Home Sweet Home: the Effect of Sugar Protectionism on Emigration in Italy, 1876-1913*

Carlo Ciccarelli† Alberto Dalmazzo‡ Daniela Vuri§

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Abstract

Protectionist policies are often considered or even implemented as a reaction to increasing globalization. This is not new in history. This paper uses the introduction of import duties on sugar in Italy in the late nineteenth century to measure the impact of protectionism on migration outflows at the time of the first globalization. Both for climate reasons and the nature of the soil, the cultivation and processing of sugar beets was geographically concentrated in a small area, leading *de facto* to a regional protectionist policy. Our theoretical model illustrates how a tariff that favours local producers may affect residents' incentives to migrate abroad. The predictions of the model are empirically tested through quasi-experimental methods which use the variation in sugar cultivation across areas to estimate the effect of interest. Our results show that protectionism effectively reduced the relative incentive to migrate away from sugar-producing areas.

Keywords: protectionism, regional economics, migrations, 19th century Italy, difference in difference, synthetic control method.

JEL Classification: N93, J4, C23.

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†Department of Economics and Finance, University of Rome Tor Vergata, Via Columbia 2, 00133 Rome, Italy. *Email*: carlo.ciccarelli@uniroma2.it

‡Department of Economics and Statistics, University of Siena, P.zza San Francesco 7-8, 53100 Siena, Italy. *Email*: alberto.dalmazzo@unisi.it

§Department of Economics and Finance, University of Rome Tor Vergata, Via Columbia 2, 00133 Rome, Italy. *Email*: daniela.vuri@uniroma2.it

1 Introduction

Migrations represent a hot and divisive topic in the agenda of EU policy makers. Several reasons underlie migration flows to Europe, including political instability, conflicts and poor economic conditions in the countries of origins. Demographic factors also play a role. This is particularly true for countries where the demographic transition has not completed yet and population keeps growing. As a consequence, restrictions to migrations are increasingly considered as valuable policy instruments by EU member states (Livi Bacci, 2018). Outside the EU, protectionist measures are also considered, just to mention the new tariffs on steel and aluminium considered by the current US administration.

The use of protectionism as a barrier to increasing globalization is not new in history. The second half of the nineteenth century was characterized by considerable movements of international resources, favoured by the reduction of transport costs induced by the diffusion of railways and steamship navigation. It was, to use the words of Hatton and Williamson (1998), the age of mass migrations. Rising transoceanic trade was a central factor for globalization. Most European countries, including Germany and Italy, reacted to the first globalization with protectionist policies. Comparisons between historical and contemporary waves of globalization and protectionism have already been made in the literature (Hatton and Williamson, 2005; Rapaport, 2016; Federico and Tena, 2017). In this perspective, the analysis of historical episodes of the past can contribute to our understanding of current socioeconomic issues.

This paper investigates the relation between protectionist policies and migration outflows in Italy during the second half of the 19th century. Much like countries of large emigration today, nineteenth century Italy was a backward country, largely based on agriculture, poor in infrastructures, with extremely low literacy rates. At the early stage of the demographic transition, with high birth and death rates, the young and fast-growing Italian population took part in the age of mass migrations in the second half of the 19th century, when millions of Italians moved to the New World (Sori, 1979; Gomellini, and Ó Gráda, 2013; Ardeni and Gentili, 2014).[1]

[1] During 1861-1911, according to the historical population censuses, the Italian population increased roughly from 25 to 35 million of individuals. Sori (1979, p. 21) reports that, according to official historical migration sources,

In this study, we focus on the take-off of the domestic sugar beet industry as a consequence of the adoption of prohibitive duties on imported cane sugar. Both for geographical reasons (latitude, nature of soil, and climate factors) and for the high perishability of the sugar beet, cultivation and processing were concentrated in a few neighbouring provinces of the Center/North-East Italy. The protectionist policy, established in principle at the national level by the Italian government, was *de facto* a regional protectionist policy. Thus, some areas potentially gained from protectionism, while the others were excluded from the potential benefits. Our research design uses the variation in sugar cultivation across areas to estimate the effect of protectionism on migration outflows.

The local effects of protectionist policies - as well as the impact of trade-liberalization - have been recently considered in the literature. Some papers have considered the asymmetric local effects of liberalization on industrial agglomeration (Lu and Tao, 2009), on regional specialization (Bai, Du, Tao, Tong, 2004), on the local formal sector employment (Dix-Carneiro and Kovak, 2017) and on local school attendance and child labour (Edmonds, Pavcnik and Topalova, 2010). In particular, Topalova (2010) considers the impact of trade liberalization on district-level poverty, showing that the Indian districts that were more exposed to tariff reductions exhibited slower progress in poverty reduction. Instead, the regional consequences of protectionism are largely overlooked in the economic history literature, partly because of the lack of adequate data disaggregated at the subnational level. Among the few exceptions, Tirado et al. (2013), building on Hanson (1997), consider the effects of protectionist policy on regional economic activity in Spain during the interwar period (1914-1930). They show that protectionist policies induced the loss of centrality of the region of Barcelona and the relative rise of other locations. Our paper also aims at expanding this branch of what we might call "historical regional economic literature".

We first present a theoretical model that relates the impact of tariffs protecting local products to residents' welfare conditions, and their incentive to migrate. Standard economic theory (see, for instance, Topalova, 2010) predicts that the implementation of tariffs has negligible effects on local living conditions, provided that production factors are perfectly mobile: as long as local protectionism raises local wages to higher levels than elsewhere, additional workers will flow into the

about 14 millions of Italians left, at least temporarily, the country during 1876-1913.

area. By contrast, our model explicitly shows that when labour mobility is imperfect,[2] protection of local goods has permanent effects on local wages and, thus, reduces the incentive of residents to migrate.

The predictions of the model are tested using annual data on Italian emigration at the provincial level (NUTS 3 units) during 1876-1913, using both a Difference in difference (DID) approach and the Synthetic Control Method (SCM). The identification strategy is similar to Topalova (2010), where the impact of tariffs is captured by exploiting differences in local industrial composition and, thus, in different local exposures to the policy change following a DID approach. However, as noticed in Billimeier and Nannicini (2013), the SCM has an advantage over other quasi-experimental methods such as the DID since it can deal with omitted variable bias by controlling for the presence of time-varying unobservable confounders. Using the SCM, we compare the emigration rate differential in two groups of provinces (sugar producers and non-sugar producers), where the non-sugar producers are chosen to be the most similar to the sugar producers with respect to some covariates, and estimate the effect of sugar protectionism on provincial migration rates. We find robust evidence that the introduction of protectionism and the related birth and upsurge of the sugar industry reduced relative regional migration outflows of beneficiary provinces.

The paper has the following structure. Section 2 describes the sugar trade policy and the development of the Italian sugar industry. Section 3 presents a model relating tariffs to local real wages, which theoretically shows how protectionism may affect the incentive to migrate. Section 4 briefly illustrates the Difference-in-Difference and the Synthetic Control Method approaches. Section 5 describes the data, and Section 6 provides the empirical results. Section 7 concludes.[3]

[2]This seems a reasonable assumption for 19th century Italy, characterized by illiterate people often speaking local dialects and with incomplete national railway network. Ciccarelli and Weisdorf (2018) illustrate the development of literacy in Italian provinces during 1821-1911. Ciccarelli and Groote (2018) illustrate the development of railways in Italian provinces during 1839-1913.

[3]The Appendices provide details on the calculations related to comparative static, and the historical sources. The Supplementary Material extends the theoretical model to the cases of monopsony in the local labour market and the presence of liquidity constraints affecting the ability to migrate away. Additional empirical evidence based on the DID and SCM is also provided.

2 Historical background: the Italian sugar industry

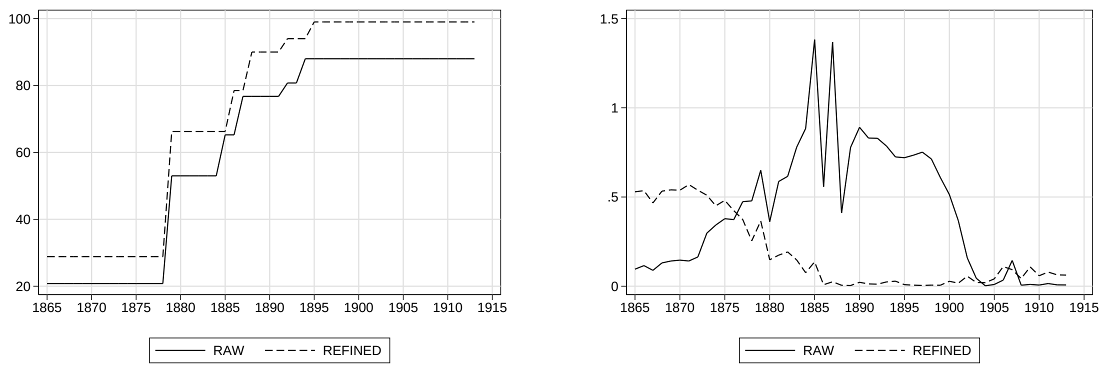
This section reviews the Italian trade policy on sugar and the rapid development of the national sugar industry in the late 19th century.

2.1 Sugar trade policy

Figure 1 illustrates the evolution of import duties on sugar (Panel A) and quantities imported from abroad (Panel B). Panel A reports two step functions with jumps at the time of tariff reforms on sugar (the main ones occurred in 1878, 1887, and at the end of 1894).[4] The continuous line refers to raw sugar, the dashed one to refined sugar. The vertical difference shows the protection guaranteed to sugar refiners. Three regimes emerge rather neatly. A first period of low protection (1865-1878), a second one of transition to protectionism (from 1878 to 1895), and a final period of high protection (1895-1913). From 1895 to the end of our sample period the import duties on sugar were unchanged. We will refer to the "sugar reform of 1895" to denote the last of a series of tariff increases that took place between 1878 and 1895.

Figure 1: Sugar: import duties and imports, 1865-1913

A. Import duties (lire per quintal) B. Imports (mil. quintals)



Source: Data on imports of raw and refined sugar, and import duties have been collected by the annual publication Ministero delle finanze, *Movimento commerciale del regno d'Italia*, the official source on Italian commercial flows (see Appendix B for details).

[4]In the reference period 1876-1913 the last law raising import duties on imported sugar was approved by Royal Decree no. 532 of 10 December 1894. The full list of laws on the Italian sugar industry approved during 1846-1945 is reported in Sabbatucci Severini (2004), pp. 264-265.

Panel B illustrates the evolution of sugar imports over time. After a decade of stability, the imports of refined sugar declined rapidly to reach nearly zero in 1885. This trend was mirrored by imports of raw sugar (to be refined in Italy), which increased over the period 1865-1885. The mid-1880s peaks in raw sugar imported by Italian refiners might be related to the expected increases in import duties. Since the early 1890s, the imports of raw sugar declined, with a rapid drop at the end of the century (see also Robertson, 1938; Eridania Zuccherifici Nazionali, 1949). Overall, Figure 1 shows that the tariff on sugar started as a fiscal duty to become more and more a protectionist duty. Around the turn of the century the domestic production of sugar beet became, as we will document, a profitable business.

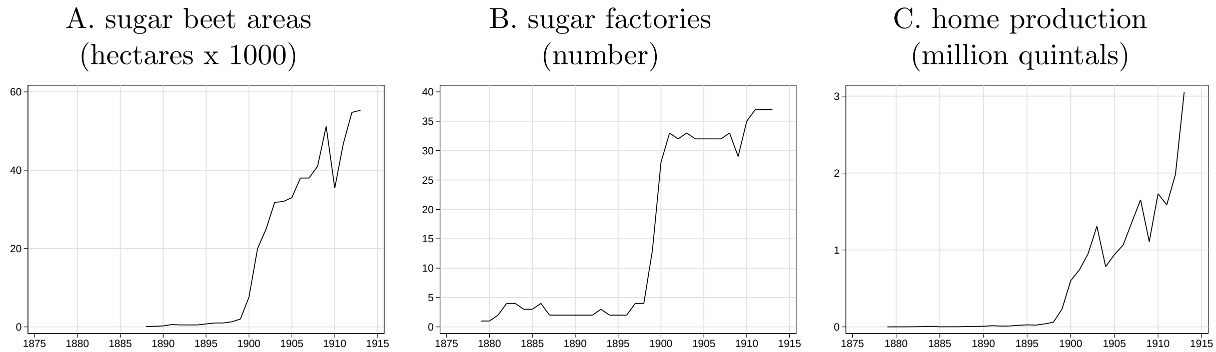
2.2 The birth of the domestic sugar industry

In the session of 17 November 1881, the Italian Chamber of Deputies voted a motion asking the Italian Government "to support, in every possible way, the development of the national cultivation of sugar beet" (Camera Deputati, 1881, p. 7145). As reported in Ministero di Agricoltura Industria e Commercio (1882): *i)* being sugar beet highly perishable, its cultivation and subsequent processing had to be done in the same area (p. 6); *ii)* the development of the sugar industry was not suitable for the South of Italy (pp. 8-9); *iii)* the Po Valley, especially its lower part, represented an appropriate region for the development of the sugar industry (pp. 37, 48; see also Maccaferri, 1883; Peglion, 1917, pp. 90, 99-104; Cardoza, 1979, p. 178). Since the early 1880s, well before the birth of the national sugar industry, it was clear to the Italian policymakers that the development of the domestic sugar industry had strong local traits.

Figure 2 documents national trends of the sugar industry. Panel A illustrates the agricultural expansion of sugar production, showing that the areas where sugar beet was cultivated rose from a few hundreds to about 55 thousand hectares over the period 1890-1913. Panel B refers to sugar factories, the industrial plants where sugar beet was processed. With a neat jump in the last years of the century, the number of sugar factories reached about 35 units in 1913. The take-off of the sugar industry followed the consolidation of protectionism after 1895, with a short, yet inevitable, time lag required to build the factories and set up the business. Finally, Panel C illustrates the

amount of sugar produced in Italy. Its profile largely reproduces the one illustrated in Panel A for the sugar beet areas. The domestic production of sugar peaked in 1913, when it reached some 3 million quintals. Depending on the conditions of the market, the annual production was sold in the national market or allocated to stock accumulation, being exports extremely limited in size.

Figure 2: The growth of the Italian sugar industry, 1880-1913



Source: Panel A: Perdisa (1938), p. 16 and Sabbatucci Severini (2004), p. 268; Panels B and C: data for the years 1879-1894 are from Ministero delle Finanze, *Statistica delle fabbriche [...]*; data for the years 1895-1913 are from Ministero delle Finanze, *Statistica delle tasse di fabbricazione*. See Appendix B for additional details.

2.3 The geographical concentration of the sugar industry

Figure 3 illustrates the geographical distribution of the sugar beet areas and the location of the industrial plants at the end of our investigation period. The vast majority of the sugar beet areas lies in the lower part of the Po Valley, as illustrated in Panel A by a dark triangular zone, the "Italian sugar triangle". There are also some scattered areas of sugar beet cultivation mainly located in the Centre of Italy.[5] Each of the 35 dots reported in Panel B represents a sugar factory. The Po river, flowing eastward across Northern Italy, is also identifiable. The factories are always located in the proximity of the cultivated fields.[6] Since sugar beet is a perishable product, "the beets are hurried from the farms to the factory and at breakneck speed turned into sugar" (Nelson Evening Mail, 24 October 1910). The spatial correlation between the two sides of the picture, representing

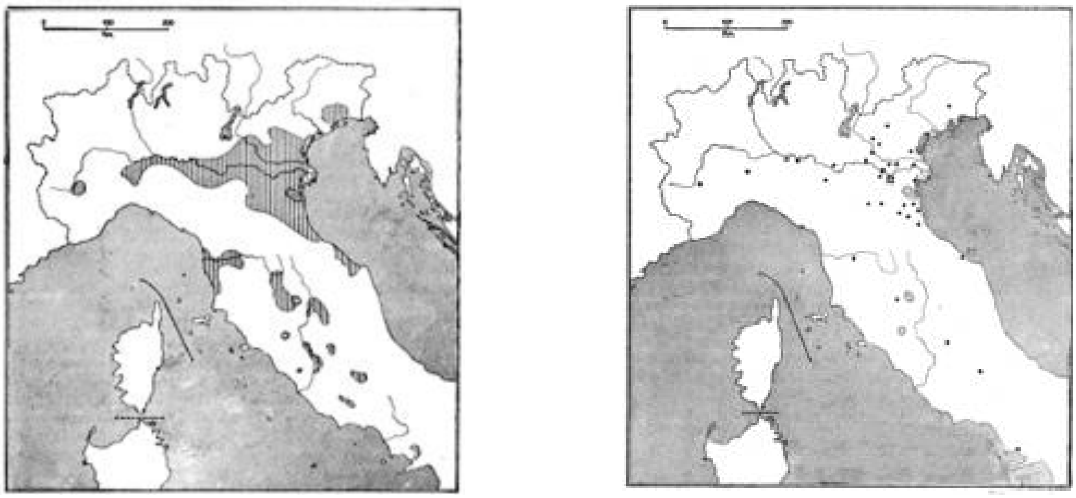
[5]Italy's lies between latitudes 36^oN and 47^oN ca, within the usual lower and upper bound for sugar beet cultivation (30^oN to 60^oN ca). Tue cultivation of sugar cane instead, has a polar upper boundary of 39^oN (Grigg 1995, p. 23) and it is thus less suitable to Italian latitudes.

[6]For a detailed analysis see Gambi (1955), pp. 85-89 and Robertson (1938).

respectively the agricultural (left-panel) and industrial (right-panel) side of the sugar industry, is crystal-clear.

Figure 3: Sugar beet areas and factories, 1910-12

A. sugar beet areas B. sugar factories



Source: Gambi (1955).

As we will explain in more detail later, the provinces belonging to the "Italian sugar triangle" form the "protected area" in the theoretical model, and the "treated group" in the empirical exercise. We deliberately exclude from the protected area/treated group the few provinces characterised by a reduced and discontinuous production of sugar over time.

2.4 The dimension of the sugar industry and its impact on the local economy

The historical literature documents the size of the Italian sugar industry and the economic conditions, including wages, of its employees. According to Montemartini (1912) at least 5,000 workers were employed throughout the year, and more than 10,000 over the August-October period. In September 1910, at its highest peak, employment in sugar factories amounted to some 15,500 individuals, of which 95% were adult men. Exact data on sugar beet growers are not available. However, Montemartini (1912) reports that one hectare of cultivated land required about 125 working days. It follows that at the end of our sample period, when the sugar beet area covered more than 50,000 hectares, about 17,000 individuals were possibly active during the sugar beet season. Using data

from each of the 38 sugar factories and refineries existing in Italy in 1910, Borgnino (1910) confirms these figures and notices that sugar factory workers were also recruited among sugar beet growers.[7] Thus, perhaps some 30,000 workers were directly or indirectly involved in the sugar industry throughout the year. If we compare these employment figures to the total male population of age 15 and above in 1901 in the twelve sugar belt provinces (about 1,2 million individual), we can see that the dimension of the sugar industry was not particularly large. Nevertheless, the spillovers generated by the birth of the Italian sugar industry were not negligible. For instance, a wide variety of new by-products such as pulp and molasses not transformed into sugar were exploited to feed livestock, especially over the winter season. These effects, however, are hard to quantify for the historical period at hand.

Historical sources also show that wages in the sugar industry were particularly high, reaching 7 lire per working day. By comparison, the daily wage of a master builder in 1910 varied between 2 and 5 lire, depending on the province considered (Direzione generale della statistica e del lavoro, 1912, p. 222). Gambi (1955, p. 81) calculates that, despite the seasonal nature of their activity, sugar refineries provided employees with 50% and more of their annual income. The following sections of the paper provide a theoretical model and the empirical evidence to assess whether the boom of the sugar industry induced by protectionism was relevant enough to reduce the incentive to migrate abroad for workers from the sugar areas.

3 A model with tariffs and regional migrations

In this section, we develop a simple model to analyze the incentive to migrate as a function of local labour market conditions. In particular, we look at the role of tariffs on foreign imports of agricultural commodities, like sugar in our case, to assess how protectionism may have different effects across different national areas on the incentive to migrate abroad. We show that, in the

[7] This last point is also contained in Robertson (1938) referring to the Italian sugar industry. The author noticed that "The erection of a beet-sugar factory affects the agriculture within a certain radius [...] somewhat similarly to the bringing nearer, by transport improvements [...] of a large market. The beet-sugar factory provides a market practically on the spot for a new cash crop that can stand increased capital and labor costs" Robertson (1938, p. 14). Ciccarelli and Fenoaltea (2013) document the rapid industrial growth experienced during the pre-WWI decade by the provinces of the Po Valley. Interestingly, the authors relate it to the boom of the Italian sugar industry.

absence of liquidity constraints, tariffs on imports reduce the incentive to migrate for workers employed in the protected sector. By contrast, tariffs can increase the incentive to migrate for workers that are employed in non-protected sectors. Thus, since territories largely specialize in certain productions, tariffs are a source of variability across space.

In the Supplementary Material, we also extend our model by considering the role of monopsony in local labour markets and the presence of liquidity constraints.[8]

3.1 The basic model

In the basic model outlined below workers decide whether to stay or migrate and competitive firms may, or may not, operate under the protection of tariffs.

3.1.1 Workers

In what follows, we will abstract from demographic movements within the *same* country: either natives stay where they are born, or they migrate abroad. Out of the $\bar{N}_c$ natives in province $c \in C$, n_c will stay and m will go abroad.

The utility of a worker who lives in province c has the following Cobb-Douglas form:

$$U_c = q^{\mu} \cdot Q^{1-\mu} \cdot \chi_c \tag{1}$$

where $\mu \in (0, 1)$, q denotes the consumption of the protected good (sugar), and Q denotes the consumption of other goods, not protected from foreign competition. As in Moretti (2011), χ_c denotes an idiosyncratic preference shock for location c which affects each of the individuals born in province c. Thus, for any given consumption bundle $\{q, Q\}$, individuals derive different

[8]With regard to the former, migration decisions can be also affected by the mechanism of local wage determination in agriculture. While it is plausible to assume competitive wage determination in areas where land ownership is fragmented and there are several competing farms, the hypothesis of monopsony in the local labour market seems more appropriate to describe wage determination in areas characterised by large estates (see, e.g., Manning 2003). On the other hand, individuals who are willing to leave their country may be liquidity constrained, as suggested by Faini and Venturini (1994a). In this case, local wages can have a non-monotonic impact on migration. An increase in local wages may initially favour migration by reducing liquidity constraints but, when liquidity does not bite anymore, additional wage increases will discourage migration.

levels of utility from living in their place of birth. As we emphasize in what follows, heterogeneity in local preferences also implies that the local labour supply is not perfectly elastic to changes in local wages. In other words, we explicitly deviate from models where the labour factor is perfectly mobile.

The workers who decide to stay in province c attain a utility level given by maximization of (1) subject to the budget constraint

$$w_c = p \cdot q + p' \cdot Q \tag{2}$$

where w_c denotes the nominal local wage, p and p' the price of the protected and unprotected goods, respectively. Prices are assumed to be the same in all areas $c \in C$ of the country considered. Tariffs are such that

$$p = p^* + \tau \tag{3}$$

where p^* denotes the international price of the good considered (sugar), and τ the per-unit tariff on imports.

The aggregate price level is given by

$$P = p^{\mu} \cdot \left(p'\right)^{1-\mu} \tag{4}$$

Maximization of (1) under (2) yields $q = \mu \cdot \frac{w_c}{p}$ and $Q = (1-\mu) \cdot \frac{w_c}{p'}$ which, once substituted back into (1), give the indirect utility function

$$\nu_c = \theta \cdot \frac{w_c}{P} \cdot \chi_c \tag{5}$$

with $\theta \equiv \mu^{\mu}(1-\mu)^{1-\mu}$. We postulate that χ_c has mean 1 and is uniformly distributed over the interval $[1-\phi, 1+\phi]$, with $0 \leq \phi \leq 1$ (see, e.g., Anderson et al., 1992, p.34). Thus, the density $f(\chi_c)$ is given by:

$$f(\chi_c) = \begin{cases} \frac{1}{2\phi} & \text{if } \chi_c \in [1-\phi, 1+\phi] \\ 0 & \text{otherwise} \end{cases} \tag{6}$$

The parameter ϕ is a measure of the dispersion of preferences about location c in the local population. Such a parameter can also be interpreted as a measure of taste in favour of the home location, relative to receiving countries. According to estimates in Armstrong and Lewis (2017, pp. 173-174) home preference-bias was relatively strong among Italians.

While (5) is the level of utility attained by an individual who stays in location c, we denote the utility attainable by moving abroad, net of transport cost t, as $\nu^* - t$.

In the absence of liquidity-constraints that can prevent from paying the pecuniary cost of migration t, an individual born in c will decide to stay in c when $\nu_c \geq \nu^* - t$, and to migrate whenever $\nu_c < \nu^* - t$. The migration option, together with local living conditions, define a critical level χ^* which makes an individual indifferent between staying or leaving:

$$\frac{\nu^* - t}{\theta \cdot \frac{w_c}{P}} = \chi^*. \tag{7}$$

Thus, the fraction of the individuals born in c who prefer to migrate is given by:

$$\frac{m}{\bar{N}_c} \equiv \frac{m}{n_c + m} = \begin{cases} 0 & \text{if } \chi^* < 1-\phi \\ \int_{1-\phi}^{\chi^*} \frac{1}{2\phi} d\chi_c & \text{if } \chi^* \in [1-\phi, 1+\phi] \\ 1 & \text{if } \chi^* > 1+\phi \end{cases} \tag{8}$$

In what follows, we assume that home and abroad living conditions are such that $\chi^* \in [1-\phi, 1+\phi]$ holds true. As a consequence, the fraction of the individuals born in c who prefer to stay is given by:

$$\frac{n_c}{\bar{N}_c} \equiv \frac{n_c}{n_c + m} = \frac{1}{2\phi}\left(1 + \phi - \chi^*\right) \tag{9}$$

By substituting (7) into (9), we obtain the local labour supply as a function of the local wage:

$$n_c = \frac{\bar{N}_c}{2\phi} \cdot \left[1 + \phi - \frac{\nu^* - t}{\theta \cdot \frac{w_c}{P}}\right] \tag{10}$$

The local labour supply is: increasing in population born in location c, $\bar{N}_c$; decreasing in the net utility which can be obtained by migrating abroad, $\nu^* - t$ and, finally, increasing in the local real wage $\frac{w_c}{P}$. Notice, that the sensitivity of the labour supply to wages is larger the smaller ϕ.[9] In other words, when the variability of idiosyncratic preferences for location c is rather small, population movements will become more sensitive to the local wage level.[10]

3.1.2 Producers and Equilibrium

We now characterize the behavior of producers. We postulate that producers are price-takers for what it concerns output. With regard to the labour market, since the main focus is about agricultural commodities, it is plausible to consider both the competitive case and the monopsony case, depending on the local concentration of land ownership. Here, we consider the case of a competitive labour market, a plausible assumption when land ownership is fragmented across several landowners. The details about the monopsony case, which better fits the case for locally-concentrated land ownership, are briefly sketched in the Supplementary Material.

3.1.3 *Producers in the protected sector*

Consider the behavior of producers located in province c, and suppose that province c is specialized in the production of a good protected by *tariffs*, like sugar in our case. Producers maximize profits

$$\pi_c = p \cdot q - w_c \cdot n_c \tag{11}$$

[9] When $\phi \to 0$, the variance of idiosyncratic location preferences, equal to $\frac{\phi^2}{3}$, shrinks to zero and $\chi^* \to 1$. In this case, the model degenerates into the case where individuals are homogeneous and perfectly mobile, as in Roback (1982). Moreover, from (7), it will hold that $\frac{w_c}{P} = \frac{\upsilon^* - t}{\theta}$: labour mobility will imply that local wages do not change.

[10] From (10), the labour supply elasticity is equal to $\frac{\partial \log n_c}{\partial \log\left(\frac{w_c}{P}\right)} = \frac{\bar{N}_c}{2\phi} \cdot \frac{\nu^* - t}{\theta \cdot \frac{w_c}{P} \cdot n_c}$ Notice that, when ϕ shrinks to zero, a tiny change in the local wage will generate a large change in local labour supply. As emphasized by Topalova (2010), this is exactly what happens in the standard trade model where factors are fully mobile.

where p is given by (3), subject to a constant returns to scale Cobb-Douglas technology $q = (L_c)^{\alpha} \cdot (n_c)^{1-\alpha}$, where $\alpha \in (0,1)$ and L_c denotes the local land input, inelastically supplied in quantity $\bar{L}$.

Under perfect competition in the labour market, a local farm maximizes profit by taking w_c as given. The first-order condition

$$\frac{\partial \pi_c}{\partial n_c} = p \cdot \frac{\partial q}{\partial n_c} - w_c = 0 \tag{12}$$

yields labour demand:

$$\frac{w_c}{P} = (1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p^* + \tau}{p'}\right)^{1-\mu} \cdot (n_c)^{-\alpha} \tag{13}$$

where we exploited (3) and (4).

We can use local labour demand (13) with labour supply (10) to obtain an implicit expression for the equilibrium level of stayers, n_c. As shown in Appendix A, differentiation delivers the following comparative statics implications:

(i) the number of stayers, n_c, in areas protected by the tariff is *increasing* in the relative price of the protected good, $\frac{p}{p'} = \frac{p^*+\tau}{p'}$, which is boosted by the tariff on imports, τ.

Moreover:

(ii) the number of stayers is decreasing in the utility level which can be obtained by migrating abroad, $\nu^* - t$.

(iii) the number of stayers is increasing in the local endowment of land, $\bar{L}$.

Implication (i) is particularly relevant to our purposes.Since it holds that $m = \bar{N}_c - n_c$, tariffs which protect local goods discourage migration. We summarize this conclusion as follows:

Result 1. In the absence of liquidity constraints, the application of tariffs on imports will reduce migration from provinces specialized in protected products.

As shown in Andini et al. (2017), a reduction in local migration also implies an increase in welfare for all the residents in the treated area.

3.1.4 ***Producers in non-protected sectors***

We now analyze what happens in provinces producing goods which are *not* protected by tariffs. Consider the behavior of producers located in province c', and suppose that province c' is specialized in the production of goods which are *not* protected by tariffs. Such producers maximize profit

$$\pi_{c'} = p' \cdot Q - w_{c'} \cdot n_{c'} \tag{14}$$

subject to a Cobb-Douglas technology $Q = (L_{c'})^{\alpha} \cdot (n_{c'})^{1-\alpha}$ where $L_{c'}$ is, again, in fixed supply $\bar{L}$. In a competitive labour market, labour demand is given by:

$$\frac{w_{c'}}{P} = (1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p^{*}+\tau}{p'}\right)^{-\mu} \cdot (n_{c'})^{-\alpha} \tag{15}$$

where we used (3) and (4). Local labour supply in area c' is given by the analog of (10):

$$n_{c'} = \frac{\bar{N}_{c'}}{2\phi} \cdot \left[1 + \phi - \frac{\nu^{*} - t}{\theta \cdot \frac{w_{c'}}{P}}\right] \tag{16}$$

By combining (15) with (16) to obtain an implicit expression for $n_{c'}$ and differentiating (see Appendix A), we find that tariffs reduce the number of stayers in areas specialized in non-protected goods.In other words, since it holds that $m' = \bar{N}_{c'} - n_{c'}$, migration will increase. We summarize this implication in the following:

Result 2. In the absence of liquidity constraints, the application of tariffs on imports will encourage migration from areas specialized in non-protected products.

There is another way to look at Result 2. Tariffs increase the cost of living, as denoted by the price level (4). Thus, in provinces where non-protected sectors dominate, real wages fall, raising the incentives to migrate. Notice also that the expenditure share on protected goods, μ, is equal to the elasticity of the cost of living P to the price of the protected good, $p^{*} + \tau$. As a consequence, the larger μ the larger the adverse impact on local wages. By contrast, in provinces where protected sectors dominate, nominal wages will increase more than the cost of life, so to discourage migration.

How important was the effect emphasized by Result 2 for workers outside the sugar industry? This crucially depends on the expenditure share on sugar, μ. Table 1 documents the average per capita consumption of sugar in selected countries during 1881-1913. The table shows that the average per-capita consumption of sugar in Italy was almost ten times below the one in the UK and USA, and between four and five times below the corresponding levels in France, Germany and Norway.

Table 1: Percapita sugar consumption in selected countries, 1881-1913 (kg/person).

Period	Italy	France	Germany	Great Britain	Norway	USA
1881-1885	3.2	10.7	9.1	27.0	5.5	20.9
1886-1890	2.3	11.4	7.9	28.8	6.5	23.0
1891-1895	2.4	11.8	9.9	31.9	9.2	29.1
1896-1900	2.4	11.0	11.7	34.3	13.6	28.1
1901-1905	3.0	13.0	13.6	33.2	16.1	32.2
1906-1910	3.9	15.3	17.1	35.5	17.8	35.5
1911-1913	4.8	17.5	18.4	36.7	19.3	37.0

Source: Authors' elaboration on Sabbatucci Severini (2004), p. 267.

We can thus argue that the expenditure share on sugar for Italian wage earners was extremely low. This is quite reassuring, since it allows us to consider workers outside the sugar producing areas as non-treated individuals, that is, as individuals who are largely unaffected by the implementation of sugar tariffs.

We can now summarize the main features of the model to address the empirical analysis that follows. First, the model suggests that the impact of protection can be gauged by simply looking at migrations flows/rates, rather than looking at local wages as, for example, in Hanson (1997) and Tirado et al. (2013). Secondly, in the absence of liquidity constraints,[11] protection is such that workers in sugar producing areas will have lower incentives to migrate away, relative to workers in non-protected areas. The size of this effect is higher the *smaller* the expenditure share on sugar. Thirdly, since workers were likely to have a negligible expenditure on sugar, the impact of protectionism on workers' cost-of-living in non-sugar producing provinces was nil. To this regard,

[11]Armstrong and Lewis (2017, p. 172) actually argue that Italians faced sizeable liquidity problems, relative to other migrants. At the same time, such problems were likely to be less stringent for individuals located in the sugar-producing areas, since indirect measures of well-being such as "height" and "literacy" were, as we will document, above the national average. The extension of the model to the case of liquidity constraints is left to Appendix A.

non-sugar producing provinces can be considered as suitable controls in the empirical analysis that follows.[12]

4 Empirical strategy

Our empirical goal is to asses the central implication of the model, that is, whether the implementation of protectionism in the sugar industry negatively affected the migration decisions of individuals living in sugar-producing provinces (in technical jargon, we want to estimate the "average treatment on the treated"). The starting point is to define the set of provinces exposed to the treatment. As mentioned in Section 2.3, both for geographical reasons and for its high perishability, sugar beet cultivation and processing were concentrated in a few neighbouring provinces of the Center/North-East, forming the "Italian sugar triangle". Our treated group, as illustrated in Figure 4, is therefore made of 12 provinces. They include the eight provinces forming the region of Emilia (Bologna, Ferrara, Forlì, Modena, Parma, Piacenza, Ravenna, Reggio Emilia), the two provinces of Cremona and Mantua in Lombardy, and the two provinces of Rovigo and Verona in Veneto.

A simple comparison of migration patterns between provinces affected by sugar protectionism (the treated provinces) and the remaining provinces might be, however, potentially biased. If, for example, the economic boom of the pre-WWI decade had been, for whatever reason, more vigourous in the provinces that benefited from protection on sugar, they might have experienced a decrease in migration rates even in the absence of protectionism. More formally, unobserved differences correlated with migration behavior between provinces exposed to protectionism and the other provinces might bias the effect of the reform. To overcome this limitation, one possible solution is represented by the use of the DID approach.

[12]An additional implication of the model is that a reduction in transport costs (here denoted by t) will raise the incentive to migrate abroad. This is what we observe with the big spikes in emigration outflows from Italy in 1887-88 and 1891, when Brazil granted exceptionally free commuting to the Italian workforce as an attempt to compensate for the labor force shortage caused by the abolition of slavery.

Figure 4: Treated provinces

The treated provinces are Bologna, Cremona, Ferrara, Forlì, Mantua, Modena, Parma, Piacenza, Padova, Ravenna, Reggio Emilia, Rovigo, and Verona. Source: see text.

4.1 The difference in difference approach

In order to produce unbiased estimates of the effect of the introduction of import duties on migration, we initially employ a difference in difference (DID) approach which exploits the quasi-experimental framework provided by the change in the tariff regime on sugar which took place in 1895, as discussed in Section 2.[13] In particular, we compare the changes in migration behavior of individuals living in treated provinces (which benefitted from an increase in protectionism) to changes in migration behavior of individuals living in control provinces (those not affected by the sugar protectionist policy). The causal effect of protectionism on migration choices is identified by the least squares estimation of the following DID specification:

$$Y_{jt} = \alpha + \beta D_{jt} + \gamma Post_{jt} + \delta D_{jt} \times Post_{jt} + \mu X_{jt} + \lambda_j + u_{jt} \tag{17}$$

where Y_{jt} represents the migration rate in province j at time t, D_{jt} is a dummy that takes the value 1 if province j belonged to the treated group, the variable $Post$ is a dummy that takes the value

[13] Topalova (2010) employs a similar approach to measure the impact of trade liberalization on poverty, using the variation in sectoral composition across districts and liberalization intensity across production sectors after the 1991 Indian trade liberalization.

one from 1895 on and zero otherwise, λ_j are a set of province dummies, and t are year dummies.[14] The coefficient β captures the effect on migration decisions of working-age individuals irrespective of the time period when this takes place, i.e. it represents permanent differences between the treated and controls. The coefficient γ captures the effect of time on Y, i.e. general changes in the economic and social context before and after the import duties reform. The interaction coefficient δ is the effect of interest. It captures the differential impact of the implementation of protectionism in treated provinces after the policy, compared with the remaining ones. We control for various socioeconomic variables at provincial level X_{jt}, including census based variables (population size, natality rate and literacy rates), height of Italian conscripts, and manufacturing value added at 1911 prices. The importance of these variables is discussed in Section 5.

The key identifying assumption in the DID approach is that δ would be zero in the absence of the reform, meaning that, on average and conditional on X_{jt}, migration in the treated and the control provinces would have followed parallel trends in absence of the reform (parallel trends assumption). This implies that the linear DID can handle treatment endogeneity as long as the resulting bias has the same magnitude before and after the reform and, therefore, it can be differenced away (Heckman *et al.*, 1998; Heckman and Smith, 1999; Heckman *et al.*, 2006).

However, the assumption of a common trend affecting similarly the treated and the controls might be difficult to hold in our context. For instance, all the provinces of the Italian South belong to the control group and they were, as confirmed by a wide historical literature on the Italian regional divide, arguably very different in many respects from the treated provinces. It makes the common trend assumption particularly strong. When the validity of this assumption is questionable, the synthetic control method, that we pass to illustrate, represents a valid alternative.

4.2 The synthetic control method

The synthetic control method (SCM, henceforth) developed by Abadie and Gardezabal (2003) and Abadie *et al.* (2010) compares the dynamics of migration in the treated provinces straddling the 19th and 20th centuries with the dynamics of a weighted combination of other Italian provinces,

[14]The Supplementary Material discusses the case of migration flows (instead of migration rates) considered as dependent variable.

namely the synthetic controls, chosen to resemble the characteristics of the treated provinces before the implementation of sugar protectionism. In other words, the SCM is used to estimate the counterfactual situation of a treated province in the absence of the regime change by looking at the outcome trend of the synthetic control.

The SCM has several advantages over the conventional DID estimator. It relies on more general identifying assumptions, allowing the effect of unobserved variables on the outcome to vary with time. In other words, it does not require the existence of a common trend between treated and control groups. In addition, the SCM limits the discretion of researchers in the choice of the control units by offering a procedure for the construction of the "ideal" control group. The synthetic control algorithm estimates the missing counterfactuals as a weighted average of potential controls' outcomes. The weights assigned to each control unit are chosen to minimise the differences in pre-treatment trends and other predictors between the treated units and the synthetic control group.[15]

In practice, the synthetic control group is constructed as the convex combination of control provinces that are most similar to the treated provinces with respect to some covariates X_{it} (more details on the covariates used are given in Section 5) as additional predictors that might capture important provincial characteristics in the pre-reform period. In formal terms, we estimate the effect of sugar protectionism θ as follows:

$$\theta_{it} = Y_{it} - \sum_{j=1}^{J} w_j Y_{jt} \tag{18}$$

for any t after the introduction of the reform, where Y represents the migration outcome, and the weights w_j are chosen to minimise a penalty function that depends on the pre-protectionism pattern of migration and on pre-protectionism values of some migration predictors (see Abadie et

[15]The several advantages of the SCM with respect to traditional regression analysis (transparency, flexibility and weakness of the identification assumptions) have led to a rapid application of this methodology in many different fields: the economics of terrorism (Abadie and Gardeazabal, 2003), political science (Abadie *et al.*, 2014), the effects of liberalizations (Billmeier and Nannicini, 2013), the effects of natural disasters on growth (Barone and Mocetti, 2014), and the economics of fertility (Machado and Sanz de Galdeano, 2015), among others. It is also worth noting that, although the synthetic control approach represents a natural extension of the standard DID estimator, it shares some features with the matching estimators as both approaches attempt to minimise observable differences between the treatment and control units.

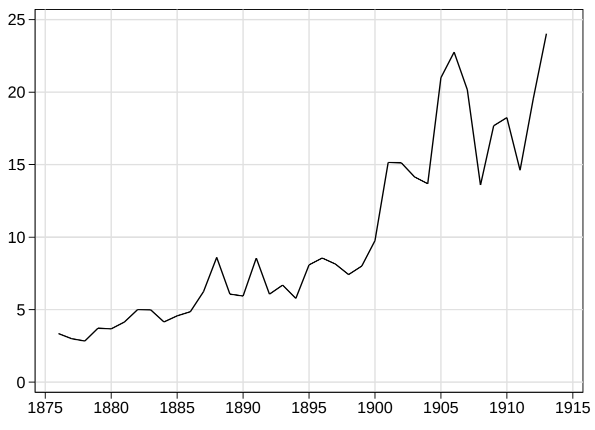
al. 2010). Notice that, in order to apply the SCM, the data from the treated provinces need to be aggregated at the province and year level as if they belonged to one single province (the "treated" province, henceforth) with initial treatment in 1895, when protectionism was fully established.

Although the SCM allows us to deal with the endogeneity problem due to time-varying omitted bias, it might still suffer from reverse causation if the timing of the sugar protectionism were linked to expectations on future migration patterns. However, we can confidently exclude this possibility since the regime change was directly aimed at boosting the local sugar industry, rather than reducing emigration.

5 The data

Annual data on emigration flows during 1876-1913 for the 69 Italian provinces (NUTS 3 units) are from *Commissariato Generale dell'Emigrazione* (1926, pp. 45-65). The same set of data has been used by Faini and Venturini (1994a), Hatton and Williamson (1998), Del Boca and Venturini (2003) in their studies on the determinants of Italian migration in the late 19th- early 20th-century.

Figure 5: Migration rate, 1876-1913 (emigrants per thous. population).

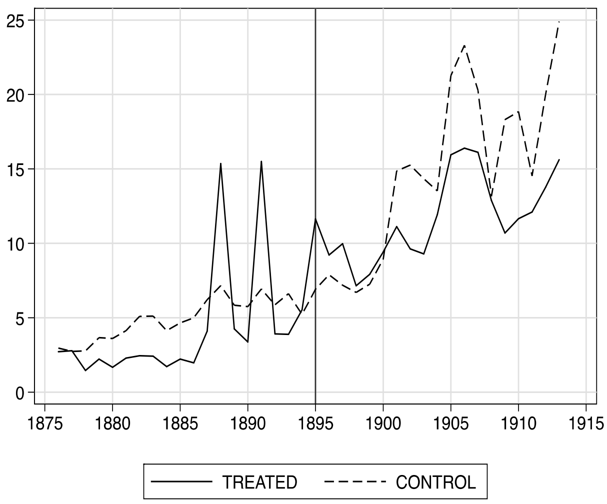


Source: Authors' elaborations on the data reported in Commissariato Generale dell'Emigrazione (1926), pp. 45-65.

Figure 5 illustrates the temporal evolution of migration rates. As a results of migration outflows increasing from about 100 thousands individuals in 1876 to reach more than 800 thousands at the

end of our sample period in 1913, the migration rate exhibits a five-fold increase during 1876-1913. It passed from slightly less than 5 to almost 25 per thousand individuals in four decades.[16] As evident from Figure 5, there is a rapid upsurge of the emigration rate soon after the turn of the century.[17]

Figure 6: Italian emigration rates by treatment groups, 1876-1913



Note: Emigration rates are per thousands population
Source: Authors' elaborations on the data reported in Commissariato Generale dell'Emigrazione (1926), pp. 45-65.

Figure 6 splits the aggregate 1876-1913 migration series into provinces affected by sugar protectionism (the treated group) and not affected provinces (the control group), in the spirit of the DID approach. With the exception of two peaks in the treated provinces, on which we will return soon, the figure shows that the emigration rate is higher in the control provinces than in the treated ones. However, while the gap between the two series is roughly constant (except of course from the two spikes) during the first 10 years of observation in the treated provinces, it starts to widen after the

[16]Ideally one would like to separate out gross from net migrations. Unfortunately, reliable data on return migration for the whole sample period are not available (Hatton and Williamson, 1998).

[17]Hatton and Williamson (1998, p. 98) note indeed that Italian emigration data are based on authorization or issue of passport collected starting from 1876. Before 1901, a passport was not obligatory for traveling and a fee needed to be paid to obtain one. From 1901, holding a passport became mandatory for traveling, but it could be obtained free of charge. Further details on the matter are in Fenoaltea (2011, pp. 77-78) and literature quoted therein. Hatton and Williamson (1998, p. 98) argue that various statistics on Italian emigration outflows after the turn of the century are likely to be exaggerated but "we simply do not know yet how much".

turn of the century.

The local peaks in emigration rates of treated provinces in 1887-1888 and 1891 deserve some clarification. As documented in Sori (1979, p.60) these peaks are mostly due to the migration from the region of Veneto, where most of our treated provinces are located, to Brazil. Together with the official abolition of slavery in 1888, the Brazilian government provided financial incentives covering travel expenses to promote immigration, so to increase the labor force. The data on the distribution of immigrants to Brazil by nationality of origin for the years 1820-1907 reported in Ferenczi and Willcox (1929) confirm that the peaks in total immigration to Brazil in 1887-1888 and 1891 were largely due to immigration from Italy. As already remarked at the end of Section 3, our theoretical model is consistent with this observation. Finally, the provinces of Belluno and Udine (in the upper North-East of Italy) were characterized by extremely sizeable seasonal migrations (Sori, 1979) and have been excluded from the analysis.

In the empirical applications we use literacy rate, heights, birth rates (collected at the provincial level) plus regional value added in the manufacturing industry, as control variables. Data on literacy rates are from the population censuses of 1871, 1881, 1901, and 1911, while those for inter-censual years were obtained by linear interpolation of provincial figures.[18] Literacy, a valuable asset in itself, might help gauge information about foreign labor markets. Data on height are often used in economic history studies since they correlate with nutrition, physical activity, health and diseases. Here we use historical provincial data on the height of Italian soldiers collected by A'Hearn et al. (2009) from military records. Due to the lack of a more direct measure of per capita income, this variable is meant to capture differences in living standards across provinces. Data on birth rates from 1862 to 1899 are collected from official historical sources (see Appendix B). Under the assumption that individuals are at risk of migration only once they turn 14, lagged birth rate controls for the impact of regional demographic pressure on regional migration (as in Faini and Venturini, 1994a; Hatton and Williamson, 1998) to capture what in the literature is called "push factor" (Ardeni and Gentili, 2014). Due to the scarcity of annual economic indicators at the provincial level, we use the annual series of regional value added at 1911 prices in the manufacturing

[18] The population census was not taken in 1891.

industry obtained from Ciccarelli and Fenoaltea (2009, 2014).

6 Empirical results

6.1 Evidence from the DID approach

Table 2 reports the DID results from estimation of equation 17 using emigration rates as dependent variable. All columns include a set of province fixed effects to account for time invariant unobserved heterogeneity at provincial level. The table includes an expanding set of covariates in columns 1-3. Column 1 displays estimation results when excluding controls in X_{it} from equation 17. The regression estimate shows a negative and significant effect of the introduction of the sugar tariff reform in treated provinces with respect to control provinces that amounts to an average of about -0.4 percentage points (from a base of 10.02) - a reduction in mean emigration of 4 per thousand.

Table 2: DID Estimates of the Effect of Sugar Duty on Emigration Rate

	(1)	(2)	(3)	(4)
Treated Province	3.145*	22.79***	5.025***	4.293**
	(1.763)	(1.837)	(1.729)	(1.719)
Post_1895	11.26***	2.263***	2.273***	2.593***
	(0.332)	(0.516)	(0.516)	(0.509)
Treated Province*Post_1895	-4.004***	-5.920***	-5.925***	-4.740***
	(0.753)	(0.699)	(0.699)	(0.695)
Birth rate		0.721***	0.713***	0.813***
		(0.0636)	(0.0658)	(0.0647)
Height		-0.294	-0.272	-0.0967
		(0.232)	(0.237)	(0.232)
Literacy Rate		82.84***	83.38***	80.90***
		(4.050)	(4.228)	(4.092)
Industrial Value Added			-0.001000	-0.000136
			(0.00223)	(0.00215)
Constant	0.536	-21.87	-25.33	-56.82
	(1.229)	(37.60)	(38.39)	(37.56)
Observations	2,546	2,546	2,546	2,345
R-squared	0.522	0.600	0.600	0.636

Note: Standard errors in parentheses: $*** : p < 0.01$, $** : p < 0.05$, $* : p < 0.1$.

A rich literature on historical Italian migration has provided evidence that socio-economic indicators are important determinants of migration choices. For this reason, in columns 2 and 3, similarly to Hatton and Williamson (1998), we control for birth rates at provincial level to take into account demographic pressure on migration rates. This seems particularly important when considering a country like Italy in the 19^{th} century experiencing the early phases of the demographic transition. In addition, as in Spitzer and Zimran (2017) we include standard indicators of economic well-being such as height and literacy rate. As long as these variables influence positively migration, the DID estimate in column 1 is upward biased (in absolute term). Net of the influence of these variables, the effect of the reform gets larger in size and remains significant. This implies that - in absolute terms - the impact of the tariff reform on emigration rate increased considerably (by about 50%) with respect to column 1. In column 3 we also control for regional industrial value added to account for the rising importance of manufacturing as a source of employment opportunities. However, the inclusion of this variable leaves the effect of interest virtually unchanged.[19] Finally, in column 4 we exclude the years 1887, 1888 and 1891 from the analysis. As mentioned in Section 5, these years exhibited sizable peaks in migration due to the provision of financial incentives to move to Brazil (Sori 1979, p.60). This led to massive emigrations from Veneto and, thus, it mainly affected treated provinces. Indeed, the effect is slightly reduced but not particularly different from column 3. We therefore take as benchmark estimates those reported in column 3.

Looking briefly at the effect of the other covariates we see that, among the measures of well-being, literacy rate has a significant impact on emigration rate, while height seems to have no discernible effect. This finding supports the traditional view that literacy played a key role in boosting migration. Demographic pressure, as measured by local birth rates, had a strong and positive effect on the emigration rate. This is not surprising, since nineteenth century Italy, as already noticed, experienced a rapid expansion of its population. The coefficient of the regional industrial value added indicator has the expected sign, but it is not significant. We finally note that the result on literacy rate is at odds with Hatton and Williamson (1998) who find a negligible

[19] Annual historical data for industrial value added or employment at the provincial (NUTS3 units) level are not available. This justify our use or annual regional (NUTS 2 units) value added data at 1911 prices, by Ciccarelli and Fenoaltea (2009, 2014).

impact of literacy rate on emigration. Such discrepancies in the results might be due to differences in the sample period and in the estimation procedure. However, the empirical evidence on the relation between literacy rate and migration is mixed. For instance, Giffoni and Gomellini (2015) find that primary school attendance rate at the beginning of the twentieth century is correlated with emigration and return migration.

6.2 Evidence from the SCM approach

As mentioned in Section 4, the common trend assumption in the DID approach might be difficult to hold in this context because the treated provinces might be intrinsically different from the control provinces for historical reasons. The SCM provides a valid solution to this problem. In order to apply the SCM, we first need to identify the predictors of the emigration rate.[20] These predictors include literacy rate, birth rate, height, and industrial value added, already used in the DID approach. These variables are all averaged over the pre-treatment period (1876-1895). We also add variables capturing the pre-existing differences among provinces, such as total number of births in 1871, infant mortality in 1871, number of postal offices in 1871, and number of schools in 1871.[21] As suggested by Abadie et al. (2010), each annual observation of the pre-treatment outcome variable (migration rate) is used as a separate control variable to maximize the pre-treatment fit.

We construct the synthetic control as the convex combination of provinces in the donor pool that is sufficiently similar to the "treated" province in terms of pre-reform values of emigration rate predictors, as indicated in equation 18.

Table 3 presents the pre-treatment (i.e. before 1895) sample averages of all predictors for the "treated" province (column 1), for the synthetic control group (column 2), as well as for the population-weighted average of the 55 control provinces in the donor pool (column 3). If we compare column 1 to column 3, we see that the average of provinces that did not benefit from the sugar reform in 1895 does not seem to provide a suitable control group for the "treated" province.

[20]The Supplementary Material discusses the case of migration flows (instead of migration rates) as outcome of interest.

[21]The number of postal offices and number of schools in Italian provinces are also used as control variables in Ciccarelli and Fachin (2017), who investigate the main determinants of the productivity growth in the Italian manufacturing industry during 1871-1911.

Table 3: Covariates and Outcome Means for Migration Rate.

	Treated Area (1)	Synthetic control (2)	Average of 55 control provinces (3)
Pre-treatment migration rate	4.21	4.21	4.89
Literacy Rate	0.37	0.36	0.32
Birth rate	34.35	34.08	34.14
Height	164.86	164.84	163.11
Industrial Value Added	164.02	146.97	140.77
No. of births in 1871	10,083.77	10,403.94	15,451.46
Infant mortality in 1871	2,672.39	2,591.65	3,425.63
No. of postal office in 1871	21.23	21.97	43.65
No. of schools in 1871	433.38	418.81	612.26
Migration rate at T_0+1	9.22	9.03	
Migration rate at T_0+5	9.43	9.77	
Migration rate at T_0+15	11.66	19.96	
Average post-treatment effect for migration rate	-4.2167		
RMSPE for migration rate	2.7338		

Note: Outcome: migration rate. Covariates are averaged over the pre-treatment period. As a benchmark, in the table the "pre-treatment migration rate" is averaged over the entire pre-treatment period, but the method minimizes the distance between each yearly outcome value for the treated province and its synthetic control. The values of the outcome refer to one period (T_0+1), five years (T_0+5) and fifteen years (T_0+15) after the treatment period (T_0=1895). RMSPE stands for Root Mean Squared Prediction Error. The list and relative weights of the provinces used to build the synthetic controls are presented in Table 4.

In particular, before the implementation of protectionism, the 55 control provinces exhibited on average a lower literacy rate and industrial value added than the "treated" province. Moreover, the total number of births, infant mortality, number of postal offices and number of schools, as measured in 1871, were higher in the 55 provinces of the donor pool. In contrast, the pre-treatment values of the synthetic control group (column 2) resemble more closely the predictors' pre-treatment values for the "treated" province (column 1). This confirms that the synthetic control group acts as a better counterfactual for the treated group.

Table 4 displays the weights of each control province in the synthetic control group. The weights indicate that the emigration rate in the "treated" province prior to the sugar reform is best reproduced by a combination of Arezzo, Bergamo, Naples, Pesaro, Porto Maurizio, Sondrio and

Table 4: Weights (x 100) of provinces in the synthetic control group

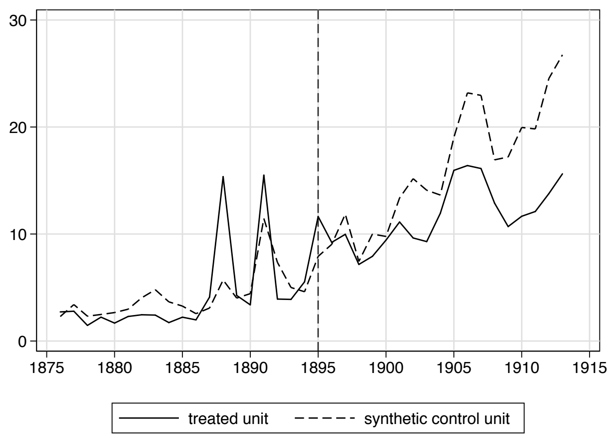
Province	Weight	Province	Weight
Alessandria	0	Lucca	0
Ancona	0	Macerata	0
Aquila	0	Massa C.	0
Arezzo	42.2	Messina	0
Ascoli P.	0	Milan	0
Avellino	0	Naples	3.9
Bari	0	Novara	0
Benevento	0	Palermo	0
Bergamo	1.4	Pavia	0
Brescia	0	Perugia	0
Cagliari	0	Pesaro	11.6
Caltanissetta	0	Pisa	0
Campobasso	0	Porto M.	12.1
Caserta	0	Potenza	0
Catania	0	Reggio C.	0
Catanzaro	0	Rome	0
Chieti	0	Salerno	0
Como	0	Sassari	0
Cosenza	0	Siena	0
Cuneo	0	Syracuse	0
Florence	0	Sondrio	3.9
Foggia	0	Teramo	0
Genoa	0	Turin	0
Girgenti	0	Trapani	0
Grosseto	0	Treviso	0
Lecce	0	Venice	0
Leghorn	0	Vicenza	24.9
		TOTAL	*100.0*

Vicenza. All other provinces in the donor pool are assigned zero weight. Interestingly, with the only exception of the province of Naples in the South of Italy, the provinces forming the synthetic control group are first or second order neighbors of the provinces forming the treated group (see the map reported in Figure C1 in Appendix).

The main empirical result stemming from the application of the SCM is illustrated in Figure 7. This figure represents the time series of the emigration rate for the ”treated” province (solid line) and its synthetic counterpart (dashed line), both in the entire pre-treatment period and for 18 years after the treatment year ($T_0 = 1895$). The comparison between the solid and the dashed lines

before 1895 provides a measure of the quality of the pre-treatment fit obtained through the SMC algorithm; after the reform, the same comparison shapes the dynamic treatment effects.

Figure 7: Italian emigrations rates by group (synthetic control method), 1876-1913



Differently from what we observed in Figure 6 for the DID, the emigration rate of the synthetic control follows more closely the pattern of the actual emigration rate in the "treated" province for the entire pre-intervention period, even for the peaks. This graphical evidence, matched with the one on the good balance on all the emigration predictors shown in Table 3, suggests that the synthetic control is a suitable counterfactual for the migration pattern that would have occurred in the "treated" province between 1896 and 1913 in the absence of the sugar reform.

Our estimate of the effect of protectionism on emigration rate is the difference between emigration rate in the "treated" province and in the synthetic control in the aftermath of the sugar reform. Immediately after the reform, the two lines still remain quite close, with an emigration rate in the treated province slightly higher than the one in the synthetic control. However, after three years, the two patterns begin to diverge. In particular, while the emigration rate in the synthetic control takes a sharp upward trend, the treated area also follows a positive pattern, but at a more moderate pace. Thus, the discrepancy between the two lines suggests once more a negative impact of protectionism on emigration.

To corroborate further the results exposed so far, Table 3 reports the emigration rate at three

points in time, 1 year, 5 years and 15 years after 1895 for the treated province and the synthetic control. One year after the reform, the emigration rate was still higher in the "treated" province than in the synthetic control, but the sign of the difference becomes negative after 5 years (although it is only -0.34). We argue that the slow change in migration behaviour can be explained by the time to build and operate the new industrial plants. Fifteen years after 1895, the difference is -8.3. This is equivalent to say that, after 15 years, the emigration rate in the treated province was 41 percent lower than the estimated counterfactual. Over the entire period the average difference between the treated province and the synthetic control is -4.22. This number is lower (in absolute term) than the DID estimate shown in column 3 of Table 2. The last row of Table 3 shows the Root Mean Square Prediction Error (RMSPE), which is a measure of the difference in the emigration rate between the treated and the synthetic control groups during the pre-treatment period. The values of the RMSPE is very low and equal to 2.73, demonstrating the good fit of the model.

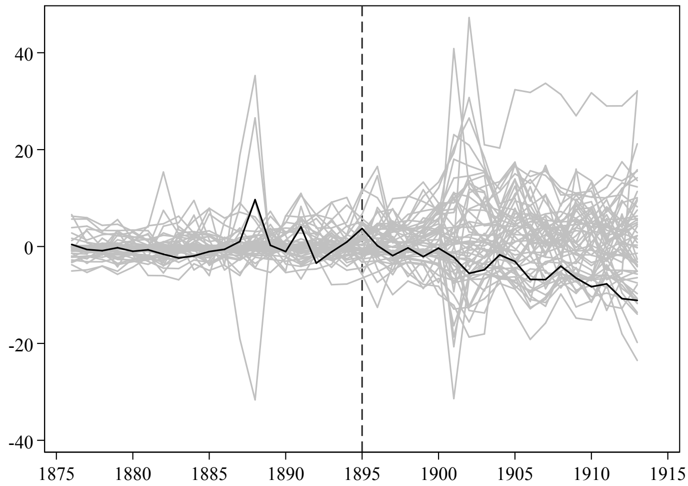
6.3 Robustness checks

A possible drawback of the synthetic control method (SCM) is that inference is often not standard because the number of observations in the control pool is typically small. As suggested by Abadie et al. (2010, 2014), alternative models of inference can be obtained using "placebo studies" (or falsification exercises), based on permutation techniques. The idea is that the SCM estimates of the impact of intervention under scrutiny are less credible if similar or even larger (in magnitude) estimates of the effect of interest are obtained when the intervention did not take place.

Abadie *et al.* (2014) propose a falsification exercise, called "in-space placebo" test, which consists in reassigning the intervention to units not directly exposed to it. A particular implementation of this idea consists in applying sequentially the synthetic control algorithm to every province in the pool of potential controls and compare the placebo with the baseline results. Were we to find that the placebo studies create gaps of magnitude similar to the one found for the treated provinces, then the credibility of the empirical strategy would be undermined. We follow this approach and apply iteratively the SCM to every potential control province. In each iteration, we reassign the sugar reform to one of the 55 control provinces, moving the original "treated" province to the

donor pool. We finally compute the estimated effect associated with each placebo run. At the end, the procedure will create a distribution of estimated gaps for the provinces not affected by the intervention.

Figure 8: Placebo test



Note: The graph reports the difference, in terms of emigration rate, between the "treated" province and its synthetic control (black line), as well as the same differences for all the other Italian provinces (placebo in gray lines).

Figure 8 shows the results of this test. The grey lines represent the gap associated with each of the 55 runs of the test, i.e. the difference in emigration rates between each province in the donor pool and its synthetic counterpart. The black line instead represents the true gap between the original "treated" province and the synthetic control group. This results confirm our baseline findings. At the end of the sample period, the estimated gap for the treated province ranked 4^{th} out of 55 tests. This indicates that the probability of estimating a larger effect by chance is 4/55=7.3%. In a confidence interval setting, this would be equivalent to say that the pseudo-p value is below 10%, confirming the significance of the effect. In the years before the estimated gap for the treated province worsens its performance though.

7 Conclusion

A rising literature considers the effect of protectionist policies on various socioeconomic outcomes at the regional level. The implicit underlying idea is that, depending on the case considered, an analysis carried out at the country level may miss a potentially important part of the story. Within nations, regions often differ in the terms of specialization patterns, local institutions and geographic and climate factors as well.

The paper considers the link between protectionist policies and migrations in 19^{th} century Italy. We asses in particular the effect of the prohibitive import duties on sugar of the mid 1890s and the induced take-off of the sugar industry on relative regional emigration rates. The historical episode considered represents, as we argued in the paper, an almost ideal framework to conduct such an exercise. Indeed the framework is very well delimited. On the one hand, production was, for the very nature of the industry considered, necessarily concentrated in a delimited geographic area of small extension. On the other hand the workers of the sugar industry benefitted from the positive aspect related to the development of a new industry without suffering much from the high price of sugar induced by the tariff, being sugar itself a luxury good. To formally investigate the topic, we develop a simple model that distinctly exploits the spatial dimension. In particular, the model shows how protection of local products raises local wages, thus reducing the incentive to migrate abroad. This implication is tested empirically following both DID and SCM approaches. The results show that the adoption and consolidation of protectionism on sugar contributed to reduce the population outflow in the treated provinces. Thus, protectionism increased welfare of the working class in the treated areas.

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Appendix

A Comparative statics with competitive labour markets

Protected sector

By using the system given by local labour demand (13) and labour supply (10), we obtain an implicit expression for the equilibrium number of stayers, n_c. By differentiating, we obtain the following expression

$$h_1 \cdot dn_c = h_2 \cdot d\left(\frac{p^* + \tau}{p'}\right) + h_3 \cdot d\bar{L} + h_4 \cdot d(\nu^* - t). \tag{A1}$$

where $h_1 > 0$, $h_2 > 0$, $h_3 > 0$, $h_4 < 0$. The explicit expressions for $\{h_1, h_2, h_3, h_4\}$ are given, respectively, by:

$$h_1 = 1 + \frac{\alpha \cdot (n_c)^{\alpha-1} \cdot (\nu^* - t)}{\theta(1-\alpha) \cdot \left(\bar{L}\right)^{\alpha} \cdot \left(\frac{p}{p'}\right)^{1-\mu}} \frac{\bar{N}_c}{2\phi} > 0 \tag{A2}$$

$$h_2 = (1-\mu)\left(\frac{p}{p'}\right)^{-\mu} \cdot \frac{(n_c)^{\alpha} \cdot (\nu^* - t)}{\theta(1-\alpha)\left(\bar{L}\right)^{\alpha}} \frac{\bar{N}_c}{2\phi} > 0 \tag{A3}$$

$$h_3 = \frac{\alpha\left(\bar{L}\right)^{\alpha-1} \cdot (n_c)^{\alpha} \cdot (\nu^* - t)}{\theta(1-\alpha)\left(\frac{p}{p'}\right)^{1-\mu}} \frac{\bar{N}_c}{2\phi} > 0 \tag{A4}$$

$$h_4 = \frac{-(n_c)^{\alpha}}{\theta(1-\alpha) \cdot \left(\bar{L}\right)^{\alpha} \cdot \left(\frac{p}{p'}\right)^{1-\mu}} \frac{\bar{N}_c}{2\phi} < 0 \tag{A5}$$

from which we obtain that $sgn\left(\frac{dn_c}{d\tau}\right) = sgn\left(\frac{h_2}{h_1}\right) > 0$, and Result 1 follows.

Moreover, by solving the system (10)-(13) for the equilibrium local wage $\frac{w_c}{P}$, and totally differentiating, we obtain:

$$H_1 \cdot d\left(\frac{w_c}{P}\right) = H_2 \cdot d\left(\frac{p^* + \tau}{p'}\right) + H_3 \cdot d\bar{L} + H_4 \cdot d(\nu^* - t). \tag{A6}$$

where $H_1 > 0$, $H_2 > 0$, $H_3 > 0$, $H_4 > 0$. The explicit expressions for $\{H_1, H_2, H_3, H_4\}$ are given, respectively, by:

$$H_1 = 1 + \alpha \cdot \frac{\bar{N}_c}{2\phi} \cdot (n_c)^{-1} \cdot \frac{\nu^* - t}{\theta \cdot \left(\frac{w_c}{P}\right)} > 0 \tag{A7}$$

$$H_2 = (1-\mu)(1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p}{p'}\right)^{-\mu} \cdot (n_c)^{-\alpha} > 0 \tag{A8}$$

$$H_3 = \alpha(1-\alpha)\left(\bar{L}\right)^{\alpha-1}\left(\frac{p}{p'}\right)^{1-\mu} \cdot (n_c)^{-\alpha} > 0 \tag{A9}$$

$$H_4 = \frac{\alpha}{\theta} \cdot \frac{\bar{N}_c}{2\phi} \cdot (n_c)^{-1} > 0 \tag{A10}$$

Notice finally that, when $\phi \to 0$ (that is, when there is full workers' mobility), it holds that $\frac{h_2}{h_1} \in (0, +\infty)$, while $\frac{H_2}{H_1} \to 0$. In words, the local supply of labour will respond to local protection (τ), so to make the effect on the local real wage nil.

Non-protected sector

By using (15) and (16) to solve for $n_{c'}$ and differentiating, we obtain the following:

$$h_1' \cdot dn_c = h_2' \cdot d\left(\frac{p^* + \tau}{p'}\right) + h_3' \cdot d\bar{L} + h_4' \cdot d(\nu^* - t). \tag{A11}$$

where $h_1' > 0$, $h_2' < 0$, $h_3' > 0$, $h_4' < 0$. The explicit expressions for $\{h_1, h_2, h_3, h_4\}$ are given, respectively, by:

$$h_1' = 1 + \frac{\bar{N}_{c'}}{2\phi} \cdot \frac{\alpha \cdot (n_{c'})^{\alpha-1} \cdot (\nu^* - t)}{\theta(1-\alpha) \cdot \left(\bar{L}\right)^{\alpha} \cdot \left(\frac{p}{p'}\right)^{-\mu}} > 0 \tag{A12}$$

$$h_2' = -\mu \cdot \left(\frac{p}{p'}\right)^{-\mu-1} \cdot \frac{(n_{c'})^{\alpha} \cdot (\nu^* - t)}{\theta(1-\alpha)\left(\bar{L}\right)^{\alpha}} \frac{\bar{N}_{c'}}{2\phi} < 0 \tag{A13}$$

$$h_3' = \frac{\alpha\left(\bar{L}\right)^{\alpha-1} \cdot (n_{c'})^{\alpha} \cdot (\nu^* - t)}{\theta(1-\alpha)\left(\frac{p}{p'}\right)^{-\mu}} \frac{\bar{N}_{c'}}{2\phi} > 0 \tag{A14}$$

$$h_4' = \cdot \frac{-\left(n_{c'}\right)^{\alpha}}{\theta(1-\alpha) \cdot \left(\bar{L}\right)^{\alpha} \cdot \left(\frac{p}{p'}\right)^{-\mu}} \frac{\bar{N}_{c'}}{2\phi} < 0 \tag{A15}$$

from which we obtain that $sgn(\frac{dn_{c'}}{d\tau}) = sgn(\frac{h_2'}{h_1'}) < 0$, and Result 2 follows.

Again, we can use (15)-(16) to solve for the local wage $\frac{w_{c'}}{P}$, and differentiate. We obtain:

$$H_1' \cdot d\left(\frac{w_{c'}}{P}\right) = H_2' \cdot d\left(\frac{p^* + \tau}{p'}\right) + H_3' \cdot d\bar{L} + H_4' \cdot d(\nu^* - t). \tag{A16}$$

where $H_1' > 0$, $H_3' > 0$, $H_4' > 0$. In this case, it holds that $H_2' < 0$. The explicit expressions for $\{H_1', H_2', H_3', H_4'\}$ are given, respectively, by:

$$H_1' = 1 + \alpha \cdot \frac{\bar{N}_{c'}}{2\phi} \cdot (n_{c'})^{-1} \cdot \frac{\nu^* - t}{\theta \cdot \left(\frac{w_{c'}}{P}\right)} > 0 \tag{A17}$$

$$H_2' = -\mu(1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p}{p'}\right)^{1-\mu} \cdot (n_{c'})^{-\alpha} < 0 \tag{A18}$$

$$H_3' = \alpha(1-\alpha)\left(\bar{L}\right)^{\alpha-1}\left(\frac{p}{p'}\right)^{-\mu} \cdot (n_{c'})^{-\alpha} > 0 \tag{A19}$$

$$H_4' = \frac{\alpha}{\theta} \cdot \frac{\bar{N}_{c'}}{2\phi} \cdot (n_{c'})^{-1} > 0 \tag{A20}$$

Thus, an increase in τ will reduce $\frac{w_{c'}}{P}$. From (A18) notice that the impact of the tariff will be larger, the larger the expenditure share μ on the protected good.

B Historical sources on the Italian sugar industry

B1 Data on international trade

Data on imports and duties on sugar illustrated in Figure 1 are from the *Movimento commerciale del regno d'Italia*, the official source on Italian commercial flows. The data are reported separately for refined sugar ("zucchero di prima classe") and raw sugar ("zucchero di seconda classe"). Duties, as it is customary, are specific (lire per unit of weight, usually quintal).

Data for the period 1862-1873 are from the retrospective figures reported (handwritten) in Movimento Commerciale del Regno 1862-1873, unnumbered pages, items "Importazione, commercio speciale, zucchero raffinato sia in pane sia in polvere" and "Importazione, commercio speciale, zucchero non raffinato".

Data for the period 1874-1906 are from the annual issue of the same historical source. So, for instance, data for the year 1889 are from page 18 (Tavola I, Importazione, Commercio speciale, Categoria II, Generi coloniali, droghe e tabacchi, items "zucchero di prima classe" and "zucchero di seconda classe") of Ministero delle finanze (1890) *Movimento commerciale del regno d'Italia nell'anno 1889*, Rome: Tipografia Eredi Botta. Similarly, data for the year 1897 are from from page 31 (imported quantity of "zucchero di prima classe"), page 32 (imported quantity of "zucchero di seconda classe"), and page 338 (import duties) of Ministero delle finanze (1898), *Movimento commerciale del regno d'Italia nell'anno 1897*, Rome: Tipografia Elzeviriana.

Finally, annual data for the period 1907-1913 are the retrospective figures reported at pp. 66-67 of Ministero delle finanze (1914), *Movimento commerciale del regno d'Italia nell'anno 1897*, Rome: Tipografia nazionale di G. Bertero e C.

The above data have been checked against those reported for the years 1877-1898 in Stringher (1899), p. 63 and against the more recent data base provided by Federico *et al* (2011), and available at `https://www.bancaditalia.it/statistiche/tematiche/stat-storiche/stat-storiche-economia/Serie_1862_1950_v2015.zip`, last accessed, 13 January 2018.

B2 Data on sugar production

The data illustrated in Figure 2, panel A are from the following secondary sources. The annual series referring to the cultivated sugar beet areas (thousand hectares) during 1889-1913 are based on two secondary sources. The first is Perdisia (1938), p. 16. The author based his statistical reconstruction elaborating on the *Nuova enciclopedia di chimica*, by I. Guareschi and the *Annuario dell'industria saccarafera italiana*. We refer the reader to Perdisia (1938) for full references and additional details. The second source is Sabbatucci Severini (2004), pp. 268-269 reporting a longer series, covering the years 1887-1951 and based in turns on Parliamentary retrospective figures published in the mid 1960s. We refer the reader to Sabbatucci Severini (2004) for full references and further details.

The annual 1877-1913 production data illustrated in Figure 2, panels B-C are from two historical sources, of fiscal nature. The data are available after the introduction in 1877 of a tax (lire per quintal) on the production of sugar. In addition, both historical sources report the place of production and the name of the producer.

The data for the period 1879-1895 are from the annual publication Ministero delle finanze *Statistica delle fabbriche di spirito, birra, acque gassose, zucchero, olio di semi di cotone, cicoria*

preparata e polveri piriche, e delle tasse relative. The data for the year 1882 are, for instance, from Ministero delle finanze (1883), *Statistica delle fabbriche [...]*, p.30.

The data for the period 1895-1913 are from the annual publication Ministero delle finanze, *Statistica delle tasse di fabbricazione.* The data for the period July 1899-June 1900 18 are, for instance, from Ministero delle finanze (1900), *Statistica delle tasse di fabbricazione*, pp. 42-43.

The annual source Ministero delle finanze, *Relazione dell'amministrazione delle gabelle*, was also consulted as a complementary source of information.

B3 Further data

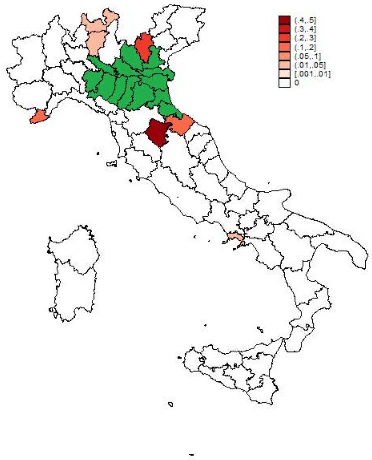
In the empirical application we control for literacy rate, birth rate, height, and industrial value added. The demographic data are from the historical source Ministero di Agricoltura Industria e Commercio, *Popolazione. Movimento dello Stato Civile*, *ad annum.* The annual 1861-1913 data on regional (roughly NUTS 2 units) industrial value added at 1911 prices are from Ciccarelli and Fenoaltea (2009, 2014). The annual data on height of Italian soldiers at the provincial level (NUTS 3 units) were kindly provided by Brian A'Hearn (see A'Hearn et al. 2009). The data on literacy in Italian provinces for the years 1871, 1881, 1901 and 1911 are reported in the population censuses and linearly interpolated, separately by province, for the remaining years.

We also use total number of births in 1871, infant mortality in 1871, number of postal offices in 1871, and number of schools in 1871. The demographic data on birth and infant mortality are from the historical source Ministero di Agricoltura Industria e Commercio, *Popolazione. Movimento dello Stato Civile*, *ad annum.* The data on the number of postal offices and primary schools at the provincial level in 1871 are from Antonielli, E. (1872), *Annuario statistico delle province italiane per l'anno 1872*, Tipografia Tofani: Florence.

C Geographical distribution of the weights used in the SCM

Figure C1 illustrates the geographical distribution of the provinces involved in the SCM. While the weights of provinces forming the synthetic control group are reported in Table 4, the maps show clearly, in accord with Tobler's first law of geography, that the provinces selected by the SCM surround those forming the treated area.

Figure C1: Geographical distribution of the SCM weights



Source: Table 4.

SUPPLEMENTARY MATERIAL (online only appendix)

A Extension of the theoretical model

A1 *Monopsony in wage determination*

Since we consider production and protection of agricultural commodities, the hypothesis of monopsony in the local labour market (e.g., Manning 2003) seems more appropriate in areas characterized by large estates. When the local labour market is dominated by a large producer which behaves as a monopsonist, the local wage is below the competitive level. As a consequence, concentrated landownership will encourage migration even further. We also show that the comparative statics implications about the impact of tariff τ are qualitatively the same as those derived in the competitive case.

Suppose that the local labour market is dominated by a single large producer. As a monopsonist, the producer will choose a point on the local labour supply (10). In other words, profits (11) are maximized subject to the Cobb-Douglas technology and labour supply (10).

The first-order condition for profit maximization under monopsony takes the following form:

$$\frac{\partial \pi_c}{\partial n_c} = p \cdot \frac{\partial q}{\partial n_c} - w_c - n_c \cdot \frac{\partial w_c}{\partial n_c} = 0 \tag{A1}$$

By comparing condition (12) with (A1), it is immediate to notice that the latter adds the term $-n_c \cdot \frac{\partial w_c}{\partial n_c} < 0$, since –from (10)- we have that $\frac{\partial w_c}{\partial n_c} = \frac{2\phi \cdot w_c}{(1+\phi)\bar{N}_c - 2\phi n_c} > 0$. As a consequence, monopsony implies that wage and employment will be lower than the competitive ones, and natives will be more prone to migrate away (if liquidity constraints do not bite).

In conclusion, large estates favour monopsonistic labour markets, where the local wage is below the competitive level. As a consequence, concentrated landownership encourages migration, given the utility level available abroad, $\nu^* - t$.

Also, the comparative statics implications derived under the competitive wage case are still qualitatively valid under monopsony. After substituting (10) into (A1) and differentiating, one obtains

$$\widehat{H}_1 \cdot d\left(\frac{w_c}{P}\right) = H_2' \cdot d\left(\frac{p^* + \tau}{p'}\right) + H_3' \cdot d\bar{L} + H_4' \cdot d(\nu^* - t) \tag{A2}$$

where

$$\widehat{H}_1 = 2\frac{w_c}{P} + \alpha(1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p}{p'}\right)^{1-\mu} \cdot \frac{\bar{N}_c}{2\phi} \cdot (n_c)^{-\alpha-1} \cdot \frac{\nu^* - t}{(1+\phi)\cdot\theta^2\cdot\left(\frac{w_c}{P}\right)^2} > 0 \tag{A3}$$

$$\widehat{H}_2 = (1-\mu)(1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p}{p'}\right)^{-\mu} \cdot (n_c)^{-\alpha} \cdot \frac{\nu^* - t}{(1+\phi)\theta} > 0 \tag{A4}$$

$$\widehat{H}_3 = \alpha(1-\alpha)\left(\bar{L}\right)^{\alpha-1}\left(\frac{p}{p'}\right)^{1-\mu} \cdot (n_c)^{-\alpha} \cdot \frac{\nu^* - t}{(1+\phi)\theta} > 0 \tag{A5}$$

$$\widehat{H}_4 = \frac{\alpha(1-\alpha)\left(\bar{L}\right)^{\alpha}\cdot(n_c)^{-\alpha-1}}{(1+\phi)\theta}\left(\frac{p}{p'}\right)^{1-\mu} \cdot \frac{\bar{N}_c}{2\phi} \cdot \left(1 + \phi - \frac{(1-\alpha)\left(\nu^* - t\right)}{\theta \cdot \left(\frac{w_c}{P}\right)}\right) > 0. \tag{A6}$$

A2 *Liquidity constraints*

When we derived the local labour supply (10), we assumed away liquidity constraints. In other words, we supposed that an individual could always get the money to pay for the pecuniary costs of migration, t. However, in very poor areas where the incentive to migrate away is the greatest, liquidity constraints may bite and force people to stay: see Faini and Venturini (1993, 1994a, 1994b). In these circumstances, an increase in local incomes will relax the constraint and, possibly, enable migration. As a consequence, since local incomes largely depend on wage earnings, the level of local wage may have an ambiguous impact on migration. Summarizing, even if higher local wages tend to reduce the incentive to move away -as emphasized above-, higher local income may allow potential migrants to afford the opportunity to leave.

To consider this issue, we postulate that in area c a fraction $1-\lambda$ of workers is liquidity constrained: such workers cannot afford to emigrate even if they are willing to do so. Thus, the local labour supply is given by:

$$n_c = (1-\lambda)\cdot \bar{N}_c + \lambda \cdot prob(\chi_c > \chi^*)\cdot \bar{N}_c \tag{A7}$$

We use local wages as a proxy for local income, and assume that a higher wage level reduces the probability of being liquidity constrained. Thus,

$$\lambda = \lambda\left(\frac{w_c}{P}\right), \tag{A8}$$

An increase in local wage income –by slackening the liquidity constraint- increases the fraction of individuals who can opt for migration. By exploiting (9) and (A8) to substitute into (A7), the local labour supply can be expressed as:

$$n_c = \frac{\bar{N}_c}{2\phi}\cdot\left[2\phi + \lambda\left(\frac{w_c}{P}\right)\cdot\left(1-\phi-\frac{\nu^*-t}{\theta\cdot\frac{w_c}{P}}\right)\right] \tag{A9}$$

where $\left(1-\phi-\frac{\nu^*-t}{\theta\cdot\frac{w_c}{P}}\right) = (1-\phi-\chi^*) < 0$, since $\chi^* > 1-\phi$.

By differentiating (A9) with respect to local wages we obtain the following expression:

$$\frac{dn_c}{d\left(\frac{w_c}{P}\right)} = \frac{\bar{N}_c}{2\phi}\cdot\left[\underbrace{\lambda'\left(\frac{w_c}{P}\right)\cdot(1-\phi-\chi^*)}_{(-)} + \underbrace{\lambda\cdot\frac{\nu^*-t}{\theta\cdot\left(\frac{w_c}{P}\right)^2}}_{(+)}\right] \tag{A10}$$

which has an ambiguous sign. Assume now that the fraction of natives who are *not* liquidity constrained, λ, is given by the following function of local wages:

$$\lambda = \sigma\cdot\left(\frac{w_c}{P}\right)^z \tag{A11}$$

where (σ, z) are positive parameters.

Under (A11), it is immediate to show that the slope of the labour supply is such that:

$$\frac{dn_c}{d\left(\frac{w_c}{P}\right)} > 0 \Longleftrightarrow \frac{z-1}{z} < \frac{(1-\phi)\cdot\theta\cdot\left(\frac{w_c}{P}\right)}{\nu^* - t} \tag{A12}$$

Thus, for $z > 1$, the local labour supply can be either decreasing or increasing in the local wage. However, when the wage level is sufficiently large, the labour supply will be upward sloping, as in the case of the basic model developed in the main text.

Figure A1: Liquidity constraints and labour supply

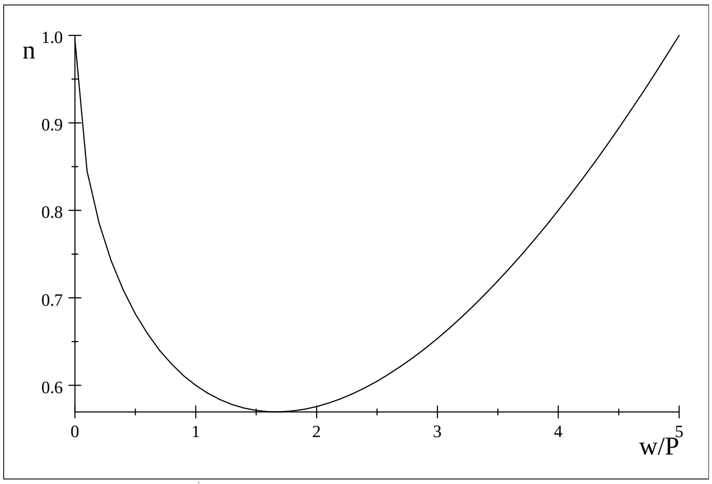


Figure A1 illustrates the number of stayers, n_c, given the number of natives $\bar{N}_c$, as a function of the local wage. This figure emphasizes that liquidity constraints can generate non-monotonicity in local labour supply. Seen from the migration viewpoint, where $m = \bar{N}_c - n_c$, migration can be initially increasing and, then, decreasing in local wages. In particular, in areas characterized by low wages (due, e.g., to large estates and monopsonistic labour markets) an increase in wages induced by tariffs can actually favour migration. By contrast, when wages are sufficiently high, liquidity constraints are likely to be less stringent. As a consequence, tariffs that protect local productions will discourage migration.

In conclusion, the impact of tariffs and wages on migration is a-priori ambiguous, since it also depends on local initial living conditions affecting liquidity.

B Further empirical evidence: migration flows

In the present section of the appendix we report the empirical results obtained using the emigration flows (instead of emigration rates as in the main text) as dependent variable. In this way we can check for the robustness of our results and provide a direct assessment of the relative effect of the sugar reform of the mid 1890s on emigrations in terms of individuals involved. We first present the results based on DID. We then show those obtained using the SCM approach. The empirical strategy, both in terms of specifications and covariates used, follow closely the one already illustrated in the main text. For this reason we we will only summarize here the main findings.

B1 Evidence from the DID approach

Figure B1 illustrates migration outflows during 1876-1913, separately for the treated and control groups. There is clear evidence of a widening gap after the 1895 sugar reform (the reform year is of course denoted by the vertical bar).

Figure B1: DID: Italian emigrations flows by groups (no. of emigrants x 1000), 1876-1913

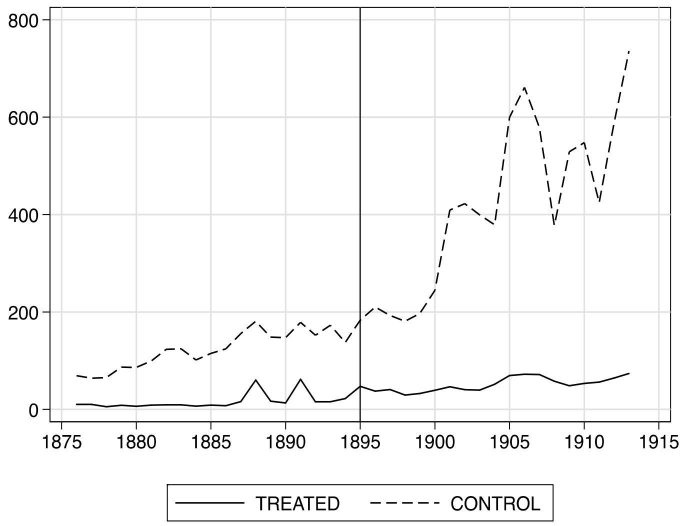


Table B1 reports the regression results from the estimation of equation 17 using emigration flows as dependent variable. For this reason, in columns 2 and 3 we add population to control for the different size of the population. The regression estimates show a negative and significant effect of the introduction of the sugar tariff reform in treated provinces with respect to control provinces. The effect, depending on the specification considered, can be quantified in a differential of about 3,000 individuals per year (with a minimum of -2,717 individuals per year in the parsimonious specification of column 1 to a maximum of 3,310 individuals in column 2, obtained after controlling for a set of socioeconomic variables).

Table B1: DID Estimates of the Effect of Sugar Duty on Emigration Flows

	(1)	(2)	(3)	(4)
Treated Province	-1,482*	10,879***	4,452***	4,251***
	(811.5)	-1.139	-1.09	-1.108
Post_1895	5,388***	649.2***	652.5***	711.2***
	(152.6)	(234.6)	(234.7)	(241.0)
Treated Province*Post_1895	-2,717***	-3,310***	-3,307***	-2,959***
	(346.4)	(321.7)	(321.8)	(333.0)
Birth rate		336.8***	332.6***	367.0***
		(28.75)	(29.67)	(30.36)
Population		0.00976***	0.00990***	0.00992***
		(0.00175)	(0.00177)	(0.00177)
Height		91.64	104.4	180.3*
		(104.5)	(106.8)	(108.7)
Literacy Rate		36,094***	36,366***	35,693***
		(1.917)	(1.974)	(1.985)
Industrial Value Added			-0.586	-0.323
			(1.011)	(1.014)
Constant	2,192***	-51,838***	-53,896***	-67,383***
	(565.8)	-16.922	-17.293	-17.606
Observations	2.546	2.546	2.546	2.345
R-squared	0.564	0.652	0.652	0.670

Note: Standard errors in parentheses: $***: p < 0.01$, $**: p < 0.05$, $*: p < 0.1$.

B2 Evidence from the SCM

By changing the focus from migration rates to migration flows, the group of provinces forming the synthetic control group changes slightly. Table B2 displays the weights of each control province forming the synthetic control group. The weights indicate that the data on migration outflows in the "treated" province prior to the sugar reform are best reproduced by a combination of Arezzo, Florence, Leghorn, Naples, Pavia, Pesaro, Sondrio and Vicenza. All the other provinces in the donor pool are assigned zero weight. As already for migration rates, also in the case of migration flows the provinces forming the synthetic control group surround, with the only exception of the province of Naples located in Southern Italy, the provinces of the treated group.

Table B2: Weights (x 100) of provinces in the synthetic control group

Province	Weight	Province	Weight
Alessandria	0	Lucca	0
Ancona	0	Macerata	0
Aquila	0	Massa C.	0
Arezzo	31.1	Messina	0
Ascoli P.	0	Milan	0
Avellino	0	Naples	2.6
Bari	0	Novara	0
Benevento	0	Palermo	0
Bergamo	0	Pavia	0.9
Brescia	0	Perugia	0
Cagliari	0	Pesaro	25.0
Caltanissetta	0	Pisa	0
Campobasso	0	Porto M.	0
Caserta	0	Potenza	0
Catania	0	Reggio C.	0
Catanzaro	0	Rome	0
Chieti	0	Salerno	0
Como	0	Sassari	0
Cosenza	0	Siena	0
Cuneo	0	Syracuse	0
Florence	3.8	Sondrio	5.5
Foggia	0	Teramo	0
Genoa	0	Turin	0
Girgenti	0	Trapani	0
Grosseto	0	Treviso	0
Lecce	0	Venice	0
Leghorn	12.3	Vicenza	18.7
		TOTAL	*100.0*

Figure B2 illustrates migration outflows during 1876-1913, separately for the treated and control groups according to the SCM approach. The rising gap between treated and control unit following the sugar reform is present in the data, although perhaps less evident to the eye given the presence of the sizable spikes in migrations during the pre-reform period.

Figure B2: SCM: Italian emigrations flows by group (no. of emigrants), 1876-1913

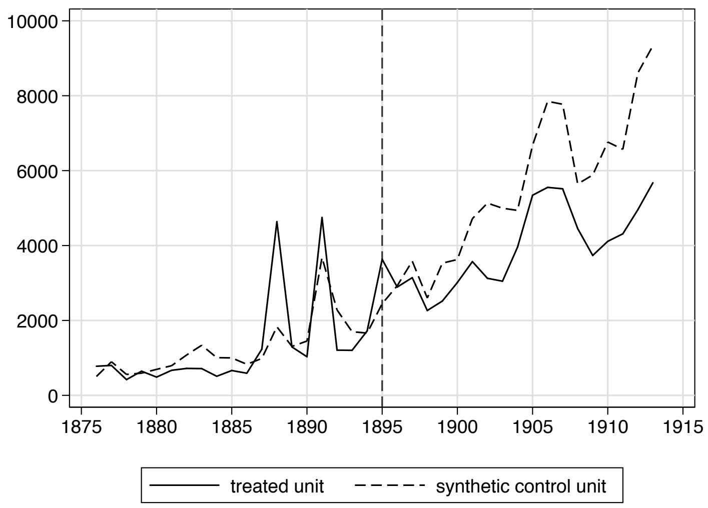


Table B3 reports the empirical results provided by the SCM. As for the DID, population is included among the control variables. The estimated difference in migration outflows in the treated group and the synthetic control increases monotonically over time to reach about 2,650 individuals at time T_0+15. The average post-treatment effect is estimated to be equal to 1,515 individuals.

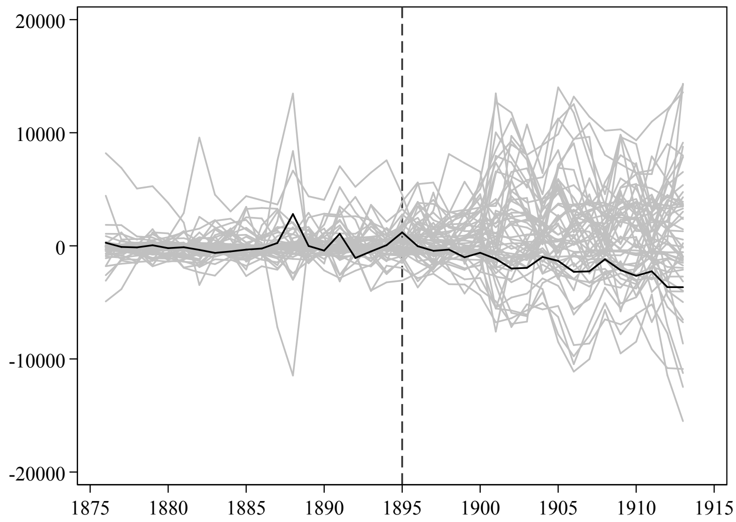
Table B3: Covariates and Outcome Means for Migration Flows

	Treated Area (1)	Synthetic control (2)	Average of 55 control provinces (3)
Pre-treatment migration flow	1,266.67	1,272.82	2,273.482
Literacy Rate	0.37	0.36	0.32
Birth rate	34.35	34.08	34.14
Population	297,688.7	293,988.2	457,773.6
Height	164.86	164.84	163.11
Industrial Value Added	164.02	146.97	140.77
Infant mortality in 1871	10,083.77	10,403.94	15,451.46
No. of births in 1871	2,672.39	2,591.65	3,425.63
No. of postal office in 1871	21.23	21.97	43.65
No. of schools in 1871	433.38	418.81	612.26
Migration flow at T_0+1	2,891.15	2,925.13	
Migration flow at T_0+5	3,012.46	3,627.39	
Migration flow at T_0+15	4,112.385	6,763.88	
Average post-treatment effect for migration flow	-1,514.85		
RMSPE for migration flow	786.2014		

Note: Outcome: migration flows. Covariates are averaged over the pre-treatment period. As a benchmark, in the table the "pre-treatment migration flow" is averaged over the entire pre-treatment period, but the method minimizes the distance between each yearly outcome value for the treated province and its synthetic control. The values of the outcome refer to one period (T_0+1), five years (T_0+5) and fifteen years (T_0+15) after the treatment period (T0=1895). RMSPE stands for Root Mean Squared Prediction Error. The list and relative weights of the provinces used to build the synthetic controls are presented in Table B2.

We finally illustrate the results of the placebo test when migration flows are considered. At the end of the sample period the treated province ranked 10^{th} out of 55 tests. In this case the pseudo p-value (10/55=18%) is above 10%, so that the empirical evidence stemming from SCM is admittedly more fragile when the migration outflows (instead of migration rates) is used as dependent variable.

Figure B3: Placebo test



Note: The graph reports the difference, in terms of emigration flow, between the "treated" province and its synthetic control (red line), as well as the same differences for all the other Italian provinces (placebo in gray lines).