writing while held in a fascist prison, argued that trade policies protected the industrial development of the North and were detrimental to the economy of the South, mostly based on agriculture (see also Fenoaltea 2011).[10] About 10 years after the end of the WWII, Rosario Romeo (1959: 44), taking his cue from Gerschenkron's (1952, 1962) theory of stages of industrial development, also argued that post-unification industrial policies damaged the South: for him the liberal elite impoverished agricultural workers in the South to finance public investments in the infrastructure necessary to enable the industrial take-off of the North.[11] In the 1970s, Gramsci's critique was revived by Zitara (1971) and Sereni (1974) who argued that Southern Italy was an "internal colony," whose industrial development had been deliberately arrested to favor that of the North. Finally, similar arguments have been recently made by de Oliveira and Guerriero (2018), who claim that the Northern elite exploited their political dominance to introduce extractive fiscal policies that favored a particularly rapid development of railway and literacy, though, notably, not industrialization, in the North at the expense of the South.

However, part of the more recent literature tends to paint a more optimistic picture on the effects of unification on Southern development, emphasizing three channels: freer trade, market integration and public investments. Ciccarelli and Fenoaltea (2013) highlight the positive impact effect of the new regime of reduced protectionism on the Southern economy, previously under the umbrella of Bourbon duties. The authors show that, as a consequence of the post-unification boom in exports of specialized agricultural products (such as for instance citrus, wine, and olive oil), Southern provinces had the highest economic growth (proxied by the growth of the male labor force) among Italian provinces in the 1861–1871 decade.[12] On a related point, A'Hearn and Rueda (2023) find that, in the South just as much as in the Centre-North, the abolishment of internal borders caused particularly rapid population growth, a proxy of economic development.[13] Regarding public investments, Ciccarelli and Weisdorf (2019) highlight that literacy rates in most of the Italian South were

the optimists propose *absolute* figures to demonstrate the positive effects of the unification on the Italian South in terms of, say, literacy or infrastructural endowment.

[9] See Cohen and Federico (2001) for a critique of Nitti's (1900) computations.

[10] Gramsci (1975) is a reprint of a critical edition of Gramsci's *Letter dal Carcere* (Prison Notebooks), a collection of essays written by Antonio Gramsci during 1929–1935, while imprisoned by the Italian fascist regime.

[11] Nevertheless Romeo (1959) was explicitly critical of Gramsci's (1975) analysis of the Risorgimento. Gerschenkron and Romeo had different opinions on the economic policies implemented in the post-unification period. Overall, Romeo expressed a positive evaluation, while Gerschenkron was more critical (on this point see Fenoaltea, 2011).

[12] The growth in the export of agricultural products from Sicily in the aftermath of 1861 had also been previously documented by Barone (1989) and Lupo (1990). See also Fenoaltea (2011).

[13] Earlier versions of the argument that unification caused economic growth due to market integration can be traced back to the early 20th century (Ciasca 1916; Greenfield 1934).

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extremely low in c. 1861 and began to increase only after the country's unification, following reforms of the primary school system. As a result, the literacy rates' gap between the South and Centre-North declined after unification (on this point see also Fenoaltea 2011 and Pescosolido 2019).

In between the two extremes of pessimists and optimists, we can distinguish two further perspectives: the moderately pessimist and the neutral. The moderately pessimists emphasize that the costs and benefits of free trade and public investments were unbalanced in a way that unintentionally favored the Centre-North over the South. For Milone (1950), the mild tariff system adopted in the aftermath of unification, after decades of protectionism, doomed to disappearance the young and fragile industry of the South (see also James and O'Rourke 2013). Over the years, the point on the negative effects of the sudden turn to free trade on industrial development has been echoed by Bassani (1932), Flore (1970: 174–176), Toniolo (1988) and Felice (2015), who however also stress that the Centre-North was not spared by such effects. Turning to public investments, Felice and Vasta (2015) argue that these, as measured for instance by kilometers of railway endowment or literacy rate of the adult population, were overall favorable to Southern regions, at least in absolute terms. However, in the South public investments did not lead to sustained economic growth because modernization was passive, without active and full involvement of its ruling classes, both entrepreneurs and politicians (see also Di Martino et al. 2020). Cappelli and Vasta (2020) focus on the rules regulating, for the first time at the Italian level, the functioning of the primary school system. The Casati law (1859) established that the payment of salaries of teachers, and other schooling expenditures, were to be paid out of the budget of municipalities in a situation where the financial resources of local authorities were very heterogeneous. In consequence, Cappelli and Vasta (2020) argue, the North–South post-unification gap in literacy did not reduce considerably until a centralized financing system was introduced by the Daneo-Credaro reform in 1911.[14] Basile, Ciccarelli, and Groote (2022) show that only the North of Italy was able to reduce considerably the urban–rural gap in literacy during 1871–1911, whereas in the South the gap did not reduce, or, in any case, not in a considerable way. On transport infrastructure, Federico (2007), following Fenoaltea (1983), points out that only within the North, where there was little competition from water transport, did the railway significantly contribute to market integration.[15]

Finally, the neutral perspective, which downplays the economic effects of unification, is mainly associated with the influential work of Luciano Cafagna (1989).[16] Writing in response to the pessimist perspective, Cafagna (1989) stressed that the North–South divide predated unification, which, for him, did not have significant economic consequences: benefits of a larger market were small because the economies of both areas were relatively backward and specialized mostly in the production of primary commodities for the industrializing countries of Northern Europe. Felice (2018: 64), too, stresses that unification hardly made

[14] Likewise, A'Hearn and Vecchi (2017) stress that the decentralized system penalized poor municipalities often located in Southern Italy where a myopic local ruling class was often not interested in paying taxes on land to sustain the education of the masses.

[15] Ciccarelli, Fenoaltea, and Proietti (2010) use annual value added data covering 1861–1913 and focus on the construction sector and its components (railway, building and other) at the regional level to investigate the possible effect of the Italian unification on regional convergence of busyness cycles. The evidence is mixed, depending on the level of sectoral disaggregation.

[16] Lupo (2011:6) also notices that the theses according to which the Italian dualism can be attributed to the country's unification are not convincing. However, as the author acknowledges, his arguments are more of an institutional and historical nature that of an economic one.

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any difference to the North–South divide: GDP pc gaps in 1891 were about as large as in 1871. Zamagni (1983, 2012) has backed up Cafagna's (1989) arguments by showing that across a battery of indicators the South was less developed than the Centre-North already in 1861 (on this see also Federico, Nuvolari, and Vasta 2019) and that inter-regional trade between the South and the Centre-North remained very modest as late as 1911. Fenoaltea (2011: 180, 189), too, points out that railway expansion was wasteful and failed to stimulate inter-regional trade or economic growth: in 1911 the bulk of freight transports by railway was still represented by imported goods such as coal and wheat, while domestic transport was limited to a few goods characterized by high value per unit of weight (such as for instance, fertilizers); capital would have been more profitably employed in alternative uses.[17] These points are consistent with another of Cafagna's (1989) arguments: that after 1861 railways were often built not where they would be economically efficient (in the Centre-North), but rather where they were politically necessary (in the South), pointing to costs tied to nation-building. The neutral perspective view sits well with the recent turn in the historiography of the Risorgimento, which sees unification as driven by cultural rather than economic forces (Banti 2020; Patriarca and Riall 2011).

Associated with the many and discordant historical interpretations is the lack of counter-factual empirical analyses, through which to compare the evolution of the South and Centre-North with that which would presumably have occurred in the absence of unification. To contribute to filling in this gap, we first assemble a dataset, which elaborates on the best available historical sources and then we use the SCM, which is particularly suitable for comparative studies such as ours. The next Section provides the details.

4. Data and empirical strategy

Our analysis is based on a newly compiled dataset, based on several different sources. We look at three dependent variables, all clearly related to economic development and often used in historical analyses: (i) agriculture employment share; (ii) literacy rate; and (iii) railway density. Outcome (i) is relevant because the onset of modern economic growth is usually associated with structural transformation. Outcomes (ii) and (iii) proxy production factors (human capital and physical infrastructures, respectively) that shape both contemporaneous and future aggregate product. Since different measures of development are typically imperfectly correlated, looking at development across several dimensions does justice to its complexity (Sen 1999). What is more, industrialization and public investments have been highlighted in the previous literature as important channels through which unification affected the North–South divide (see Section 3).

We consider these variables for the period 1840–1911, separately for the Centre-North, the South, and various countries entering the donor pool (see below). We exclude from the donor pool Germany and the Austro-Hungarian Empire, since the former unified in 1871 and the latter lost territories and influence because of Italy's unification. Hence, the assumption

[17] Though Federico (2007) is critical of the view that no progress in domestic market integration was made after 1861, he also finds that wheat market integration did not progress in the 1860s and was faster in the decades before unification, when agricultural duties were slashed, than in the 1870s and 1880s, with institutional harmonization and railway construction hardly contributing to price convergence. Federico (2023) also stresses that very few Southern manufacturing companies were actually shut down in the wake of increased competition after 1861 and that in any case, since industrial value added accounted for an only small share of Southern GDP, the shock was of little macroeconomic significance.

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Table 3. *Descriptive statistics of the outcome variables (1840–1911).*

		N	Mean	St. dev.	Min	Max
Agricultural employment share	Central-Northern Italy	72	0.620	0.015	0.570	0.637
	Southern Italy	72	0.741	0.012	0.721	0.765
	Donors	792	0.518	0.171	0.118	0.821
Literacy rate (percent)	Central-Northern Italy	72	54.449	15.611	35.800	83.000
	Southern Italy	72	25.894	9.5489	16.000	45.000
	Donors	864	63.302	27.884	6.667	100.000
Railway density (1000*km/km squared)	Central-Northern Italy	72	3.180	2.175	0.008	6.367
	Southern Italy	72	2.277	2.073	0.007	5.524
	Donors	864	3.667	5.133	0.000	27.483

Notes: Sources are reported in Appendix A.

of not being treated is not tenable for these two cases. No other state included in the analysis experienced similarly major changes to their borders and the only criterion for their inclusion in our sample is data availability. Altogether, we consider twelve European potential donors.

For railway density we mostly rely on the recently published work by Ciccarelli et al. (2021: table 2). Literacy rates are drawn from several secondary sources, such as Cipolla (1969) and Flora et al. (1983). These publications draw literacy rates from census data and, for the first half of the nineteenth century, from of a variety of sources, like marriage records. We adjusted the data to make them comparable, using adult literacy rates as our baseline. Agricultural employment shares are mostly from Nuvolari and Russo's (2021) database, which, in turn relies on census data. For the Italian macro-areas, we rely on the recently published estimates by Chilosi and Ciccarelli until 1861. These estimates highlight issues with the census data in liberal Italy for the South which had been only partly addressed by the previous literature. After 1861, we therefore rely on census data only for the Centre-North and reconstruct new estimates for the South, relying on urbanization data. While we cannot rule out a non-negligible margin of error in this case, it is worth stressing that, as compared to the census data, our estimates are biased against our finding that unification delayed industrialization in the South, since, differently from the census data, our estimates detect slow industrialization instead of de-industrialization. We refer the reader to Appendix A for details on the sources and construction of the variables. Table 3 presents the descriptive statistics of our outcome variables.

To assess the impact of unification on our outcomes we use the SCM for comparative case studies, which we briefly illustrate below, following in Abadie and Gardeazabal's (2003) and Abadie et al.'s (2010) footsteps.

We observe $\mathcal{J}+1$ regions, with the first one—without loss of generality—exposed to the intervention of interest (the "treated unit": in our case South or Centre-North) while the others are potential comparisons (the "donor pool"). The sample is a balanced panel, that is, we observe the same units for all periods. Let Y_{it}^{1} be the potential outcome of region i $(i=1,\ldots,\mathcal{J}+1)$ at time t $(t=1,\ldots,T)$ if the region is treated and Y_{it}^{0} if the region is not treated. Let T_0 be the number of pre-intervention periods (i.e. the number of years in which region i is observed in the pre-unification period). The causal effect of the unification

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is $\alpha_{it} = Y_{it}^{1} - Y_{it}^{0}$. For each region we observe:

$$Y_{it} = Y_{it}^{0} + \alpha_{it} D_{it} \tag{1}$$

with $D_{it} = 0$ in all regions in all periods up to T_0 as well as in the unaffected regions from $T_0 + 1$ onward and $D_{it} = 1$ for region $i = 1$ from $T_0 + 1$ onward. The synthetic control estimator compares the observed outcome of the treated region with a weighted average of units in the control group:

$$\hat{\alpha}_t = Y_{1t} - w_j \sum_{j=2}^{\mathcal{J}+1} Y_{jt}, for\ t > T_0 \tag{2}$$

where w_j is the (non-negative) weight attached to each unit in the donor pool. Turning to the choice of the weights, we adopt a two-step procedure. Firstly, let X_1 be a $(Kx1)$ vector of pre-treatment characteristics of region 1, X_0 be a $(Kx\mathcal{J})$ matrix that contains the same variables for the $\mathcal{J}$ possible control regions. The preintervention characteristics in X_1 and X_0 may include preintervention values of the outcome variable. Conditional on a positive definite diagonal matrix V, the vector of weights, $W^*(V)$, must solve:

$$\min (X_1 - X_0 W)' V (X_1 - X_0 W) \tag{3}$$

subject to $w_j \geq 0$ and $\sum w_j = 1, \forall j = 2, \ldots, \mathcal{J} + 1$, meaning that it minimizes the difference between the treated region and the synthetic control with respect to a set of characteristics. V collects the weights that reflects the relative importance that we assign to each variable when we measure the discrepancy between X_1 and $X_0 W$. It is chosen using a data-driven regression-based method in such a way that the resulting synthetic control region approximates the trajectory of the outcome variable of interest of the treated region in the pre-treatment period, that is:

$$V^* = \text{argmin} \left(Z_1 - Z_0 W^*(V)\right)' \left(Z_1 - Z_0 W^*(V)\right) \tag{4}$$

where Z_1 is the vector containing the outcome variable values for region 1 up to T_0 and Z_0 is the corresponding matrix for the untreated $\mathcal{J}$ regions.

Intuitively, consider a situation in which one aggregate unit (Italian South and Centre-North in our case) is exposed to a treatment or intervention of interest (unification). The SCM is based on the idea that when the treated units are a very small number relative to the other units, a proper combination of unaffected units often provides a more appropriate comparison than any single unaffected unit alone. The selection of comparison units is obtained using a data-driven procedure. Moreover, such an approach also opens the door to a number of validating placebo exercises (Abadie 2021). In our case, treated units are both Southern and Centre-Northern Italy, considered separately. Table B1 in Appendix B reports the pool of potential donors for each outcome. The treatment year is 1861. The model is estimated using data relative to the 1840–1860 period, while the post period goes

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up to 1911 (just before WWI).[18] As to the control variables, we include the 1860 value of the dependent variable (to control for the convergence effect), its 1840–1860 change (to control for previous trend), a dummy variable for catholic countries to take into account possibly different propensity to entrepreneurship, tons of coal per capita (in 1860) that proxy for availability of natural resources, market potential (computed as the sum of population in thousands of foreign countries weighted by the inverse of distance in km; measured in 1850), railway density (in 1860), if not already included as outcome variable, to control for communication infrastructures, and literacy rate (in 1860), if not already included as outcome variable, to take into account human capital. Table B2 in Appendix B shows that the synthetic controls generally match the treated units better than the whole sample. Having presented our sources and method, we are now ready to present the results.

5. The effects of unification

As a first outcome variable, we consider the share of the labor force in agriculture, a standard indicator of economic development: industry and services tend to be more productive and dynamic than agriculture; according to Engel's law, rich areas tend to have a lower share of agricultural employment than poor areas because the share of income spent on food declines with incomes. Figure 3 shows that unification slowed down industrialization in both areas.

These results challenge the old view that the Centre-North industrialized by exploiting the South (Nitti 1900, Gramsci 1975 [1948–51], Romeo 1959). Our findings are consistent with interpretations that the delayed industrialization of the country, both in the Centre-North and in the South, was a consequence of the sudden introduction of the free trade regime, which promoted agricultural exports (Felice 2015; Toniolo 1988), while the eventual turn to protectionism was ineffective (Federico and Tena-Junguito 1998). In turn, the suggestion that free trade promoted specialization in primary production not only in the South but also in the Centre-North provides support for Cafagna's (1989) argument that both Italian macro-regions had a comparative advantage in primary production at the time. While specialization according to comparative advantage implies static Ricardian gains from trade, specialization in primary production could also imply possibly larger dynamic losses (Allen 2011; Williamson 2013).

Figure 4 shows that the estimated effects for the two Italian regions tend to dominate those estimated in the placebo exercises, although this result should be treated with caution because the pseudo-inference is based on a very small number of cases. As for the robustness checks on the exclusion of the main donor, they are inconclusive in the case of the South, because the data do not allow the path of the treated units in the pre-period to be satisfactorily replicated, while this robustness test is passed for the Centre-North (fig. B1, Panel A).

[18] We start from 1840 because at the date it is reasonable to assume that the effects of the splitting between Belgium and Netherlands (1815–1830) and those relative to the border changes linked to the Napoleon period (1815) faded away. We end in 1911 because, on the one hand, we are interested in the long-term economic consequences of unification. On the other hand, a long post-treatment period implies that the identifying assumption that there are no confounding treatments affecting the outcome variables become increasingly untenable. In this latter respect it is noteworthy that our main conclusions would not differ if we had chosen a shorter post-treatment periodization (see e.g. fig. 4). After all our post-treatment duration is in line with other applications of the SCM in economic history (cf. Gilchrist et al. 2023).

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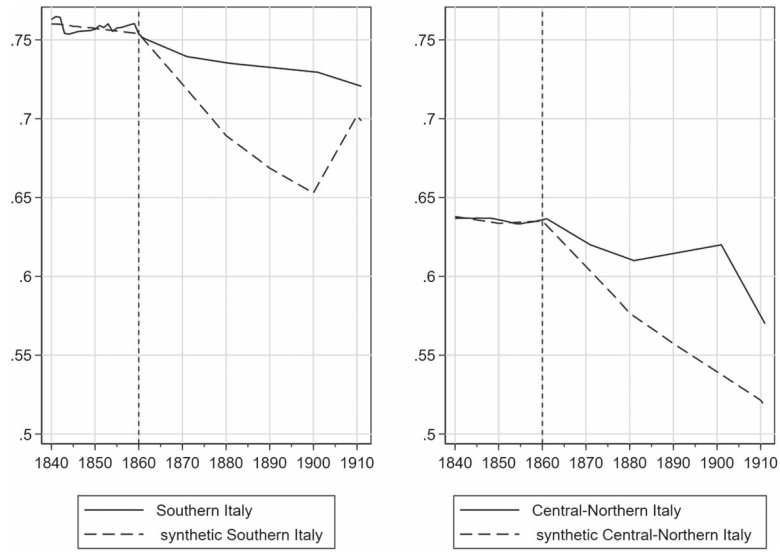

Figure 3. The effect of unification on agriculture share. *Notes*: The dependent variable is the agricultural employment share. Southern Italy: RMSPE = 0.033; donors (weights in parentheses): Finland (0.711), France (0.091), Spain (0.198). Central-Northern Italy: RMSPE = 0.001; donors (weights in parentheses): Denmark (0.224), Finland (0.034), France (0.194), Portugal (0.355), Spain (0.185), Switzerland (0.008).

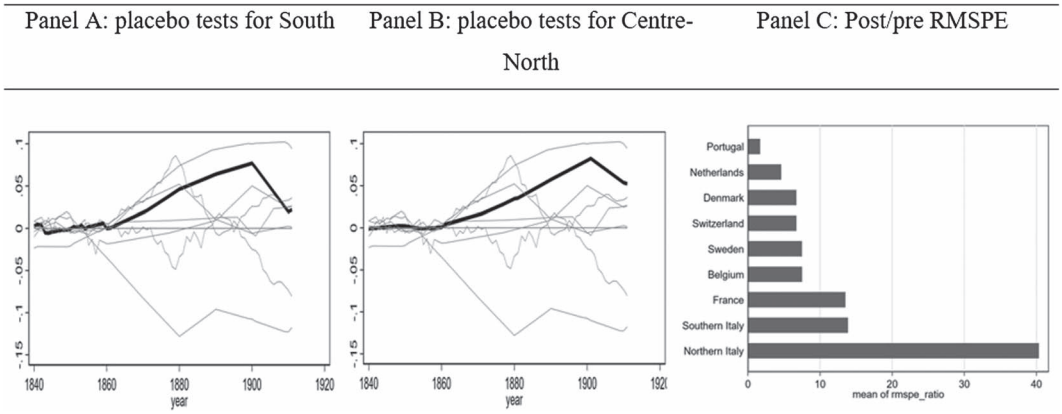

Figure 4. Pseudo-inference for agriculture share. *Notes*: In Panel A(B) the black line indicates Southern (Central-Northern) Italy. In all panels, only placebo tests with RMSPE not higher than five times the maximum between South and Centre-North RMSPEs are reported.

In figure 5, we consider the effect of unification on literacy rates. In the South, there is a small positive effect in the first part of the post-estimation period, which is reversed in the final years (Panel A). Overall, no clear pattern emerges (see also fig. 6, Panels A and C, on placebos). For the Centre-North, the two lines diverge from 1861 onwards, with a clear gain

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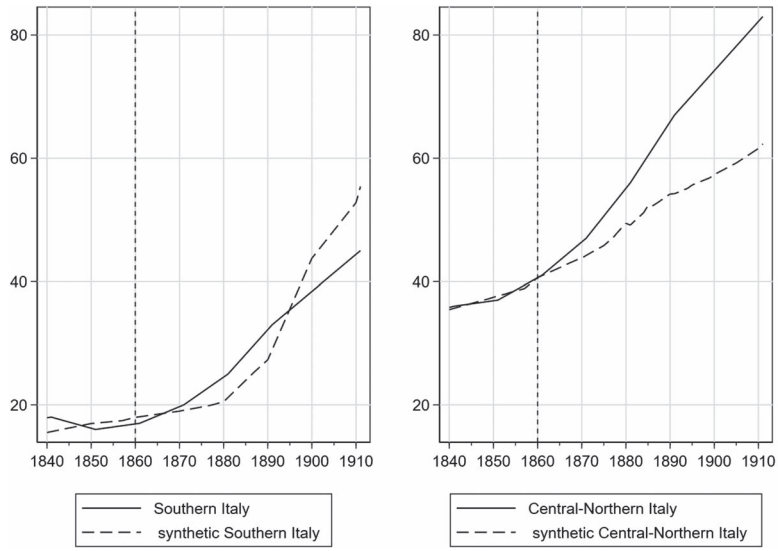

Figure 5. The effect of unification on literacy. *Notes*: The dependent variable is the literacy rate. Southern Italy: RMSPE = 1.188; donors (weights in parentheses): Finland (0.610), Netherlands (0.121), Portugal (0.269). Central-Northern Italy: RMSPE = 0.334; donors (weights in parentheses): France (0.016), Spain (0.745), Switzerland (0.239).

for the Centre-North (Panel B).[19] The placebo analysis broadly supports such a result (fig. 6, Panels B and C), which is also there if we exclude the main donor (fig. B1, Panel B).

The evidence presented in figure 5 is in line with the historical literature (see Section 3) according to which the decentralized system adopted to finance the diffusion of the primary school system in the aftermath of the unification of 1861 (Casati law) was relatively more suitable for the better-off municipalities of the Centre-North. The development of schooling in southern municipalities would have been held back by the small size of municipal budgets (Cappelli and Vasta 2020) and the reluctance of local elites to raise taxes to finance the education of the working classes (A'Hearn and Vecchi 2017). The end product was that, in the terminology recently employed by Bozzano et al. (2024), unification fostered the shift from an elitist model to one aiming at providing education for all in the Centre-North, where by 1911 counterfactual literacy was not much above 50 percent but actual literacy was about 20 percentage points higher. However, in the South, where, in the same year, both actual and counterfactual literacy remained at about 50 percent or less, nation-building did not have the same effect (fig. 5).

The last outcome of interest is railway density. For the South, the effect is positive (fig. 7), robust (fig. B1, Panel C), and rather significant compared to placebos (fig. 8, Panels A and C). On the other hand, no effect is detected for the Central-Northern counterpart (fig. 7;

[19] The results, available upon request, are qualitatively very similar if we use the estimate of literacy rates by Martinez (2024), which rely on samples of marriage records and are slightly different from our baseline estimates from Ciccarelli and Weisdorf (2019).

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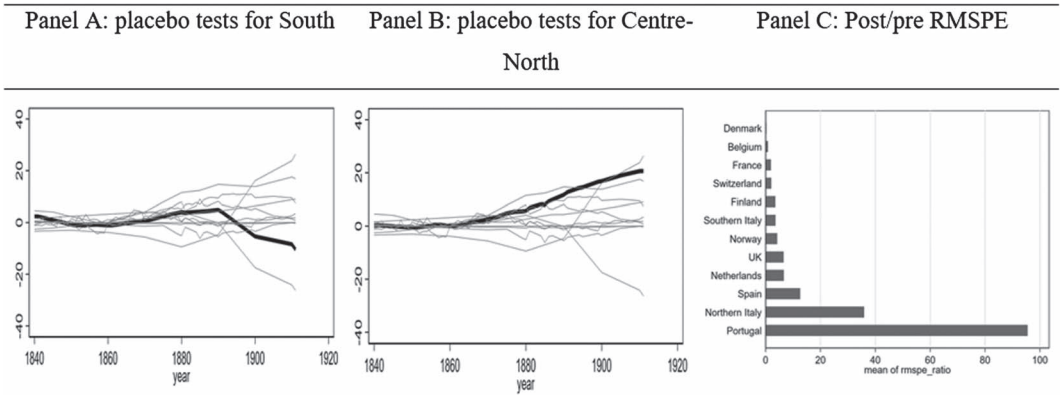

Figure 6. Pseudo-inference for literacy. *Notes*: In Panel A(B) the black line indicates Southern (Central-Northern) Italy. In all panels, only placebo tests with RMSPE not higher than five times the maximum between South and Centre-North RMSPEs are reported.

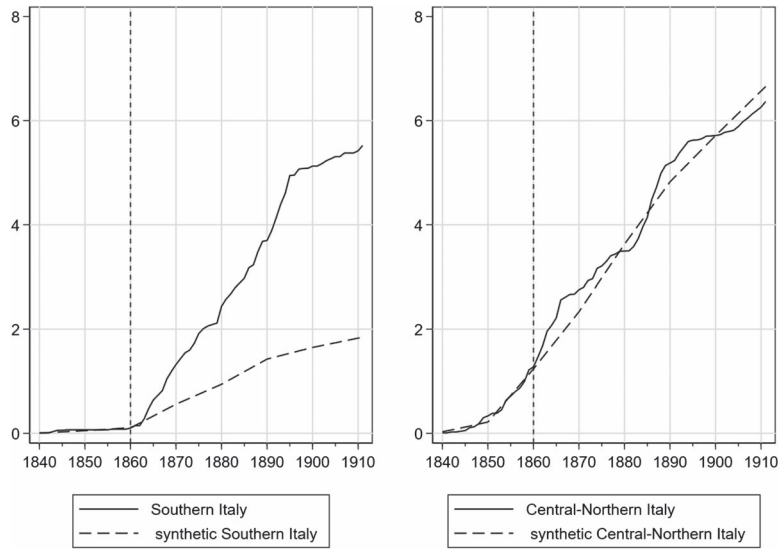

Figure 7. The effect of unification on railway density. *Notes*: The dependent variable is railway density. Southern Italy: RMSPE = 0.017; donors (weights in parentheses): Belgium (0.001), Finland (0.876), Iceland (0.006), Netherlands (0.117). Central-Northern Italy: RMSPE = 0.057; donors (weights in parentheses): France (0.423), Spain (0.404), Switzerland (0.173).

fig. B1, Panel C; fig. 8, Panels B and C). This result is not so surprising, in the light of clearer catching-up potential of the South in 1861, relative to the Centre-North (Section 2).

Taken together, our results raise the question of why increased literacy in the Centre-North and railway construction in the South were not matched by trends in industrialization. The overall indication is that any positive effect on industrialization they might have had were

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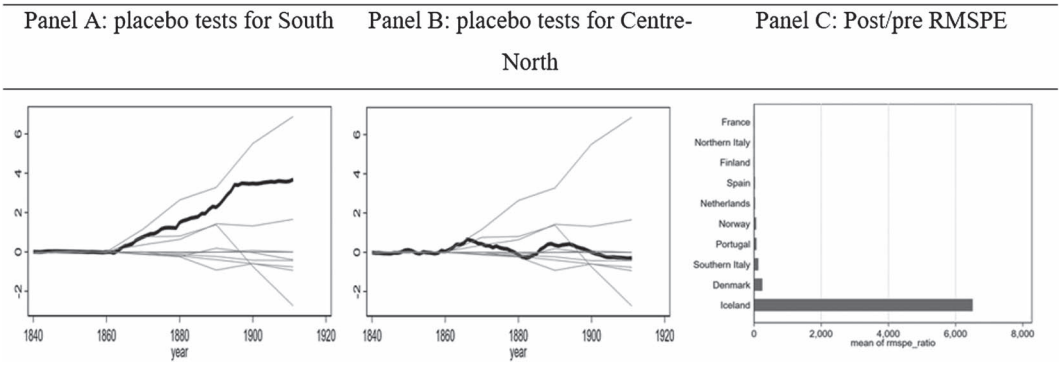

Figure 8. Pseudo-inference for railway density. *Notes*: In Panel A(B) the black line indicates Southern (Central-Northern) Italy. In all panels, only placebo tests with RMSPE not higher than five times the maximum between South and Centre-North RMSPEs are reported.

too small to offset the possible delaying effect of free trade on industrialization. Zooming on literacy in the Centre-North, the results, at first sight, agree with the perspective that nineteenth century schooling expansion was primarily determined by state formation rather than the economic demands of industrialization (Green 1990; Ramirez and Boli 1987), which did not benefit from and might have even hindered the growth of primary schooling and literacy (De Pleijt, Nuvolari, and Weisdorf 2020; Squicciarini and Voigtländer 2015). However, the skeptical interpretation that primary schooling and industrialization were unrelated runs counter empirical analyses of industrialization in liberal Italy, like those by Ciccarelli and Fachin (2017), Cappelli (2017) and Nuvolari and Vasta (2017). An alternative interpretation, which highlights that schooling promoted industrialization mainly in selected areas within the Centre-North, is also consistent with our results.[20] In this view, the initial literacy advantage of the North-West in 1861 where the "industrial triangle" began taking shape in the late nineteenth century was so large vis-à-vis the rest of the Centre-North that this area maintained a comparative advantage in industry despite literacy gains in the rest of the Centre-North in the aftermath of unification. It is noteworthy in this respect that, on the one hand, post-unification schooling expansion in the rest of the Centre-North led to the rise of mass literacy but barely made a dent in the absolute literacy advantage of the North-West, which was 21 percentage point in 1861 (54 percent vs. 33 percent) and remained 20 percentage points in the 1911 (94 percent vs. 73 percent).[21] On the other hand, slow structural transformation describes the North-West much more imperfectly than the rest of the Centre-North: while in 1861 in both macro-areas 63 percent of the workforce was employed in agriculture, by 1911 this share had declined by as much as 16 percentage points in the North-West as compared to just 6 points in the rest of the Centre-North.

As for rail construction in the South, our findings are in line with the views that railway investments were inefficient since, there, water transport remained cheaper and the need to win political support in the South diverted investments in transport infrastructure away from

[20] Admittedly, our estimates might fail to fully capture dynamics that occur at more granular levels.

[21] The sources of trends within the Centre-North are the same as for the Centre-North as a whole, with the only exception of trends in the occupational structure, which also draw on Felice's (2019) data.

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the North where it was most economically needed (Cafagna 1989; Fenoaltea 2011). Yet a qualification is in order: between 1861 and 1911, the absolute increase in railway density in the North-West (5.60 '000 km/km²) was actually slightly more marked than in the South (5.38 '000 km/km²), while it was significantly lower in the rest of the Centre-North (4.49 '000 km/km²). The result of this uneven growth was that by the turn of the century the South had caught up with the rest of Centre-North. By contrast, its larger gap with the North-West remained stable. It thus looks like the rest of the Centre-North had been negatively affected by political decisions on the geographical distribution of railway investment favoring the South significantly more than the North-West (Fenoaltea 2011: 190 also makes the point that the North-West was the main beneficiary of railway expansion in the nineteenth century). Either way, the upshot was that costly investments in nation-building policies underlying the steep rise in taxation documented before (Section 2) failed to bring about rapid industrialization, either in the South or most of the Centre-North. This finding agrees with the idea that political and cultural, rather than economic, factors played a crucial role in driving the Risorgimento movement.

6. Conclusions

The link between state formation and economic development continues to attract the interest of economists and economic historians (see the recent Pfister and Wolf 2023, focusing on the first German unification). The present paper focuses on the Italian case and presents new evidence on the effect of the Italian unification on its dual development using a new set of historical data and employing a well-established technique in counterfactual analysis, the SCM.[22]

Our analysis suggests that in the half century following the country's unification, neither the Centre-North nor the South achieved generalized advantages from the unification. According to the results for the share of labor force in agriculture, unification delayed industrialization in both areas. We also find that the South benefited from a strong spread of rail infrastructure, while the Centre-North enjoyed a pronounced increase in literacy. Taken together, our results suggest that the benefits of a larger market for industrialization were small and the costs associated with nation-building were significant, as public investments were diverted from where they were economically efficient to where they were politically necessary. Our results are thus also in line with the recent literature on the Risorgimento that sees Italian unification as determined by cultural movements rather than economic convenience.

Acknowledgements

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[22] The SCM may struggle to achieve a satisfactory pre-treatment fit between the treated and control units (Ferman and Pinto 2021; Ben Michael et al. 2021), but in our case, this concern is not very compelling given the good pre-treatment fit. However, admittedly, a relatively small sample of potential donors reduces the power of the pseudo-inference tests.

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Data availability

Data and codes are available in a repository and can be accessed via the following DOI: Barone, Guglielmo; Chilosi, David; Ciccarelli, Carlo; de Blasio, Guido (2024), "Replication Files - The effects of Italy's unification on its dual development: a synthetic control approach," Mendeley Data, V1, doi: 10.17632/hky6px45vw.1

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Appendix A. Sources and variables' construction

Outcome variables

Data availability constraints imply that it is possible to reconstruct series of the other dependent variables (agricultural employment share, railway density and literacy rates) spanning our years (1840–1911) only for a handful of extra-European countries. We therefore consider only Western European countries.

For the potential donors, the median number of years with observations of the agricultural employment share per country between 1840 and 1911 is 6,[23] meaning that on average we observe the agricultural employment share once every 12 years. We linearly interpolate to estimate missing years. We rely on Chilosi and Ciccarelli (2022) for the agricultural employment share series for Southern and Central-Northern Italy until the treatment year (1840–1861) (however, again, we exploit the availability of yearly urbanization data to extrapolate trends when provincial data is incomplete). For the post-treatment period in the Center-North we rely on census data, as elaborated by Daniele and Malanima (2009: table 5). Their values are slightly higher than those from Felice (2019: table B4 in Appendix B), which are also based on the national censuses, but are adjusted for industrial under-employment and are therefore less directly comparable to our earlier figures.

There are known problems with the agricultural employment shares from Southern Italy recorded by the national censuses. Several scholars (Vitali, 1970; Kuznets, 1971; Zamagni, 1987; Daniele and Malanima, 2017) have argued that the figures are too low because women spinning for home consumption were misclassified as full-time industrial workers. As stressed by Chilosi and Ciccarelli (2022: 1352), this issue is bound to influence trends, as well as levels: the process of de-industrialization detected by the 1881 and 1901 national censuses might in fact be entirely spurious, as it coincides with a hardening of the previously porous distinction between active and passive population (Patriarca, 1998). Moreover, the national census employment figures for the South suffer also from another and likely more serious

[23] The mean is 11. The range is between a minimum of 3 observations for Norway and 63 observations for Sweden, which is however atypical in having a complete yearly series from 1850.

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problem, which had been noticed by government officials after the 1861 census but neglected by scholars since: statisticians classified workers as industrial if they resided in large centers (Direzione della Statistica Generale del Regno, 1867: 90). Due to the large diffusion of agro-towns—large agglomeration of peasant farmers—in Southern Italy, this approach is bound to significantly inflate the importance of industry in the South. In consequences of the two sources of error, the actual agricultural employment share in Southern Italy in 1861 can be estimated as being as much as 20 percentage points higher than detected by the census figures (Daniele and Malanima, 2009: table 5; Chilosi and Ciccarelli 2022: fig. 2). Such a large bias implies that neglecting it, as done by Daniele and Malanima (2009: table 5), is bound to cause gross distortions. Similarly, adjusting national census data to address over-counting of industrial women with available industrial censuses data, as done by Felice (2019: table B4 in Appendix B) (following Zamagni, 1987), is bound to fall significantly short of solving the problem. We therefore decided to neglect the national census data altogether for the South.

Instead, following Chilosi and Ciccarelli (2022), we have extrapolated the trend with urbanization rates, assuming constant shares of agricultural workers in city and country and using 10,000 inhabitants as a threshold to identify a city. Unfortunately, for the period 1871–1911 we only have urban population data for the 63 largest cities (vs. 133 cities with at least 10,000 inhabitants in 1861): since 1871, the national censuses switched to collecting population for a larger administrative unit, the *comune*, which included also the surrounding country-side and we therefore had to rely on a different source, Giusti (1913).[24] These limitations with data availability imply that, arguably, the urbanization trend that we use to extrapolate the post-treatment trend in the occupational structure of Southern Italy will under-estimate structural transformation in the South, both because, if anything, the share of agricultural workers living in cities should decline over time and because we neglect to consider new cities crossing the 10,000 inhabitants threshold. Nevertheless, our trend overturns the picture of southern de-industrialization emerging from the national censuses. Daniele and Malanima (2009: table 5) find that the Southern share of agricultural workers went from 55 percent in 1861 to 62 percent in 1911. Felice (2019: table B4 in Appendix B), even after adjusting for over-counting of weavers, also detects an increase in the same figure, from 57 percent in 1871 to 60 percent in 1911. By contrast, we estimate that the Southern agricultural employment share declined from 75 percent in 1861 to 72 percent in 1911. In other words, using our post-treatment trend instead of that detected by the national censuses makes it more difficult to find that unification slowed down industrialization in the South.

Literacy rates refer to individuals aged 10 or more who can read and write.[25] Whenever sources reported literacy rates for other categories (eg. army recruits) the rates have been normalized to our baseline category with available information (eg. using the ratio between literacy rates of the two categories in overlapping years). In a few cases, the sources did not report the specific category to which the literacy rates applied. In such cases, we cross-checked

[24] Giusti (1913) reports the population data in the census years (1871, 1881, 1901 and 1911). Again, we rely on linear interpolation for the urbanization trends in the missing years. Malanima (2005: 106) uses an alternative strategy: from 1871 he identifies cities those *comuni* with at least 20,000 inhabitants and a minority of agricultural workers. There are difficulties with applying this strategy in our context. Firstly, this strategy implicitly assumes that the occupational data was reliable. Secondly, the threshold is geared towards matching a 5,000 rather than 10,000-threshold urban population in previous times.

[25] Italy is an exception as there our sources report statistics for individuals who can read, rather than read and write. Nevertheless, data from the 1881 census shows that in Italy the two rates were nearly identical: in the South 20.65 percent of individuals could read as compared to 20.02 percent who could read and write; in the Centre-North the same two rates were 50.76 percent vs. 47.41 percent.

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the data for consistency, eliminating a few unplausible data points. Altogether, in our years (1840–1911), the mean number of observations per country is 22, corresponding to one every 3 years.[26] We linearly interpolate for the remaining missing years. As for Italian literacy rates, regional data, that we aggregate for our two macro-areas, are available at 10-year benchmarks since 1821 from Ciccarelli and Weisdorf (2019), who back-cast them from post-unification national censuses. For Italy, too, we rely on linear interpolation in missing years.

To compute railway density, we divide railway length (in km) by the area of each place (in km^2). (Non-Italian) European data on the year of opening of the railway and length is at 10-year benchmarks (starting with 1840), with the sole exception of Finland, which is at 20-year benchmarks. Missing years, again, are filled in with linear interpolation. Italian data on railway length, for both the South and the Centre-North, are available with yearly frequency.

Our main source of the agricultural employment shares for the control group is Nuvolari and Russo (2021), which has data from Belgium, Denmark, Spain, Finland, France, UK, Netherlands, Norway and Sweden.[27] However, most of these series start only in the second half of the nineteenth century. We therefore also draw on Allen (2000: table 2) for Belgium and the Netherlands, Ridolfi and Nuvolari (2021: table 4) for France, Enflo and Missiaia (2018: table 4) for Sweden, Mitchell (1998: table B1) for Finland and Simpson (1995: table 1.2) for Spain. Our sources for Portugal are Palma and Reis (2019: table 1) and Instituto Nacional de Estatística (2001: table 4.1); for Switzerland, we rely on Zimmer (2003: table 1) and Kuznets (1957: table 4). In the cases of Denmark and Norway, the agricultural employment share series before 1850 and 1891, respectively, are extrapolated from the agricultural value added share series. For Denmark, we assume that agricultural labor productivity in the 1840s was the same as in 1850. The same approach in Norway would demand making the heroic assumption that agricultural labor productivity did not change in half a century. We therefore prefer assuming that it was the same as in the neighboring Sweden in the same years.

Belgian literacy rates since 1843 are from Cipolla (1969: table 25) and Flora et al. (1983). Allen's (2003: table 2) 1800 estimate implies a slight decline between 1800 and 1843, which has no parallel in the sample and is hardly plausible in a country which was relatively rapidly industrializing. It is therefore ignored. Instead, the 1820 literacy rate is extrapolated from the French one, assuming that the difference between the two countries is the same as in the first Belgian census year (1850). Danish literacy rates are from Markussen (1990: 46-48) (until 1859) and from Crafts (1997: tables 1 and 2) (1870, 1913). Our sources for Finland are Myllantaus (1991: 117) until 1870. Henceforth, we rely on Flora et al. (1983) and Crafts (1997: table 2). We nevertheless ignore the Crafts' (1997: table 2) rate for 1870 as it implies a slight decline in literacy between 1870 and 1880, which is hardly plausible. Our sources for France are Pamuk and van Zanden (2010: table 9.4), Cipolla (1969: table 25) and Flora et al. (1983). Literacy rates in Iceland are assumed to be the same as in the Danish metropolis. Johansson (1977: 71), Markussen (1990: 46) and Tveit (1991) also support the view that the island had relatively high literacy rates, although they do not report sufficient data to construct precise estimates. Dutch literacy is from Pamuk and van Zanden (2010: table 9.4) and Crafts' (1997: table 2). Norwegian data are from Markussen (1990: 49) and Crafts (1997:

[26] There is however a huge variation in coverage: for instance, in France there is no missing observation, while in the Netherlands and Norway we only observe literacy rates at benchmark years half a century apart (1820, 1870 and 1913). In consequence, the median number of observations per country, 8, is much lower than the mean (22).

[27] We thank Alessandro Nuvolari for kindly sharing the data with us.

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tables 1 and 2). For Portugal, we rely on Tortella (1994: table 6) since 1860 and a guess-estimate for 1820. Our sources for Spain are Pamuk and van Zanden (2010: table 9.4), Crafts (1997: tables 1 and 2), Tortella (1994: table 6) and Cipolla (1969: tables 24 and 30). The data in Frago (1990: tables 1 and 2) are not consistent with those from the other sources and are therefore excluded. Swedish literacy is from Johansson (1977: table 13 and 15) and Crafts' (1997: table 2). We also rely on Pamuk and van Zanden (2010: table 9.4), but only for 1870, as their 1820s figure is much higher than those from other sources at around the same time, suggesting that it also includes individuals who could only read: in the early nineteenth century these tended to be much more numerous than fully literate people in Scandinavian countries. Flora et al. (1983) report also Swedish literacy rates, but for individuals aged 5 or more, rather than 10 or more, in periods already very well covered by Johansson (1977: table 13). We therefore did not include their rates in the analysis. In Switzerland, we assume that in 1820 the literacy rate was the same as in the Netherlands, following Zimmer's (2003: 131) assessment that Switzerland was one of the most literate societies of early 19th-century Europe. Swiss data from 1870 onward are from Crafts (1997: tables 1 and 2), Cipolla (1969: table 25) and Flora et al. (1983). Finally, for the United Kingdom, we rely upon Pamuk and van Zanden (2010: table 9.4), Crafts (1997: tables 1 and 2) and Flora et al. (1983).

Turning to railway density, country areas are from Wikipedia. (Non-Italian) European data on year of opening of the railway and length are from Ciccarelli et al. (2021: table 2), except for Finland, for which the source is Marti-Henneberg (2013: table 2) (there are only minor discrepancies between the two sources and whenever available we rely on the most updated one, Ciccarelli et al. (2021), which also has higher frequency data) and Iceland (which still does not have a railway, see Wikipedia). We aggregate Italian regional data on railway length from Ciccarelli and Groote (2017) and regional areas from Annuario Statistico Italiano (1912) by our macro-areas, South and Centre-north.

Other controls

Regarding the other controls, to compute market potential in 1850, we sum up all the populations (in thousands) of foreign countries weighted by distance (in km) between the capitals. Our source for populations is the database by Giovanni Federico and Antonio Tena-Junguito from their on-going project (see Federico and Tena Junguito, 2023) on World Population, which includes data from 143 countries at current borders (nearly all the world). The coordinates used to compute distances (as the crow flies) are from the website https://simplemaps.com/data/world-cities (last consulted on 29th November 2022). For Southern Italy, we consider Naples as the capital; for Central-Northern Italy, we use Rome. Data on coal output (in '000 of metric tons) are from Mitchell (1982, 1983, 1998). Again, we combine them with population data from the Federico-Tena-Junguito database to obtain per capita data in tons.

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Appendix B. Additional empirical details

Table B1. *List of potential donors.*

Dependent variable	Potential donors
Agriculture share	Belgium, Denmark, Finland, France, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK
Literacy rate	Belgium, Denmark, Finland, France, Iceland, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK
Railway density	Belgium, Denmark, Finland, France, Iceland, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK

Table B2. *Balancing properties.*

Panel A: dependent variable: agriculture share						
	South			Centre-North		
Variable	Treated Unit	Synthetic control	Whole sample	Treated Unit	Synthetic control	Whole sample
Agriculture share (1860)	0.754	0.755	0.572	0.636	0.636	0.572
1840–1860 change in agriculture share	−0.009	−0.003	−0.018	−0.001	−0.001	−0.018
Market potential (1850)	388.994	376.819	428.742	422.754	364.373	428.742
Coal per capita (1860)	0.000	0.026	0.509	0.000	0.050	0.509
Railway density (1860)	0.101	0.210	1.774	1.275	0.489	1.774
Literacy rate (1860)	16.900	16.910	53.306	40.6000	40.632	53.306
Catholic (1860)	1.000	0.289	0.364	1.000	0.734	0.364

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Table B2. *Balancing properties (continued)*.

Panel B: dependent variable: literacy rate						
	South			Centre-North		
Variable	Treated Unit	Synthetic control	Whole sample	Treated Unit	Synthetic control	Whole sample
Literacy rate (1860)	16.900	17.693	55.644	40.600	40.577	55.644
1840–1860 change in literacy rate	−1.000	2.151	13.075	4.800	5.152	13.075
Market potential (1850)	388.994	370.918	412.775	422.754	384.244	412.775
Coal per capita (1860)	0.000	0.000	0.467	0.000	0.019	0.467
Railway density (1860)	0.101	0.138	1.626	1.275	0.941	1.626
Catholic (1860)	1.000	0.269	0.333	1.000	0.761	0.333
Panel C: dependent variable: railway density						
	South			Centre-North		
Variable	Treated Unit	Synthetic control	Whole sample	Treated Unit	Synthetic control	Whole sample
Railway density	0.101	0.100	1.626	1.275	1.238	1.626
1840–1860 change in railway density	0.094	0.094	1.471	1.267	1.206	1.471
Market potential (1850)	388.994	399.264	412.775	422.754	407.503	412.775
Coal per capita (1860)	0.000	0.002	0.467	0.000	0.108	0.467
Literacy rate (1860)	16.900	16.880	55.644	40.600	51.639	55.644
Catholic (1860)	1.000	0.001	0.333	1.000	0.827	0.333

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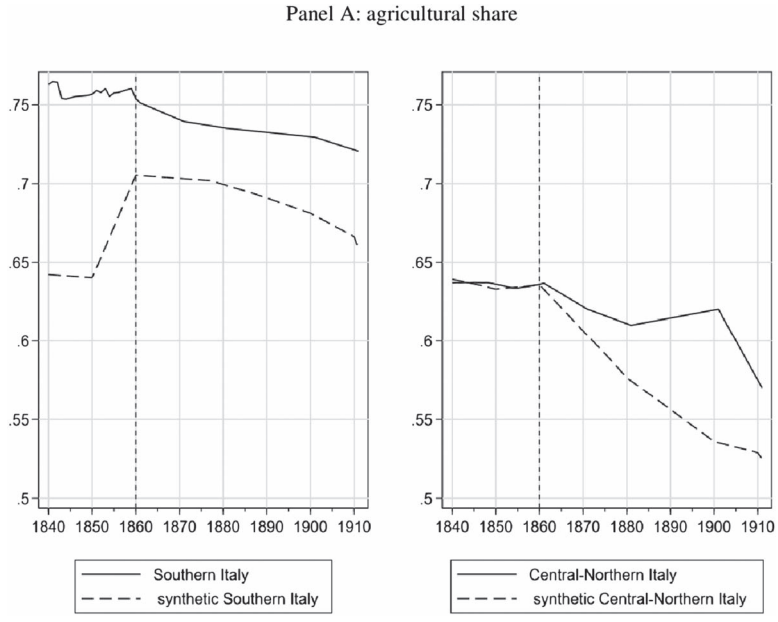

Figure B1. Robustness excluding the main donor. Panel A: Agriculture share. *Notes*: Southern Italy: the excluded donor is Finland; RMSPE = 0.103; donors (weights in parentheses): Sweden,Spain (1.000). Central-Northern Italy: the excluded donor is Portugal. RMSPE = 0.002; donors (weights in parentheses): Belgium (0.029), Finland (0.230), Netherlands (0.067), Spain (0.387), Switzerland (0.286).

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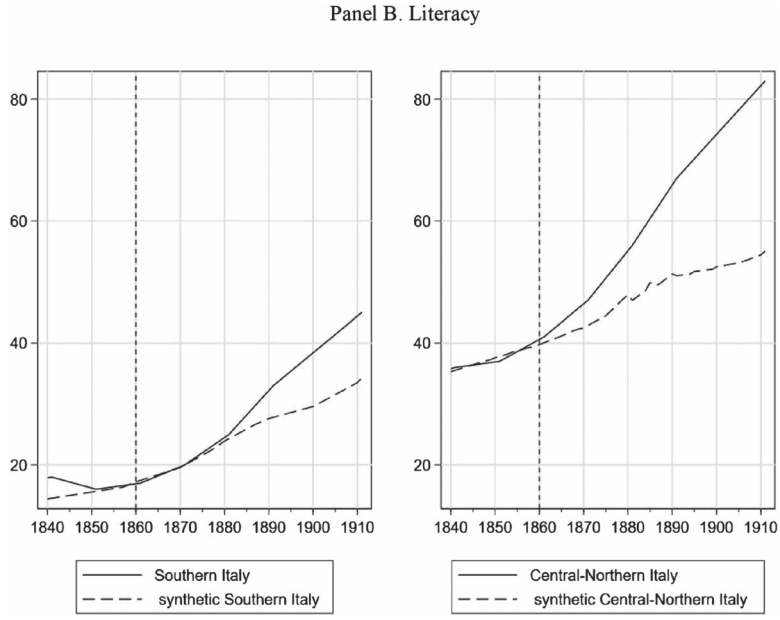

Figure B1. Panel B: Literacy. *Notes*: Southern Italy: the excluded donor is Finland; RMSPE = 1.740; donors (weights in parentheses): Portugal (0.652), Spain (0.348). Central-Northern Italy: the excluded donor is Spain. RMSPE = 0.458; donors (weights in parentheses): France (0.042), Portugal (0.589), Switzerland (0.369).

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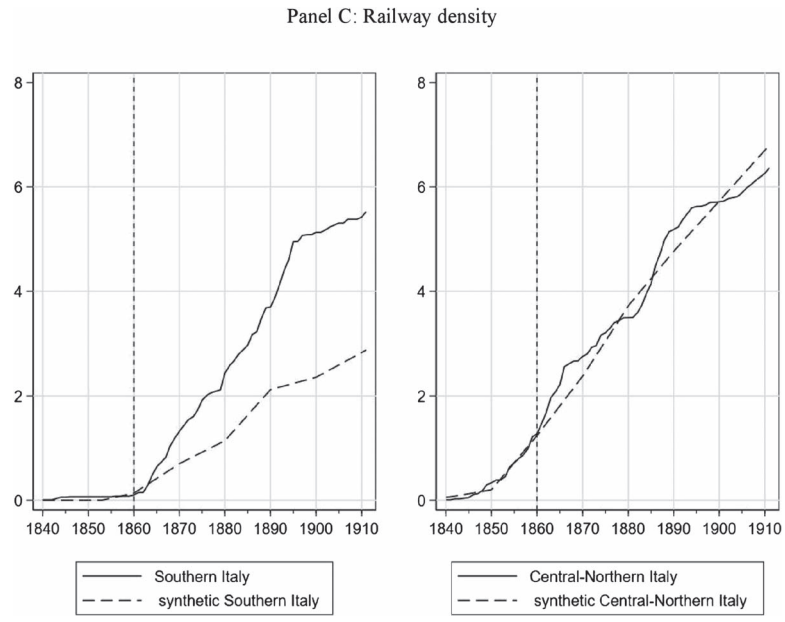

Figure B1. Panel C: Railway density. *Notes*: Southern Italy: the excluded donor is Finland; RMSPE = 0.049; donors (weights in parentheses): Denmark (0.001), Norway (0.110), Portugal (0.889). Central-Northern Italy: the excluded donor is France. RMSPE = 0.062; donors (weights in parentheses): Belgium (0.046), Netherlands (0.125), Spain (0.580), Switzerland (0.249).

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