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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 the late nineteenth century Italy 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 tested with the synthetic control method which uses 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.

JEL Classification: N93, J4, C23.

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1 Introduction

Migrations represent a hot and divisive topic in the agenda of EU policy makers. Several reasons underly 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 and human capital. 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 about

In this study, we focus on the take-off of the domestic sugar beet industry, 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 was concentrated in a few neighbouring provinces of the center/north-east. 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 other areas 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 - are often considered in the literature. Some recent 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.[2] Nevertheless, studies focusing on historical periods of the past at the regional level are increasingly numerous (see, e.g., Rosés and Wolf, 2018). Our paper 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

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

[2]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.

area. By contrast, our model explicitly shows that when labour mobility is imperfect,[3] 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 flows and rates at the provincial level (NUTS 3 units) during 1876-1913, using the Synthetic Control Method (SCM). A similar identification strategy, although based on the DID, is followed in Topalova (2010), where the impact of tariffs is captured by exploiting differences in local industrial composition and, thus, different local exposures to the policy change. Using the SCM, we compare the emigration rate differential in two groups of provinces (sugar producers and non-sugar producers) and estimate the effect of sugar protectionism on provincial migration rates. As noticed in Billimeier and Nannicini (2013), the SCM has the advantage over other quasi-experimental methods such as DID that it can deal with endogeneity from omitted variable bias by controlling for the presence of time-varying unobservable confounders. 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. In order to analyze how protectionism affects the incentive to migrate, Section 3 presents a model relating tariffs to local real wages. Section 4 briefly illustrates the Synthetic Control Method. Section 5 describes the data, and Section 6 provides the empirical results. Section 7 concludes.[4]

2 Institutional background: the Italian sugar industry

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

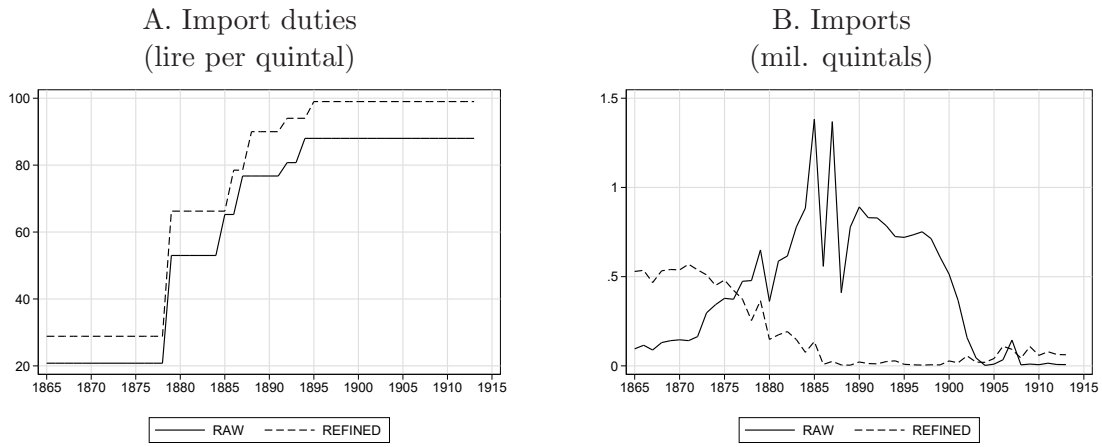
[3]This seems a reasonable assumption in a recently unified country like Italy at the end of the 19th century characterized by illiterate speaking local dialects and with incomplete national railway network. Ciccarelli and Groote (2017, 2018) illustrate the development of railways in Italian provinces during 1839-1913. Ciccarelli and Weisdorf (2018) illustrate the development of literacy in Italian provinces during 1821-1911.

[4]The Appendices provide details on the historical sources, and extend 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 evidence based on the DID empirical approach is also provided.

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).[5] 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. In the empirical part of the paper 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



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).

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 late 1880s peaks in raw sugar imported by Italian refiners might be related to the expected increases in

[5] 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.

import duties. Since the early 1890s, the imports of raw sugar declined, with a rapid drop at the end of the century. 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

After the implementation of protectionism, the imports of sugar dropped swiftly while domestic production developed rapidly (Robertson, 1938a; Eridania Zuccherifici Nazionali, 1949).

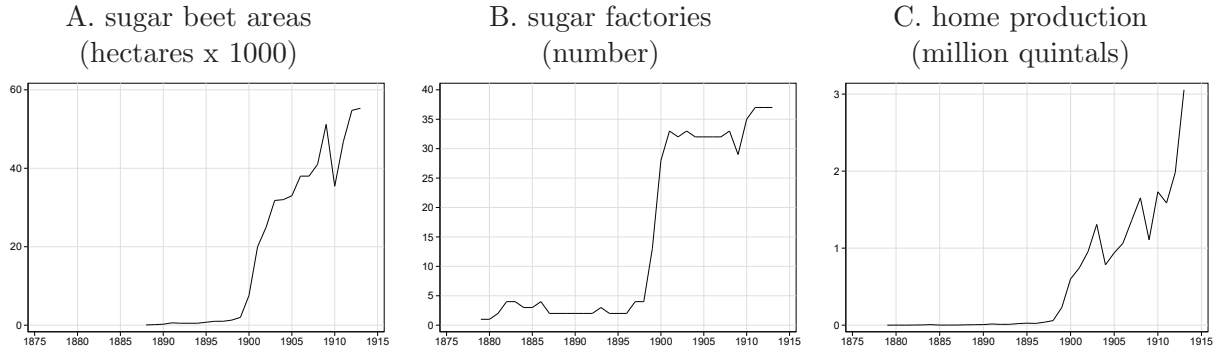
In the session of 17 November 1881, the Italian Chamber of Deputies voted a motion asking the Italian Government "to support, in every possible way, the development of the national cultivation of sugar beet" (Camera Deputati, 1881, p. 7145). As reported in Ministero Agricoltura (1882): *i)* being sugar beet highly perishable, the 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 Italian South (p. 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. Panel A illustrates the agricultural expansion, 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.[6] 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

[6]On the "sugar mania" of the late 19th century see also Sabbatucci Severini (2004, pp. 101-102), and Cardoza (1979), p. 187.

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.[7]

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 belt. There are also some scattered areas of sugar beet cultivation mainly located in central Italy.[8] 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.[9] Since sugar beet is a perishable product, "the beets are hurried from the

[7]After the Bruxelles international agreements of 1902 on the abolition of subsidies to sugar exports, and the birth in 1904 of the Italian sugar cartel (*Unione Zuccherieri*, with headquarters in Genoa, the Italian sugar market was highly protected, and domestic production regulated by agreements between refiners, producers and sugar beet growers at the expense of Italian consumers (Cardoza 1979, p. 189, Doria 1969-1973, volume II, pp. 244-260, and Perdisa 1938, pp. 22-28). On the Bruxelles international agreements of 1902 and situation of the sugar industry in Europe see Guyot (1902).

[8]Italy's lies between latitudes 35^oN and 48^oN ca. The polar lower and upper bounds of sugar beet are, respectively, between 30^oN and 40^oN and between 60^oN and 70^oN. The cultivation of sugar cane has a polar upper boundary of 39^oN (Grigg 1995, p. 23). Sugar cane was first cultivated in Sicily, with latitude between 36^oN and 38^oN ca, since the 10th century (Gambi 1955, p. 9). Sugar cane and sugar beet are thus generally mutual exclusive. There are cases however, such as Southern Spain, were both sugar cane and sugar beet are cultivated.

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

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 respectively the agricultural (left-panel) and industrial (right-panel) side of the sugar industry, is apparent. As a matter of fact, the actual development of the sugar industry was mainly concentrated in 12 provinces. They included the 8 province forming the region of Emilia (Bologna, Ferrara, Forlì, Modena, Parma, Piacenza, Ravenna, Reggio Emilia), the 2 provinces of Cremona and Mantua in Lombardy, and the 2 provinces of Rovigo and Verona in Venetia. As we will illustrate in the subsequent sections of this paper, these are the provinces forming the "protected area" considered in the theoretical model, and the "treated group" of our empirical exercise. Instead, we deliberately excluded from the protected area and the treated group the few provinces characterized by a reduced and discontinuous production of sugar over time.

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

A. sugar beet areas



B. sugar factories



Source: Gambi (1955).

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

In what follows, we use historical evidence to quantify the size of the Italian sugar industry and the economic conditions, including wages, of its employees. Montemartini (1912) documents that 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 on 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.[10] Thus, perhaps some 30,000 workers were directly or indirectly involved in the sugar industry throughout the year. If, as a terms of comparison, these employment figures are compared to the total male population of age 15 and above in 1901 in the twelve sugar belt provinces (about 1,2 million individual), it can be argued that the dimension of the sugar industry was not particularly large. However, one should also consider the spillovers generated by the birth of Italian sugar industry. 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. Such 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

[10]This last point is also contained in Robertson (1938a) 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 (1938a, p. 14). Ciccarelli and Fenoaltea (2013), propose the first statistical reconstructions of provincial industrial valued added at 1911 prices for the census years between 1871 and 1911 and, when considering the rapid industrial growth of the pre-WWI decade, note that: "Perhaps the most striking feature [...] is the unusual diffusion of industrial and overall growth to the centre/north-east, and specifically to the Emilian provinces on the right bank of the middle and lower Po [...] The entire region [the Po Valley] seems to have shared in the sugar boom [...]". And also: "[...] the structure of the tariff pushed them [the regions of the Po Valley] into beet cultivation, and the sugar beet's extreme perishability (the rapid loss of sugar content after the harvest) brought local industrialization in its wake" (p. 81).

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 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 Appendix A, we also extend our model by considering the role of monopsony in local labour markets and the presence of liquidity constraints. 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 characterized 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.

3.1 The basic model

We now outline the basic model where 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. 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 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, p.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:

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

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.[11] 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.[12]

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

[11] 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 $\frac{w_c}{P} = \frac{\nu^* - t}{\theta}$: labour mobility will imply that local wages do not change.

[12] 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.

landowners.

The details about the monopsony case, which better fits the case for locally-concentrated land ownership, are briefly sketched in Appendix A.

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

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

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.[13] 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, Dalmazzo, de Blasio (2017), a reduction in local migration also implies an increase in welfare for all the residents in the treated area. Next, we analyze what happens in provinces producing goods which are *not* protected by tariffs.

3.1.4 *Producers in non-protected sectors*

Consider now 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

[13] In the space $\left(n_c, \frac{w_c}{P}\right)$, we have an upward-sloping supply curve (10) and a downward-sloping demand curve (13). An increase in the tariff τ will shift the local labour demand outwards, implying larger equilibrium values for both $\frac{w_c}{P}$ and n_c. The impact on local wages is formally discussed in the Appendix.

goods.[14] 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.[15]

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

[14] We have again an upward-sloping supply curve (16) and a downward-sloping demand curve (15) in $\left(n_{c'}, \frac{w_{c'}}{P}\right)$. This time, however, the tariff τ will shift the local labour demand *inwards*, implying lower equilibrium values for both $\frac{w_c}{P}$ and n_c. The impact on local wages is formally discussed in Appendix A.

[15] Historical percapita consumptions os sugar in comparative perspective is also discussed in Tonizzi (2001).

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, rather than looking at local wages as, for example, in Hanson (1997) and Tirado et al. (2013). Secondly, in the absence of liquidity constraints,[16] 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, non-sugar producing provinces can be considered as suitable "donors" in the empirical analysis that follows.[17]

4 The empirical approach

In the empirical section we asses the central implication of the model, that is, the implementation of protectionism in the sugar industry negatively affected the migration decisions of individuals living in sugar-producing provinces (in the technical jargon, we estimate the "average treatment on the treated", ATT henceforth). 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 (Bologna, Ferrara, Forli', Modena, Parma, Piacenza, Ravenna, Reggio Emilia, Cremona, Mantua, Rovigo and Verona), located in the regions of Emilia,

[16] 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 above the national average. The extension of the model to the case of liquidity constraints is left to Appendix A.

[17] 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 free commuting to the Italian workforce as an attempt to compensate for the labor force shortage caused by the abolition of slavery.

Lombardy and Venetia.

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.

A simple comparison of migration patterns between provinces affected by 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 might be represented by the use of a DID approach.[18] This approach provides unbiased estimates of the ATT if the effects of any provincial-level factor, potentially leading to unobserved compositional differences between provinces affected by the treatment and the rest of Italy, remain constant over time and if the unobserved time effects are common across provinces in treated and untreated provinces. However, a possible drawback of the DID methodology in our specific case is related to the fact that the treated provinces had, on

[18] Appendix C provides empirical evidence based on the DID approach.

average, better socioeconomic conditions than the remaining ones. Consequently, a simple comparison of migration patterns (of the treated and control provinces) may not only reflect the impact of sugar protectionism, but also other previous differences which affected subsequent migrations.

The synthetic control method (SCM, henceforth) developed by Abadie and Gardezabal (2003) and Abadie *et al.* (2010) offers a valid solution to this problem. The SCM 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, namely the synthetic controls, chosen to resemble the characteristics of the treated provinces before the implementation of sugar protectionism. In other words, after the sugar protectionism affected a specific province, the SCM is used to estimate the counterfactual situation of this 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 than the standard DID model, 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 the outcomes of potential controls.

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.[19]

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

[19]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.

effect of sugar protectionism θ as follows:

$$\theta_{it} = Y_{jt} - \sum_{j=2}^{J} w_j Y_{jt} \tag{17}$$

for any t after the introduction of the reform, where 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 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

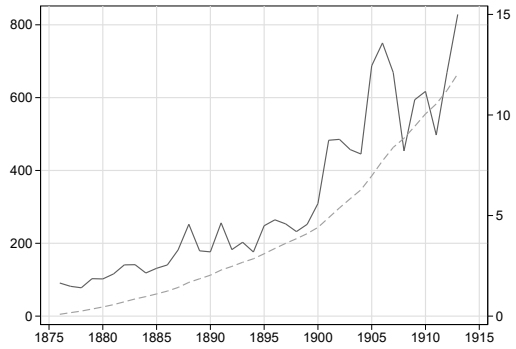
Annual data on emigration flows during 1876-1913 at the provincial level (NUTS 3 units) are from *Commissariato Generale dell'Emigrazione* (1926, pp.45-65). The same set of data has been used by Faini and Venturini (1994a), Hatton and Williamson (1998), Del Boca and Venturini (2003) in their studies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

Figure 5 illustrates the temporal evolution of migration outflows (Panel A) and migration rates (Panel B). Migration outflows passed from about 100 thousands individuals in 1876 to reach more than 800 thousands at the end of the sample period, in 1913. The migration rate exhibits a five-fold increase over the sample period. It passed from slightly less than 5 to almost 25 per thousand individuals in four decades.[20]

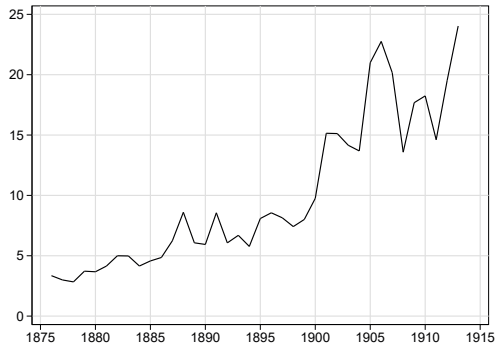
[20] Ideally one would like to separate out gross from net migrations. Unfortunately, reliable data on return migration for the whole sample period are not available (Hatton and Williamson, 1998).

Figure 5: Italian emigrations, 1876-1913

A. emigrant flows (per thous., left scale) and cumulative sum (mil., right scale)



B. emigration rates (per thous. population)

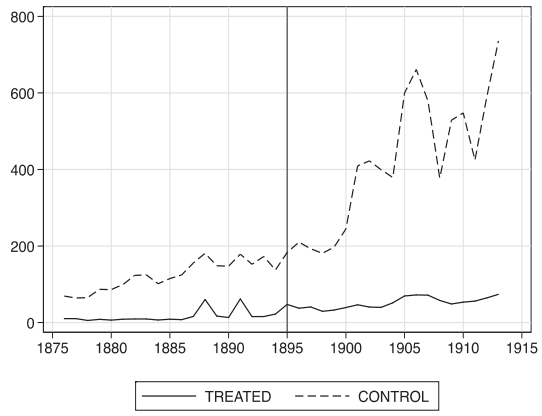


Source: Authors' elaborations on the data reported in Commissariato Generale dell'Emigrazione (1926), pp. 45-65.

As evident from Figure 5, there is a rapid upsurge of emigration outflows soon after the turn of the century.[21]

Figure 6: Italian emigrations by groups, 1876-1913

A. emigrant flows (per thous.)



B. emigration rates (per thous. population)



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

[21] 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". In any case, more than national trends, what matters to our purposes is that potential migration count problems affect treated and non-treated areas in a similar way.

Figure 6 splits the aggregate 1876-1913 migration series, so to separate the provinces affected by sugar protectionism (the treated group) from the remaining ones (the control group), much in the spirit of the DID approach. Two main observations emerge. First, the flow of emigration and the emigration rate are higher in the control provinces than in the treated ones. However, while the gap between the two series is roughly constant during the first 10 years of observation (except for the peaks[22] in the treated provinces), it starts to widen after the turn of the century.

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.[23] Literacy, a valuable asset in itself, might also have helped to 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, birth rate controls for the impact of regional demographic pressure on regional migration (see also 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 industry from Ciccarelli and Fenoaltea (2009, 2014).

[22]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 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.

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

6 Empirical results

6.1 Evidence from the SCM approach

In order to apply the SCM, we first need to identify the predictors of the emigration rate. These predictors include literacy rate, birth rate, height, and industrial value added. 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.[24] As suggested by Abadie et al. (2010), each annual observation of the pre-treatment outcome variable (migration rate or migration flow) 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 and flow) predictors, as indicated in equation 17.[25]

We first consider emigration rate as outcome of interest. Table 2 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. 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" provinces. 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

[24] 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.

[25] As mentioned in the main text, the treated provinces need to be collapsed at province and year level as they belonged to one single "treated" province.

Table 2: 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 T0+1	9.22	9.03	
Migration rate at T0+5	9.43	9.77	
Migration rate at T0+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 (T0+1), five years (T0+5) and fifteen years (T0+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 4, column 1.

group.

Table 3 gives a similar comparison for the case of migration flows (instead of migration rates). Population is now included among the control variables.

Table 4 displays the weights of each control province in the synthetic control groups (column 1 for migration rate and column 2 for migration flow. Although the predictors are the same across the two estimations (emigration rate and emigration flows), the composition of the synthetic control group is not exactly the same. The weights reported in column 1 of Table 4 indicate that the emigration rate in the "treated" province prior to the sugar reform is best reproduced by a combination of Arezzo, Bergamo, Napoli, Pesaro, Porto Maurizio, Sondrio and Vicenza. For the emigration flows (see the weights reported in column 2 of Table 4) the best combination of control

Table 3: Covariates and Outcome Means for Migration Flow.

	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	45,7773.6
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 T0+1	2,891.15	2,925.13	
Migration flow at T0+5	3,012.46	3,627.39	
Migration flow at T0+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 (T0+1), five years (T0+5) and fifteen years (T0+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 4, column 2.

provinces includes Arezzo, Florence, Leghorn, Naples, Pavia, Pesaro, Sondrio and Vicenza.[26] All the 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 for the emigration flow surround the provinces of the treated group.

The main empirical result stemming from the application of the SCM is illustrated in Figure 7. This figure represents the time series of the outcome variable, that is, 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

[26]See Appendix D for map illustrating the geographical distribution of treated and control provinces.

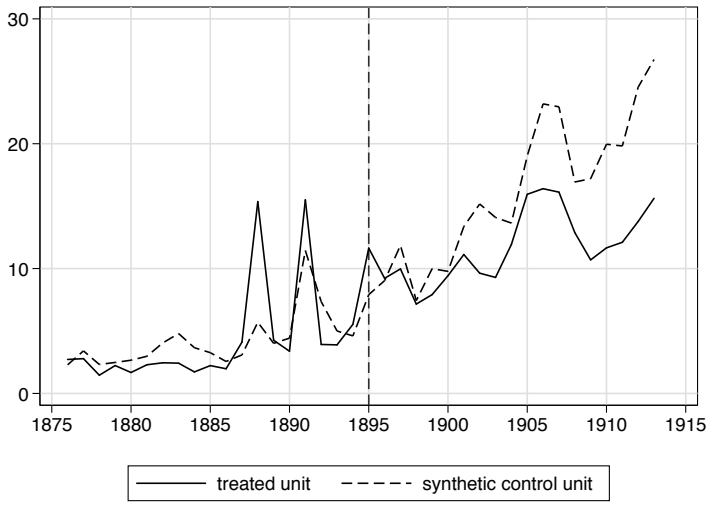
Table 4: Weights of provinces in the synthetic control group

Province	(1) Weight (migration rate)	(2) Weight (migration flow)	Province	(1) Weight (migration rate)	(2) Weight (migration flow)
Alessandria	0	0	Naples	.039	.026
Ancona	0	0	Novara	0	0
Aquila	0	0	Palermo	0	0
Arezzo	.422	.311	Pavia	0	.009
Ascoli P.	0	0	Perugia	0	0
Avellino	0	0	Pesaro	.116	.250
Bari	0	0	Pisa	0	0
Benevento	0	0	Porto M.	.121	0
Bergamo	.014	0	Potenza	0	0
Brescia	0	0	Reggio C.	0	0
Cagliari	0	0	Rome	0	0
Caltanissetta	0	0	Salerno	0	0
Campobasso	0	0	Sassari	0	0
Caserta	0	0	Siena	0	0
Catania	0	0	Syracuse	0	0
Catanzaro	0	0	Sondrio	.039	.055
Chieti	0	0	Teramo	0	0
Como	0	0	Turin	0	0
Cosenza	0	0	Trapani	0	0
Cuneo	0	0	Treviso	0	0
Florence	0	.038	Venice	0	0
Foggia	0	0	Vicenza	.249	.187
Genoa	0	0			
Girgenti	0	0			
Grosseto	0	0			
Lecce	0	0			
Leghorn	0	.123			
Lucca	0	0			
Macerata	0	0			
Massa C.	0	0			
Messina	0	0			
Milan	0	0			

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.

Differently from what we observe in Figure 6 (Panel A), the emigration rate of the synthetic

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



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

control follows more closely the pattern of the actual emigration rate in the "treated" province for the entire pre-intervention period, even considering the peaks. This graphical evidence, matched with the one on the good balance on all the emigration predictors shown in Table 2, 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.

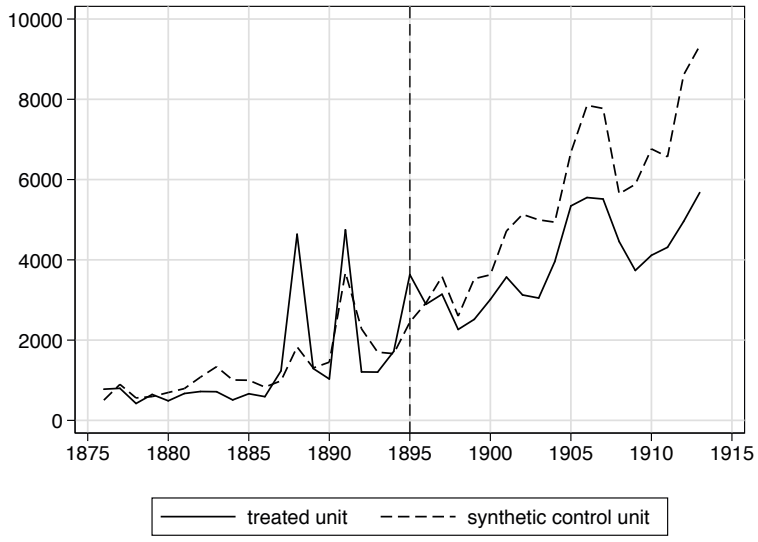
Our estimate of the effect of protectionism on emigration rate is the difference between emigration rate in the "treated" province and in the synthetic control in the aftermath of the sugar reform. Immediately after the reform, the two lines still remain quite close, with an emigration rate in the treated 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 2 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 new plants, requiring several years. 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. The last row of Table 2 shows the Root Mean Square Prediction Error (RMSPE), which is a measure of the difference in emigration rate between the treated and the synthetic control groups during the pre-treatment period. In our case, the values of the RMSPE is very low and equal to 2.73, demonstrating the good fit of the model.

Figure 8 reports the results in terms of migration flows. Our previous results, emerging from the analysis of migration rates, are largely confirmed.

Figure 8: Italian emigrations flows by group (synthetic control method), 1876-1913



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

6.2 Robustness checks

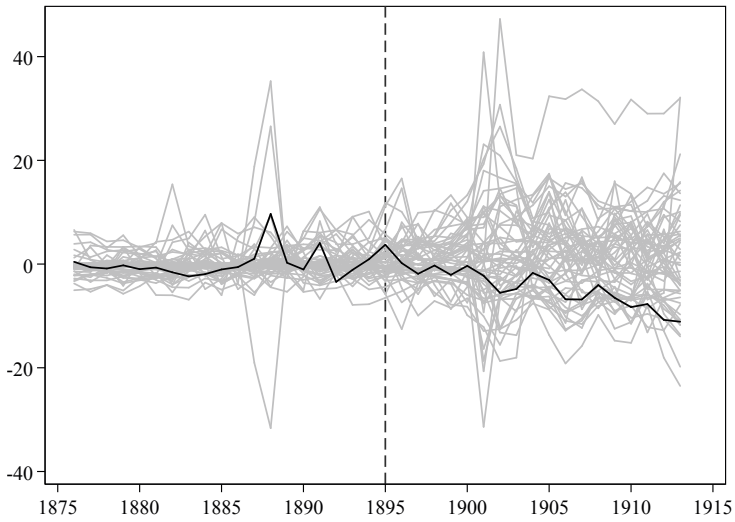
A possible drawback of the synthetic control method (SCM) is that inference is often not standard because the number of observations in the control pool is typically small. As suggested by Abadie et al. (2010, 2014), alternative models of inference can be obtained using "placebo studies" (or falsification 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. As an additional robustness test, 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 9 shows the results of this test for the outcome emigration rate. The grey lines represents 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.

Figure 10 shows a similar set of results for the case of migration flows. In this case the results

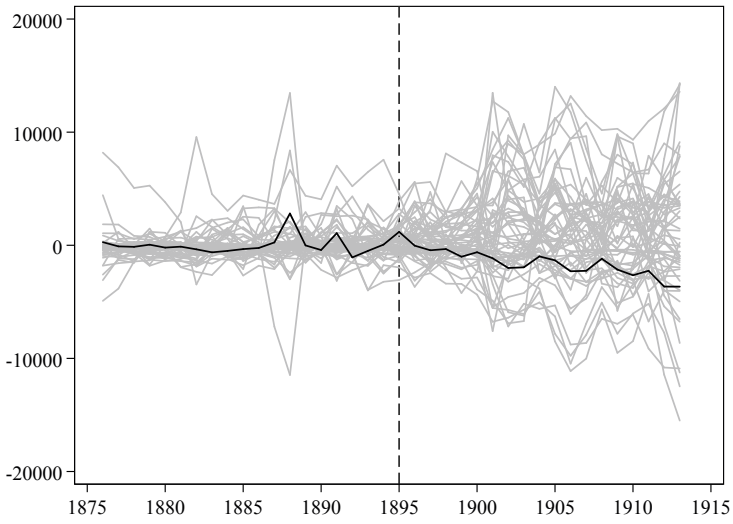
Figure 9: Placebo test



Note: The graph reports the difference, in terms of emigration rate, 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).

obtained by SCM must be interpreted with some caution since at the end of the period in 10 cases out of 55 we obtain an effect more negative than the one for the treated group. This is equivalent to say that the probability of estimating a larger effect by chance is 18%.

Figure 10: 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).

7 Conclusion

The paper considers the link between protectionist policies and migrations in 19th century Italy and contributes to the literature that analyzes the impact of trade protection/liberalization at the local level. The focus on the Italian sugar industry allows us to investigate the local impact of tariffs in the mid 1890s. Given the constraints posed by the nature of the soil and climate conditions, the areas which were fit for sugar production included a limited number of provinces mainly concentrated in the Italian sugar belt, in the lower Po valley.

While a certain number of empirical studies considered Italian migrations during the 19th century, none has, to the best of our knowledge, investigated the possible connections between migration and protectionism at the regional level. To 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. The results of the synthetic control method 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

$$h_1 \cdot dn_c = h_2 \cdot d\left(\frac{p^* + \tau}{p'}\right) + h_3 \cdot d\bar{L} + h_4 \cdot d(\nu^* - t). \tag{18}$$

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:

$$h_1 = 1 + \frac{\alpha \cdot (n_c)^{\alpha-1} \cdot (\nu^* - t)}{\theta(1-\alpha) \cdot \left(\bar{L}\right)^{\alpha} \cdot \left(\frac{p}{p'}\right)^{1-\mu}} \frac{\bar{N}_c}{2\phi} > 0 \tag{19}$$

$$h_2 = (1-\mu)\left(\frac{p}{p'}\right)^{-\mu} \cdot \frac{(n_c)^{\alpha} \cdot (\nu^* - t)}{\theta(1-\alpha)\left(\bar{L}\right)^{\alpha}} \frac{\bar{N}_c}{2\phi} > 0 \tag{20}$$

$$h_3 = \frac{\alpha\left(\bar{L}\right)^{\alpha-1} \cdot (n_c)^{\alpha} \cdot (\nu^* - t)}{\theta(1-\alpha)\left(\frac{p}{p'}\right)^{1-\mu}} \frac{\bar{N}_c}{2\phi} > 0 \tag{21}$$

$$h_4 = \frac{-(n_c)^{\alpha}}{\theta(1-\alpha)\cdot\left(\bar{L}\right)^{\alpha}\cdot\left(\frac{p}{p'}\right)^{1-\mu}}\frac{\bar{N}_c}{2\phi} < 0 \tag{22}$$

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:

$$H_1 \cdot d\left(\frac{w_c}{P}\right) = H_2 \cdot d\left(\frac{p^* + \tau}{p'}\right) + H_3 \cdot d\bar{L} + H_4 \cdot d(\nu^* - t). \tag{23}$$

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:

$$H_1 = 1 + \alpha \cdot \frac{\bar{N}_c}{2\phi} \cdot (n_c)^{-1} \cdot \frac{\nu^* - t}{\theta \cdot \left(\frac{w_c}{P}\right)} > 0 \tag{24}$$

$$H_2 = (1-\mu)(1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p}{p'}\right)^{-\mu} \cdot (n_c)^{-\alpha} > 0 \tag{25}$$

$$H_3 = \alpha(1-\alpha)\left(\bar{L}\right)^{\alpha-1}\left(\frac{p}{p'}\right)^{1-\mu} \cdot (n_c)^{-\alpha} > 0 \tag{26}$$

$$H_4 = \frac{\alpha}{\theta} \cdot \frac{\bar{N}_c}{2\phi} \cdot (n_c)^{-1} > 0 \tag{27}$$

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:

$$h_1' \cdot dn_c = h_2' \cdot d\left(\frac{p^* + \tau}{p'}\right) + h_3' \cdot d\bar{L} + h_4' \cdot d(\nu^* - t). \tag{28}$$

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:

$$h_1' = 1 + \frac{\bar{N}_{c'}}{2\phi} \cdot \frac{\alpha \cdot (n_{c'})^{\alpha-1} \cdot (\nu^* - t)}{\theta(1-\alpha) \cdot \left(\bar{L}\right)^{\alpha} \cdot \left(\frac{p}{p'}\right)^{-\mu}} > 0 \tag{29}$$

$$h_2' = -\mu \cdot \left(\frac{p}{p'}\right)^{-\mu-1} \cdot \frac{(n_{c'})^{\alpha} \cdot (\nu^* - t)}{\theta(1-\alpha)\left(\bar{L}\right)^{\alpha}}\frac{\bar{N}_{c'}}{2\phi} < 0 \tag{30}$$

$$h_3' = \frac{\alpha\left(\bar{L}\right)^{\alpha-1} \cdot (n_{c'})^{\alpha} \cdot (\nu^* - t)}{\theta(1-\alpha)\left(\frac{p}{p'}\right)^{-\mu}}\frac{\bar{N}_{c'}}{2\phi} > 0 \tag{31}$$

$$h_4' = \cdot\frac{-(n_{c'})^{\alpha}}{\theta(1-\alpha) \cdot \left(\bar{L}\right)^{\alpha} \cdot \left(\frac{p}{p'}\right)^{-\mu}}\frac{\bar{N}_{c'}}{2\phi} < 0 \tag{32}$$

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

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

$$H_1' \cdot d\left(\frac{w_{c'}}{P}\right) = H_2' \cdot d\left(\frac{p^* + \tau}{p'}\right) + H_3' \cdot d\bar{L} + H_4' \cdot d(\nu^* - t). \tag{33}$$

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:

$$H_1' = 1 + \alpha \cdot \frac{\bar{N}_{c'}}{2\phi} \cdot (n_{c'})^{-1} \cdot \frac{\nu^* - t}{\theta \cdot \left(\frac{w_{c'}}{P}\right)} > 0 \tag{34}$$

$$H_2' = -\mu(1-\alpha)\left(\bar{L}\right)^{\alpha} \left(\frac{p}{p'}\right)^{1-\mu} \cdot (n_{c'})^{-\alpha} < 0 \tag{35}$$

$$H_3' = \alpha(1-\alpha)\left(\bar{L}\right)^{\alpha-1} \left(\frac{p}{p'}\right)^{-\mu} \cdot (n_{c'})^{-\alpha} > 0 \tag{36}$$

$$H_4' = \frac{\alpha}{\theta} \cdot \frac{\bar{N}_{c'}}{2\phi} \cdot (n_{c'})^{-1} > 0 \tag{37}$$

Thus, an increase in τ will reduce $\frac{w_{c'}}{P}$. From (35) notice that the impact of the tariff will be larger, the larger the expenditure share μ on the protected good.

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:

$$\frac{\partial \pi_c}{\partial n_c} = p \cdot \frac{\partial q}{\partial n_c} - w_c - n_c \cdot \frac{\partial w_c}{\partial n_c} = 0 \tag{38}$$

By comparing condition (12) with (38), 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 (38) and differentiating, one obtains

$$\widehat{H}_1 \cdot d\left(\frac{w_c}{P}\right) = H_2' \cdot d\left(\frac{p^* + \tau}{p'}\right) + H_3' \cdot d\bar{L} + H_4' \cdot d(\nu^* - t) \tag{39}$$

where

$$\widehat{H}_1 = 2\frac{w_c}{P} + \alpha(1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p}{p'}\right)^{1-\mu} \cdot \frac{\bar{N}_c}{2\phi} \cdot (n_c)^{-\alpha-1} \cdot \frac{\nu^* - t}{(1+\phi)\cdot\theta^2 \cdot \left(\frac{w_c}{P}\right)^2} > 0 \tag{40}$$

$$\widehat{H}_2 = (1-\mu)(1-\alpha)\left(\bar{L}\right)^{\alpha}\left(\frac{p}{p'}\right)^{-\mu} \cdot (n_c)^{-\alpha} \cdot \frac{\nu^* - t}{(1+\phi)\theta} > 0 \tag{41}$$

$$\widehat{H}_3 = \alpha(1-\alpha)\left(\bar{L}\right)^{\alpha-1}\left(\frac{p}{p'}\right)^{1-\mu} \cdot (n_c)^{-\alpha} \cdot \frac{\nu^* - t}{(1+\phi)\theta} > 0 \tag{42}$$

$$\widehat{H}_4 = \frac{\alpha(1-\alpha)\left(\bar{L}\right)^{\alpha} \cdot (n_c)^{-\alpha-1}}{(1+\phi)\theta}\left(\frac{p}{p'}\right)^{1-\mu} \cdot \frac{\bar{N}_c}{2\phi} \cdot \left(1 + \phi - \frac{(1-\alpha)(\nu^* - t)}{\theta \cdot \left(\frac{w_c}{P}\right)}\right) > 0. \tag{43}$$

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:

$$n_c = (1-\lambda) \cdot \bar{N}_c + \lambda \cdot prob(\chi_c > \chi^*) \cdot \bar{N}_c \tag{44}$$

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,

$$\lambda = \lambda\left(\frac{w_c}{P}\right), \tag{45}$$

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 (45) to substitute into (44), the local labour supply can be expressed as:

$$n_c = \frac{\bar{N}_c}{2\phi} \cdot \left[2\phi + \lambda\left(\frac{w_c}{P}\right) \cdot \left(1 - \phi - \frac{\nu^* - t}{\theta \cdot \frac{w_c}{P}}\right)\right] \tag{46}$$

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

By differentiating (46) with respect to local wages we obtain the following expression:

$$\frac{dn_c}{d\left(\frac{w_c}{P}\right)} = \frac{\bar{N}_c}{2\phi} \cdot \left[\underbrace{\lambda'\left(\frac{w_c}{P}\right) \cdot (1 - \phi - \chi^*)}_{(-)} + \underbrace{\lambda \cdot \frac{\nu^* - t}{\theta \cdot \left(\frac{w_c}{P}\right)^2}}_{(+)} \right] \tag{47}$$

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:

$$\lambda = \sigma \cdot \left(\frac{w_c}{P}\right)^z \tag{48}$$

where (σ, z) are positive parameters.

Under (48), it is immediate to show that the slope of the labour supply is such that:

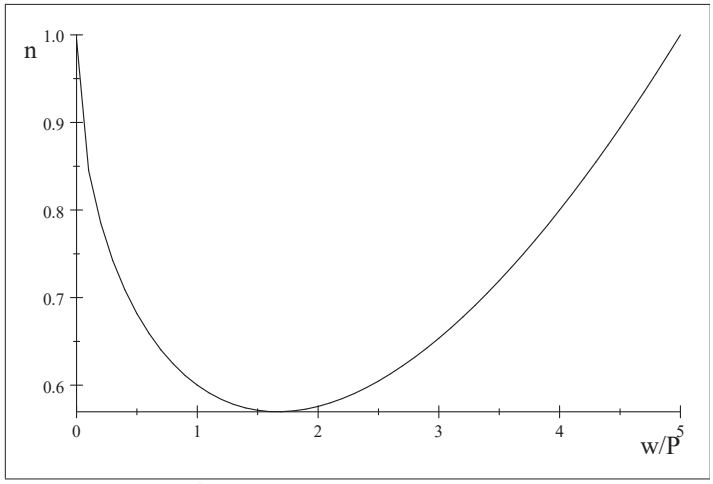
$$\frac{dn_c}{d\left(\frac{w_c}{P}\right)} > 0 \Longleftrightarrow \frac{z-1}{z} < \frac{(1-\phi) \cdot \theta \cdot \left(\frac{w_c}{P}\right)}{\nu^* - t} \tag{49}$$

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 11 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.

Figure 11: Liquidity constraints and labour supply



Appendix B: Historical sources on the Italian sugar industry

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.

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 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.

Further data

As illustrated in the main text, to apply the SCM we first need to identify the predictors of the emigration rate. These predictors include literacy rate, birth rate, height, and industrial value added. 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. 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. 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 annual 1861-1913 data on regional (roughly NUTS 2 units) industrial value added at 1911 prices are from Ciccarelli and Fenoaltea (2009, 2014).

Appendix C: The DID approach

In order to produce unbiased estimates of the effect of the introduction of import duties on migration, we 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 dis-

cussed in Section 2.[27] 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 could be identified by least squares estimation of the following DID specification:

$$Y_{jt} = \alpha + \beta D_{jt} + \gamma Post_{jt} + \delta D_{jt} \times Post_{jt} + \mu X_{jt} + \lambda_j + u_{jt} \tag{50}$$

where Y_{jt} represents the migration rate (OR the number of migrants) 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 one from 1895 on and zero otherwise, λ_j are a set of province dummies, and t are year dummies. 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 the data section (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 pur 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 SCM, pioneered by Abadie and Gardeazabal (2003) and Abadie *et al.* (2010), represents a valid alternative.

7.1 Evidence from the DID approach

Table 5 reports regression results from the estimation of equation 50 using emigration flows 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 (columns 1-3). Column 1 displays estimation results when excluding controls in X_{it} from equation 50. The regression estimate shows a negative and significant effect of the introduction of the

[27] 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.

sugar tariff reform in treated provinces with respect to control provinces that amounts to an average of -1,631 individuals per year.

Table 5: 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: $***: p < 0.01$, $**: p < 0.05$, $*: p < 0.1$.

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 we add population to control for the different size of the population at-risk of migration. However, population alone could not fully capture the influence of demographic factors on migration attitudes, especially in a country like 19th century Italy experiencing the early phases of the demographic transition. For this reason, similarly to Hatton and Williamson (1998), we control for birth rates at provincial level to take into account demographic pressure. In addition, we include standard indicators of economic well-being such as height and literacy rate (Spitzer and Zimran, 2017). As long as these variables influence positively the migration flow, 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 outflows increased by 33% with respect to column 1.

In column 3 we also control for 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. The introduction of the sugar tariff reform generates a reduction of about 2,200 migrants in the treated provinces.

Finally, in column 4 we exclude the years 1887, 1888 and 1891 from the analysis. As mentioned in Section 5 (Sori 1979, p.60), these three years exhibited sizable peaks in migration due to provision of financial incentives to move to Brazil. This led to massive emigrations from Venetia and, thus, it mainly affected provinces that were subject to the treatment. The effect is slightly reduced but not significantly 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, only the literacy rate has a significant impact on emigration flows, 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 population and birth rate, has a strong and positive effect on the emigration rate. This is not surprising, since nineteenth century Italy experienced a rapid expansion of its population. The coefficient of the regional industry indicator has the expected sign, but is not significant.

Table 6: 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: $***: p < 0.01$, $**: p < 0.05$, $*: p < 0.1$.

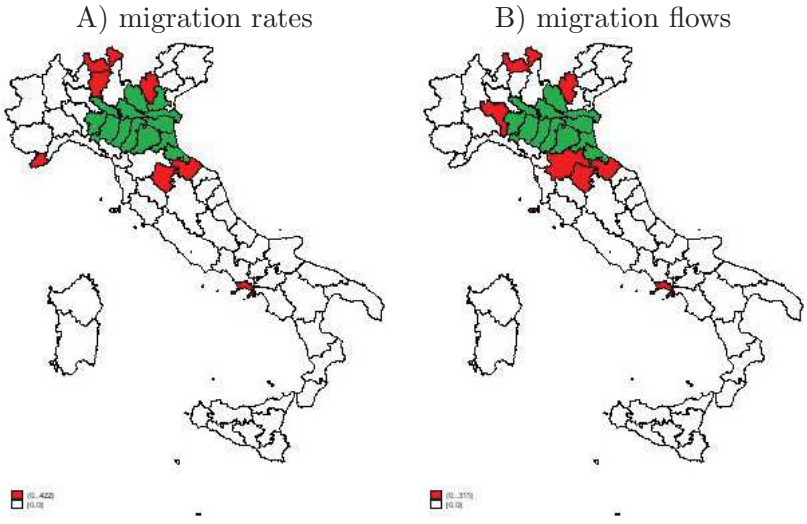
Following Faini and Venturini (1994a), we also estimate equation 50 using the emigration rate as dependent variable. The results in Table 6 confirm essentially those reported in Table 5. The effect of the tariff on sugar reduced the emigration rate of the treated provinces by about 6 per thousand. The results for the controls X_s in Table 6 are strictly analogous to those in Table 5. We finally note that the result on literacy rate is at odds with Hatton and Williamson (1998) who do not find a significant 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.

D: Geographical distribution of the weights used in the SCM

Figure 12 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 that the provinces selected by the SCM surround those forming the treated area.

Figure 12: Treated and control provinces in the SCM



Source: see text.

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