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Abstract

The impact of protection on economic growth is one of the traditional issues in economic history, which has enjoyed a revival in recent times, with the publication of a number of comparative quantitative papers. They all share a common weakness: they measure protection with the ratio of custom revenues to imports, which is bound to bias results if imports are not perfectly inelastic. In this paper, we show that the measure of protection matters, by estimating the Trade Restrictiveness Index (TRI) by Anderson and Neary (2005) for Italy from its unification to the Great Depression. We put forward a different interpretation of some key moments of Italian trade policy and we show that the aggregate welfare losses were small in the long run and mostly related to the outlandish protection on sugar in the 1880s and 1890s. We also show that different measures of protection affect considerably the results of econometric tests on the causal relation between trade policy on economic growth in Italy and in the United States. Accordingly, we argue that the economic history of trade policy needs a systematic re-estimating of protection.

JEL Classification: F13, F14, N73 and N74

Keywords: Italian economic growth, trade policy and trade restrictiveness index

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1. Introduction

In his recent book Allen (2011) quotes protection as one of the key element of the "standard model" which, jointly with investment in human capital, unification of domestic markets and financial development, fostered modern economic growth of the most successful countries in Europe and in the Western Settlement in the late 19th century and early 20th century. Williamson (2011) argues that less developed countries succeeded to revive their industrial sector in the 20th century, badly damaged in the first half of the 19th century by a massive increase in relative prices of primary products, only by protecting their manufactures. This view is surely not new: it was strongly championed in the once very influential synthesis by Bairoch (1989). Certainly the view is not uncontroversial: the debate on trade policy is as old as the policy itself and it has been one of the big topics in economic history since its beginning as a scientific discipline. The earlier literature adopted a traditional narrative approach: authors usually focused on one country, inferred changes in the level of protection from a list of main policy measures (tariffs, trade treaties and so on) and assessed the impact with *post hoc propter hoc* arguments.

The field has been transformed by the publication of a seminal paper by O'Rourke (2000) who estimated the effect of protection for a number of countries with a simple growth regression. Since then, the literature has grown a lot, but this quantitative turn has yet to reach a consensus. In this paper, we argue that measurement of protection may be a serious issue in this literature, because it proxies the level of protection with the ratio of custom revenues to imports (henceforth nominal protection or NT). The NT fails to capture the impact of quantitative restrictions and biases downward the impact of protection if the import elasticity is not zero, as shown, among many others in the careful analysis by Pritchett and Sethi (1994). The neglect of quantitative restrictions may not be such a serious problem in historical perspective, as they were adopted massively only during the Great Depression. In contrast, the effect of changes in composition is always troublesome, as pointed out by Irwin (1993) while criticizing Nye (1991) on comparison of protection in the United Kingdom and France in the 19th century.

Solving the problem is however less easy than pinpointing it. The recent literature on gravity models of trade (Arkolakis, Costinot, and Rodriguez-Clare 2012, Costinot and Rodriguez-Clare 2013) suggests some micro-founded measures of gains from trade, which lump together the effects of all changes in trade costs, including trade policy but also transportation costs. In the past, scholars have used different weighting schemes to get an unbiased measure of protection (see Federico and Tena-Junguito 1998 for a short review). Anderson and Neary, in a number of papers and in a compendium book (Anderson and Neary 2005), have put forward such a measure, the Trade Restrictiveness Index (TRI). In their original, general equilibrium, version, the index is rather data-intensive and computationally burdensome and thus it has hardly been used in historical research. However, Feenstra (1995) has elaborated a much less data-intensive version, which can yield yearly series of TRI (or TRI^P to distinguish it from the original Anderson-Neary version) and also estimates of welfare losses. This Feenstra approximation has been already used in historical perspective by Irwin (2010) for the United States and Beaulieu and Cherniwchan (2014) for Canada. In this paper, we compute this approximation for the first time (as far as we know) for an European country, Italy from 1861, the year of its Unification, to 1929, the outbreak of the Great Depression, following the methodology by Kee, Nicita and Olarreaga (2008, 2009).

After this introduction, in Section 2 we sketch out changes in Italian trade policy and we compare levels of nominal protection to argue that Italy was fairly representative of the historical pattern of nominal protection for the Great Powers of Continental Europe (James and O'Rourke 2013). Section 3 surveys the literature on protection and economic growth in Italy and the main results of the quantitative turn. Section 4 sketches out the method to estimate the TRI^P, discusses the potential biases of the results and provides the essential information on sources we use. Section 5 shows that in Italy protection and thus welfare losses were fairly low, and that most of them reflected the outlandish protection on sugar. Section 6 shows that our estimate of TRI is fairly robust to changes in data (e.g. different level of aggregation or different sets of elasticities) but it may undervalue protection relative to the general equilibrium version of the TRI. A fortiori, the undervaluation of NT is bound to be even greater: Section 7 discusses the extent of this bias and, above all, its changes in time, for Canada, Italy, and the United States. The outcome is straightforward: the relation between TRI and the NT differs by country and in time and thus it is impossible to infer the former from the latter. Section 8 confirms that using the TRI rather than the NT can make a great difference to (some) results of the quantitative turn. We also speculate on the effects of a systematic re-estimation of protection on the conventional wisdom about 19^{th} century trade policy. Section 9 concludes.

2. The Italian protection in comparative perspective

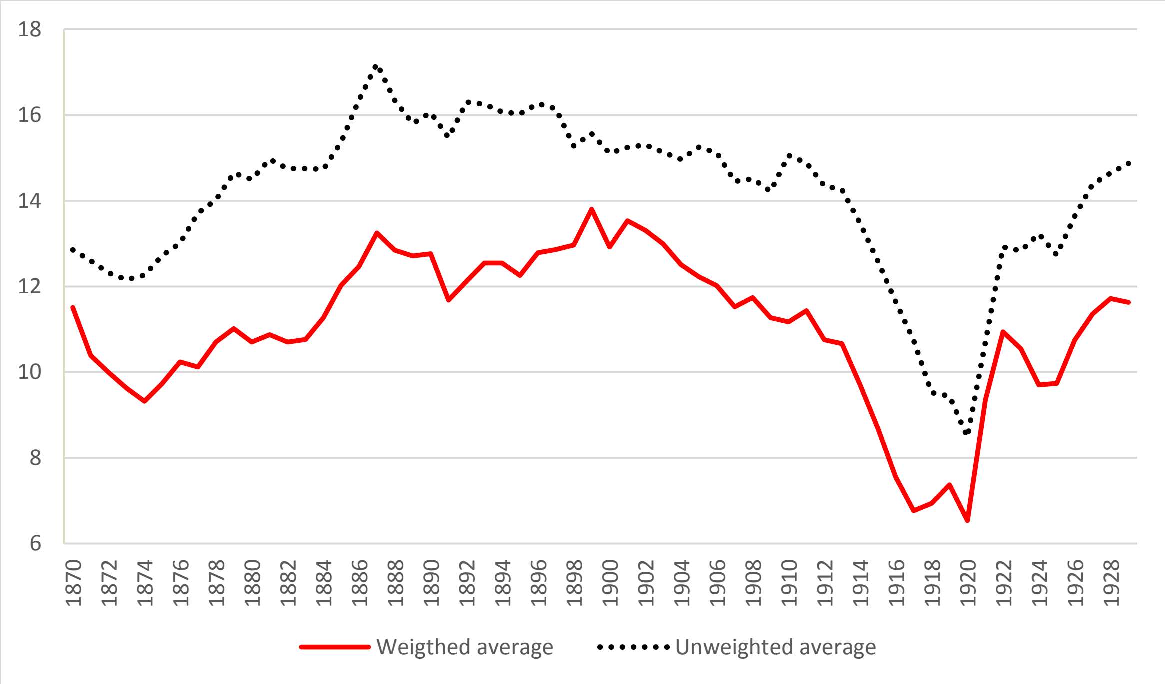
Italy unified when world trade was booming, largely thanks to liberalization which had started in the United Kingdom in the 1830s and had since then extended most countries on the Continent (Federico and Tena-Junguito 2015a). The Kingdom of Sardinia (the official name of Piedmont) had joined the Europe-wide liberalization earlier and with more enthusiasm than any other state in the peninsula but Tuscany. The new Kingdom adopted the Piedmontese tariff in 1861 and it cut further duties three years later, in a trade treaty with France.[1] This policy caused industrialists to complain loudly, but their requests were accepted only in 1878. Italy was thus the first major country in Continental Europe to return to protection, but the duties affected only some industrial products. Thus, the conventional wisdom downplays the relevance of the 1878 tariffs which was further reduced by the trade treaty with France three years later. The game-changer was the fall in prices of cereals on the international market, which threatened the economic conditions of a substantial share of landowners. In March 1887, the Italian Parliament approved jointly a new tariff on industrial goods and a sharp increase in duty on wheat. This was only the beginning of a period of sharp increase in protection. In the following years, the duties on some commodities, including wheat, were increased several times, allegedly for raising revenues, and Italy entered in a trade war with France, by then its main trading partner. Italy tried to find alternative outlets for its goods by signing treaties with Austria-Hungary, Germany and Switzerland in 1892-1893 and again in 1904-1906. The cuts in duties were extended to all partners (including France after 1898) via the most-favoured nation (MFN) clause. This creeping liberalization irritated industrialists, which lobbied for a new tariff, but the preparatory work as still on-going in 1915, when Italy entered the World War One. Trade was strictly regulated until 1920 and a new, and allegedly very protectionist, tariff on industrial goods was finally approved in 1921 (Bachi 1914-1921, De Stefani 1926). The duty on wheat was re-instated in 1926, allegedly as part of a strategy for self-sufficiency, bombastically called ‘battle for wheat’. Italy, as most European countries, reacted to the Great Depression by raising duties and by imposing quantitative restrictions, often in the framework of bilateral clearing agreements (Tattara 1985). It is for this reason that we limit our quantitative analysis to 1929.

How representative is Italy? As a starting point, we have collected series of nominal protection for 33 countries (14 in Europe, 8 in the Americas, 5 in Asia, 4 in Africa and 2 in

[1] There are many accounts of Italian trade policy in Italian (cf. e.g. Corbino 1931-33 and Del Vecchio 1979). English readers may find the basic information in Coppa (1970), Zamagni (1994) and Federico (2006).

Oceania, relying mostly on the work by Clemens and Williamson (2004) and Lampe and Sharp (2013) .[2] The sample is highly representative, accounting for about 81 per cent of world GDP (Maddison project data) and for 89 per cent of world exports in 1913 (Federico and Tena-Junguito 2015a). Figure 1 plots their un-weighted and import weighted averages.

Figure 1. World nominal protection (1870-1929)



Sources: our own elaborations on series presented in Table A2.

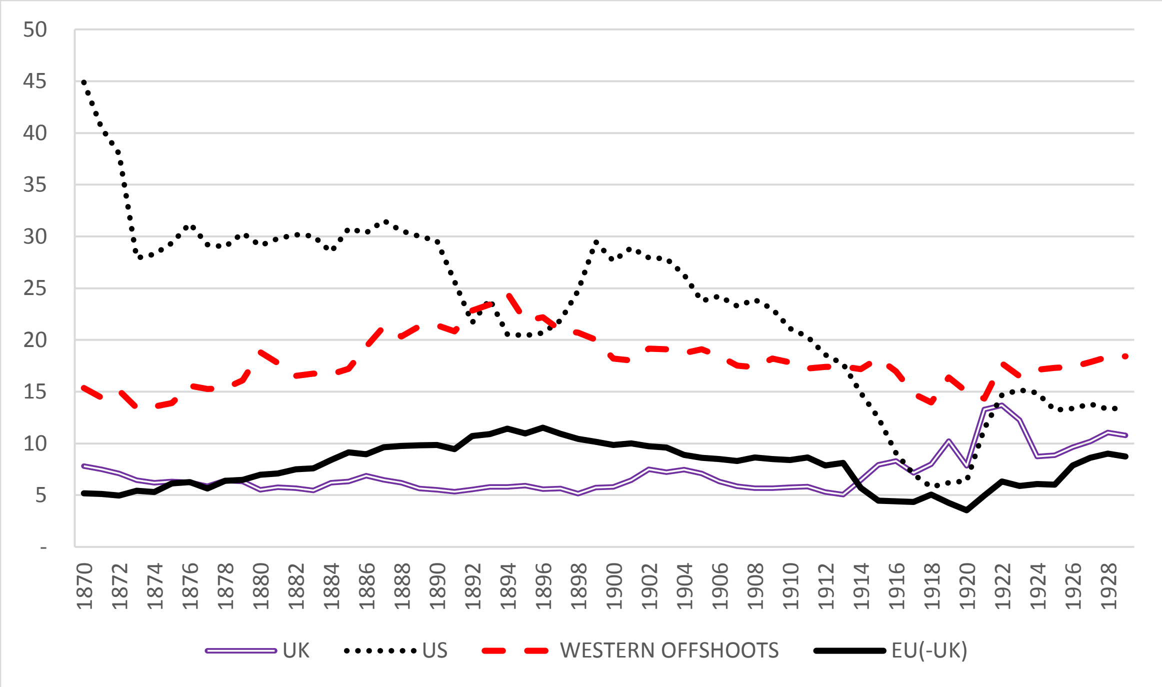
The two series are correlated at 0.875, but the un-weighted series seems to overvalue the level of protection. In fact, its average from 1870 to 1929 (14.1 per cent) is about 30 per cent higher than the trade-weighted average (11.1 per cent) and the United Kingdom accounts for two thirds of the difference.[3] We group countries, broadly following Clemens and Williamson (2004) and we plot the corresponding trade-weighted series in Figure 2.

[2] We have dropped few polities with incomplete series and added (or extended in time) few others with data on imports and custom revenues from the *Statistical Abstract of British colonies*. See the full list of countries in the Appendix (Table A2).

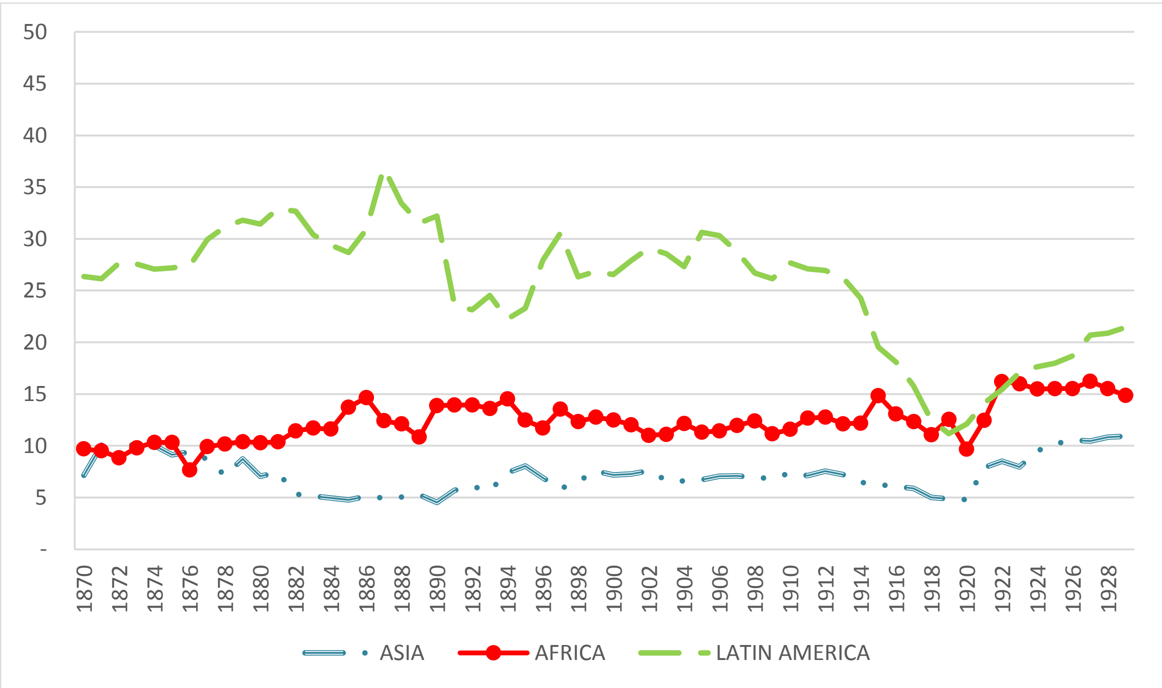
[3] We obtain the figure as $T=[R_{bas}-R_{nuk}]/[1- R_{bas}]$ where R is the ratio of trade-weighted to un-weighted series and the subscripts bas and nuk refer respectively to the baseline series and to a series computed without the United Kingdom.

Figure 2. Nominal protection by groups of countries (1870-1929)

a) Advanced countries



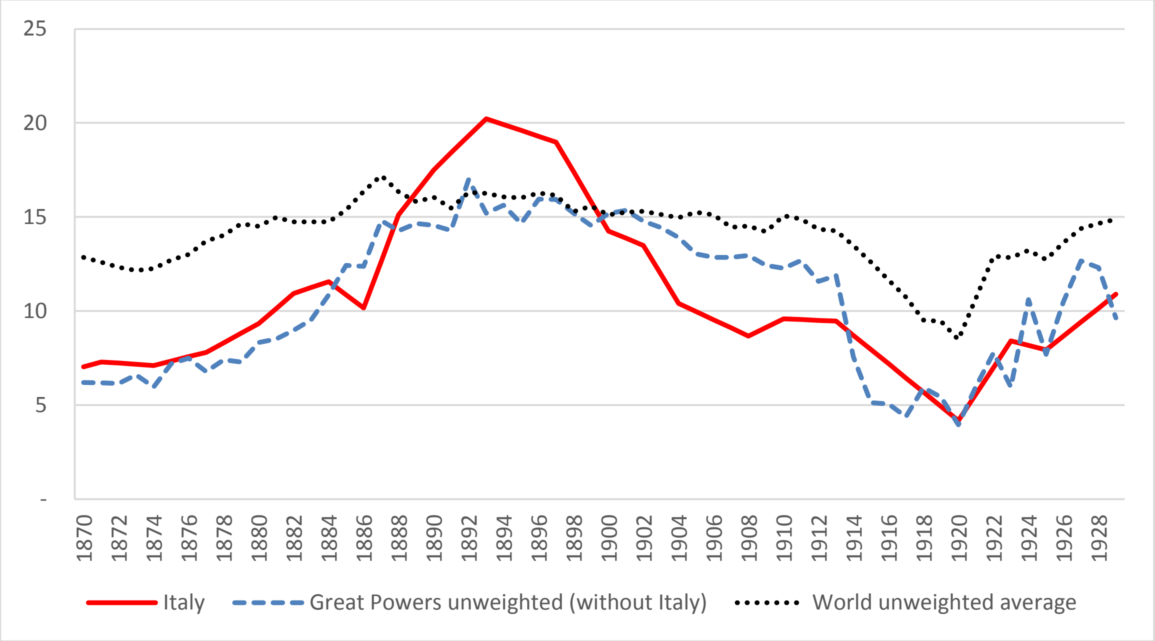
b) Less developed countries



Sources: our own elaborations on data presented in Table A2.

Protection was quite high in Latin America (25.5 per cent), United States (23.1 per cent) and other Western Offshoots (17.9 per cent), quite low in Africa (12.3 per cent) and low in Europe (7.8 per cent) and Asia (7.2 per cent). There is no convergence (divergence) towards (away from) a world level of protection, and very little evidence of common movements. The coefficient of variation by country remained constant around 0.7 throughout the period and, out of 528 simple coefficients of correlation for the period 1870-1913, only a fifth (118) exceeds 0.5 and less than a tenth (46) exceeds 0.75. These significant coefficients cluster in a group of large European countries, which henceforth we will label as Great Powers of Continental Europe which includes Austria-Hungary, France, Germany, Russia and Italy, although the NT in the latter case was somewhat higher than in the average of the four countries (Figure 3).

Figure 3. Nominal protection: Italy, the other Great Powers and the World (1870-1929)



Sources: our own elaborations on series presented in Table A2.

Nominal protection in Italy grew as much as in the other Great Powers until the late 1880s, but it went on growing up to a peak of 20.2 per cent in 1893. Since then, it halved to 9.5 per cent on the eve of World War One – still higher than France or Germany, but decidedly lower than Russia. We can only speculate on the causes of this common pattern. It may reflect the imitation between similar countries, or the waves of trade treaties or the autonomous strategic interaction between trading partners, strengthened by the MFN clauses (Clemens and Williamson 2004). Thus Italy may be representative, at least in terms of timing, of the evolution of protection on the European continent.

On the other hand, Italy was too small to affect world prices. On average it accounted for 3.5 per cent of world imports, and for less than a sixth of trade of its three main imported goods (wheat, cotton and coal), being the two last ones imported free. The Italian imports of sugar did account for 32 per cent of world sugar trade in 1870, but this share fell in the subsequent years. Furthermore, the corresponding shares on world supply were surely lower.[4]

3. Protection and economic growth

The effects of protection on economic growth have always been controversial in Italy. Until Great Depression, duties were the major tool of industrial policy and thus the debate between protectionists and free-traders was often really heated. In general, Italian economic historians tend to avoid the most extreme positions and settle on more nuanced views.[5] Some historians, such as Sapelli (1991), Zamagni (1994) and Pescosolido (1998) reckon that protection, in spite of all its defects, made possible the development of key sectors, such as the iron and steel industry. Are (1974) criticizes protection to industry for having been too selective: all industries should have received the same level of (effective) protection, obviously to the detriment of agriculture. On the other hand, Gerschenkron (1962) sustains that it would have been much better to protect engineering, a highly (skilled) labour-intensive sector, or the chemical industry, technologically more advanced, rather than the traditional cotton manufacturing or the iron and steel industries which were unsuitable for a country without coal. Fenoaltea (2001) endorses cautiously protection on some manufactures, most notably cotton, while calling the duty on wheat "the greatest single cause of the Italian diaspora, of Italy's disappointing growth between Unification and the Great War" (Fenoaltea 2011, p. 165). This work stands out in the literature because Fenoaltea bases his conclusion on an explicit Ricardian model with internationally mobile factors, while most other authors rely on the traditional *post hoc propter hoc* approach à la Bairoch. However, Fenoaltea's work does not escape the other major shortcoming of the literature, the dearth of hard evidence. Many authors rely on statements from 19th century sources, supplemented by few and scattered data on duties on specific products. In fact, the sheer size of the Italian trade statistics (*Movimento Commerciale del Regno d'Italia*) has discouraged any systematic quantitative analysis of levels of protection. So far, only Federico and Tena-Junguito (1998 and 1999) have attempted a comprehensive quantitative analysis of Italian protection. They

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[4] The shares on world trade of cotton, coal and wheat were respectively 6.9 per cent 10.8 per cent and 8.9 per cent in 1913 and 12.1 per cent, 12.2 per cent and 8.8 per cent in1929. The share on world exports of sugar declined to 14.9 per cent in 1890, to 6.2 per cent in 1900 and plunged to 0.4 per cent in 1913. Data on Italian imports are from FTVplus dataset, on world trade of cotton, coal and wheat from Yates (1959 tab. A17), on trade of sugar from Federico and Tena-Junguito (2015b).

[5] For additional references and information on this debate, see Federico and Tena-Junguito (1999), Cohen and Federico (2001) and Federico (2006) and for outlines of main trends in Italian trade see: Vasta (2010) and Federico and Wolf (2013).

estimate TRI, with the original Anderson-Neary method, and rates of effective protection for five benchmark years (1877, 1889, 1897, 1913 and 1926), while relying on the NT for their overall interpretation of changes between these dates. Their interpretation differs from the conventional wisdom. They argue that the nominal and effective protection remained fairly low, but for a spike of the 1890s, and thus cautiously suggest that its effects on aggregate welfare and allocation of resources could not be as large as traditionally assumed.

The origins of the quantitative turn in comparative history of protection can be traced back to a pioneering paper by Capie (1983), who suggested to test the impact of nominal protection (NT) on economic growth (ΔY) with a growth regression:

$$\Delta Y = \alpha + \beta NT + \gamma X \qquad (1)$$

where X is a set of controls. Capie (1983) runs separate regressions for 4 European countries (France, Germany, Russia and Italy), failing to find any significant effect of nominal protection. In contrast, O'Rourke (2000) widens the sample to 10 countries, including some extra-European ones, with a panel approach and finds a positive and significant effect of tariffs. This rather surprising result (the 'tariff-growth paradox') has been confirmed, with different data-sets, by Vamvakadis (2002), Clemens and Williamson (2004) and Jacks (2006).[6] Clemens and Williamson add that the effect of protection became irrelevant in interwar years. The growing consensus for a positive relation is shattered by Shularick and Solomou (2011), which is the most comprehensive and technically sophisticated analysis so far. They consider 20 countries, use a greater set of control variables (including investment rates, literacy and population growth) and a number of different statistical techniques (traditional and GMM panel, dynamic models, etc.). The tariff variable comes out either not significant or negative – more in line with the predictions of standard economic theory. More recently, Lampe and Sharpe (2013) have adopted a different approach. Rather than assuming a common treatment effect of protection on economic growth of all countries, they looks at country-specific causality relations between tariffs and GDP in a two-variable cointegrated VAR model framework. They run it for 24 countries in 1870-1913 (and also for 1950-2000) and conclude that 'our results show clearly that there is no uniform 'treatment effect' of tariff levels on economic performance for all countries, as regards neither the sign nor the direction of causality' (Lampe and Sharp 2013, p. 221). This underlying diversity may

[6] Cf. the summary of all results by Lampe and Sharp (2013, Table.1).

explain why the results of the growth regression approach are not robust. The diversity is likely to depend on the difference in the structure of protection among countries, as shown by some research by Irwin (2002), Dormois (2006), Tena-Junguito (2010) and Lehmann and O'Rourke (2011). The latter paper covers 10 advanced countries and argue that protection on agricultural goods damaged growth, protection on manufactures fostered it and revenue tariffs were irrelevant. Tena-Junguito (2010) deals with manufactures only, for a much bigger sample of 42 countries, and narrows the range of growth-fostering duties to skill-intensive manufactures only. However, the poor results may depend also on the use of NT as measure of protection. How big is this bias? In the rest of the paper, we address this issue comprehensively by comparing NT with unbiased (or, more accurately, less biased) measure.

4. The TRI: sources and methods

Anderson (1995, p. 160) defines the TRI as 'the uniform tariff factor (domestic price) deflator, which, applied to the new tariff factors, permits the initial level of utility of the representative consumer to be supported in general equilibrium' or, more simply, "the uniform tariff that if applied to imports instead of the current structure of protection would leave home welfare at its current level" (Kee, Nicita and Olarreaga 2009, p. 179). The original version of TRI it is quite data-intensive, as it needs detailed data on production and consumption by product in each year and, on top of this, a set of elasticities. Thus, the original version has been used in historical work only by Federico and Tena-Junguito (1998) for Italy and Tena-Junguito (1999) for Spain, and only for few benchmark years. However, Feenstra (1995) has suggested a simple partial equilibrium approximation (eq. 2) of the Trade Restrictiveness Index (TRI), which needs 'only' detailed data on trade and duties, plus (estimates of) product-specific import elasticities:

$$TRI = [\Sigma S_n \varepsilon_n \tau_n^2 / \Sigma S_n \varepsilon_n]^{0.5} \qquad (2)$$

where ε is the own-price elasticity of imports, S is the share of imports on GDP, τ is the *ad valorem* duty and subscript n refers to a tradable good. The formula may be used to measure the impact of protection on a specific set of goods by assuming zero duties on all other goods. In a recent set of papers, Kee, Nicita and Olarreaga (2008, 2009, 2010) have put forward a comprehensive micro-founded strategy of estimation of the Feenstra approximation. They specify a function of production under the assumption that imports differ from domestic products (the so called Armington assumption) and obtain the regression:

$$S_n = a_{0n} + a_{nn} \ln P_n / P_{-n} + \Sigma\, c_{nm} \ln v_m / v_l \qquad (3)$$

where P_n is its price of the n-th good, P_{-n} is a product-specific price index (-n = ‘all the rest’) and v_m/v_l is the ratio of endowment of other factors to endowment of land (i.e. capital/land and labour/land). The own-price elasticity ε_{nn} can then be computed as:

$$\varepsilon_{nn} = a_{nn} / S_n + S_n - 1 \qquad (4)$$

In this framework, the usual formula for the Haberger triangle to measure welfare losses (DWL / GDP) becomes:

$$DWL / GDP = 0.5\ TRI^{2*}\ \Sigma S_n \varepsilon_n \qquad (5)$$

Furthermore, it is possible to measure the impact of protection on imports by the OTRI (Overall Trade Restrictiveness Index), also known as MTRI (Mercantilist Trade Restrictiveness Index) – i.e. the “uniform tariff that if imposed on home imports instead of the existing structure of protection would leave aggregate imports at their current level (Kee, Nicita and Olarreaga 2009 pp. 179-180).[7]

$$OTRI = [\Sigma S_n \varepsilon_n \tau_n / \Sigma S_n \varepsilon_n] \qquad (6)$$

Thus the change in OTRI from one year to another (Var-OTRI) measures the change in tariffs which would have maintained imports at their actual level in both years – i.e. it is a measure of the pure change in tariffs (Kee, Nicita and Olarreaga 2010).

The Feenstra approximation of TRI is bound to understate the true level of protection relative to the Anderson-Neary general equilibrium version of TRI. It neglects the effects on consumption of other goods (via the substitution effects) and the effects on production costs of protection on inputs. Lloyd and Mac Laren (2010) show that the TRI^P underestimates TRI if effective protection rates are lower than nominal ones and/or if more products are

[7] Kee, Nicita and Olarreaga (2009) put forward a third measure, MA-OTRI, which in a nutshell is an average of the OTRIs of trading partners, weighted with the share of exports from the i-th country on their total imports. It is obviously impossible to compute for one country only.

substitutes than complements (and own price elasticities exceed cross-product ones). Furthermore the TRI^P neglects the general equilibrium effects on factor markets. By definition, protection is aimed at increasing the returns to factors used import-competing productions either because scarce or because sector-specific (e.g. skilled labour). Thus, the general equilibrium TRI would be higher than any partial equilibrium version, unless factors are perfectly substitutable and perfectly mobile across sectors – a clearly implausible hypothesis. Last but not least, the TRI does not take into account the welfare effect of changes in the variety of imported goods, which have been substantial in the final decades of the 20th century (Broda and Weinstein 2006, Chen and Ma 2012). Our data are not detailed enough to replicate the Broda and Weinstein (2006) method to estimate welfare gains from growing varieties and anyway it would be impossible to distinguish the effect of trade policy, which may entail a loss or a gain of varieties, from other causes of changes.

The estimation of TRI^P needs data on trade, custom revenues and on domestic GDP. We have obtained the data on trade from the on-line version of trade statistics, available in the web-site of the Banca d'Italia (Bankit-FTV).[8] The data-base does not include data on custom revenues, which we have collected for 24 benchmark years from the original source (*Movimento Commerciale del Regno d'Italia*).[9] As the number and the classification of products vary hugely across time, we have re-classified them according to the SITC Revision 2.0 at 4-digit level. The number of these 4-digit 'products' vary across time from a minimum of 208 in 1863 to 433 in 1924. For each of them we compute unit values and tariff rates, filling gaps between benchmark years with linear interpolation by product. We also adjust revenues, which were collected in gold Liras, to make them comparable to import values, expressed in paper liras.[10]

We use the nominal GDP estimates by Baffigi et al. (2013) to compute the while domestic prices for the indexes P_n and P_{-n} are obtained by adding the tariff rates to import prices. The series for labor and capital are from Broadberry, Giordano and Zollino (2013), while the series of land is estimated by Federico from official sources. We run equation (3) for 21 years rolling windows, as well as for the whole period 1862-1929, separately for nine

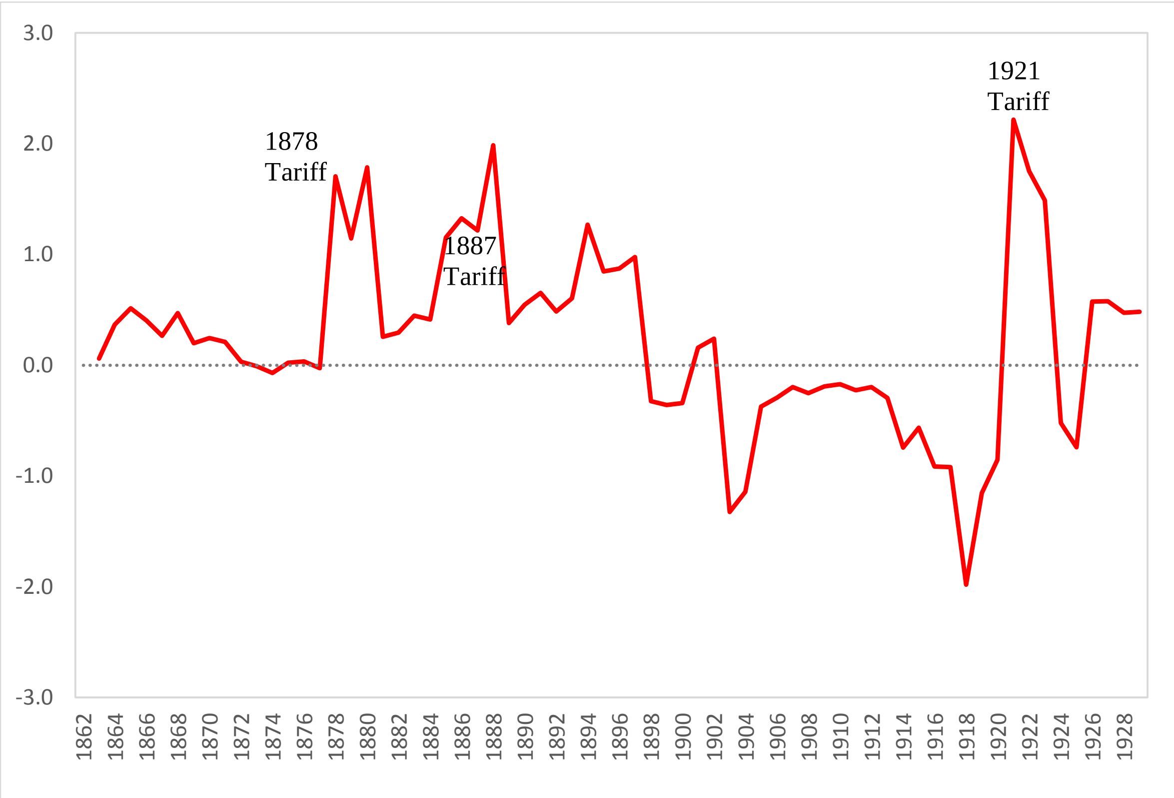
[8] This database was developed by Giovanni Federico, Giuseppe Tattara and Michelangelo Vasta in a project supported by Banca d'Italia. For details see Federico et al. (2012). We use a second-generation version (labelled FTV*plus*).
[9] The years are 1862, 1863, 1866. 1871, 1874, 1877, 1880, 1882, 1884, 1886, 1888, 1890, 1893, 1897, 1900, 1902, 1904, 1908, 1910, 1913, 1920, 1923,1925 and 1929.
[10] The difference was particularly large in the early 1920s, when paper lira was about a fifth of the gold lira (Federico and Tena-Junguito 1998, p.81). The well-known data-base by Mitchell (2007) does not adjust the series of custom revenues and thus the NT underestimates Italian protection in the 1920s by four fifths.

SITC-1 and 59 SITC 2-digit categories. We obtain yearly series of elasticities from 1873 to 1919, which we extend backwards to 1862 and forward to 1929 by assuming the parameters to have remained constant – i.e. we use the average for 1873-1875 for all years before 1873 and the average for 1917-1919 for the period 1919-1929.

5. A new quantitative history of Italian protection

As said, most of the literature on Italian protection assumes that changes in protection depended on policy decisions – most notably the tariffs of 1878, 1887 and 1921 and the trade treaties of 1863 and 1904-6. Indeed, the OTRI (Figure 4) shows peaks in these dates, but also a near continuous stream of changes.[11]

Figure 4. Variations of Italian trade policy (1862-1929)



Sources: our own elaborations on FTV*plus* dataset.

Some of these changes reflect minor changes in duties, but many others depend on changes in prices. In fact, Italy, as most countries of continental Europe, preferred to set

[11] The OTRI changed by more than 10 per cent in 13 years out of 67 and by more than 5 per cent in 29, while it remained constant (changing by less than 1 per cent) in five years only.

duties in terms of physical units (specific duties), rather than as a proportion of the value of the good (*ad valorem*). With specific duties, any decline (increase) in prices cause, ceteris paribus, protection to rise (fall)[12]. We disentangle this price effect from the effect of main policy decisions by running the following regression:

$$\Delta OTRI = a + b\Delta P_M + c\,X \qquad (7)$$

Where P_M is the index of import prices from Federico and Vasta (2010) and X is a set of dummies for major policy changes. This latter includes the three tariffs and a dummy for war years, while dummies for the 1906 treaties are not significant. Table 1 reports all results.

Table 1. The effects of tariffs policies

Variable	(1)	(2)	(3)
IMPORT_PRICES_FV	-0.002** (0.0010)	-0.003*** (0.0010)	
DUMMY1878	1.156*** (0.4493)	1.163** (0.4586)	1.180*** (0.4651)
DUMMY1888	1.240*** (0.4503)	1.268*** (0.4603)	1.245*** (0.4667)
DUMMY1921	1.307*** (0.4996)	1.210** (0.5064)	1.793*** (0.4727)
DUMMYWAR		-0.771** (0.3853)	-0.513 (0.4063)
AR(1)	0.664*** (0.0996)	0.577*** (0.1108)	0.626*** (0.1050)
Constant	0.180 (0.1987)	0.242 (0.1583)	0.210 (0.1813)
Log likelihood	-48.7106	-46.8722	-51.4872
Observations	65	65	67

Notes: Least Squares (dependent variable is VAROTRI), standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

The difference in coefficients of the three tariffs is very small and not significant: in the full specification, each tariff increased protection by around 1.25 percentage points – i.e. by about a sixth at the long-run average of the tariff. The coefficient of the price variable implies that at the average a 1 per cent increase in import prices caused protection to decline by 0.5-1 per cent (according to the specification of the regression).

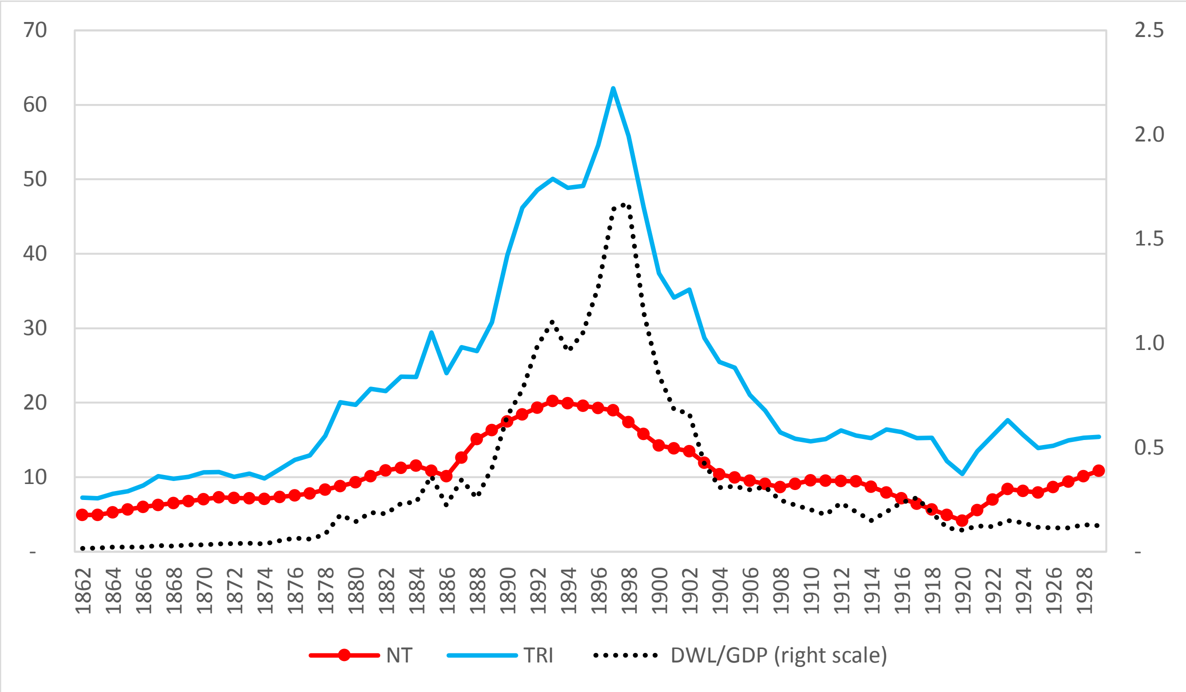
Figure 5 reports our series of TRI^P and the corresponding welfare losses (right-hand scale), plus the NT for comparative purposes.

Protection did rise progressively from about 10 per cent to a peak of 62 per cent in 1897, but then it fell almost back to its pre-1878 level: the average TRI^P in 1910-1929 was 14.9 per cent - i.e. only 50 per cent higher than the level during the alleged free-trade period before 1878 (9.8 per cent). Thus, at a first glance, one would conclude that the TRI^P adds little to the early view by Federico and Tena-Junguito (1998), based on movements of NT. Indeed,

[12] Federico and Tena-Junguito (1998, Tab. A2) estimate that this price effect accounted for about a tenth of the increase in nominal protection from 1877 to 1889, for about a half of the decline from 1897 to 1913 and compensated about two thirds of the increase in protection from 1913 to 1926.

the coefficient of correlation between the TRI^P and the (revised) NT series is 0.95. But this conclusion would be hasty, as there are some relevant differences.

Figure 5. Italian protection: TRI, NT and DWL (1862-1929)

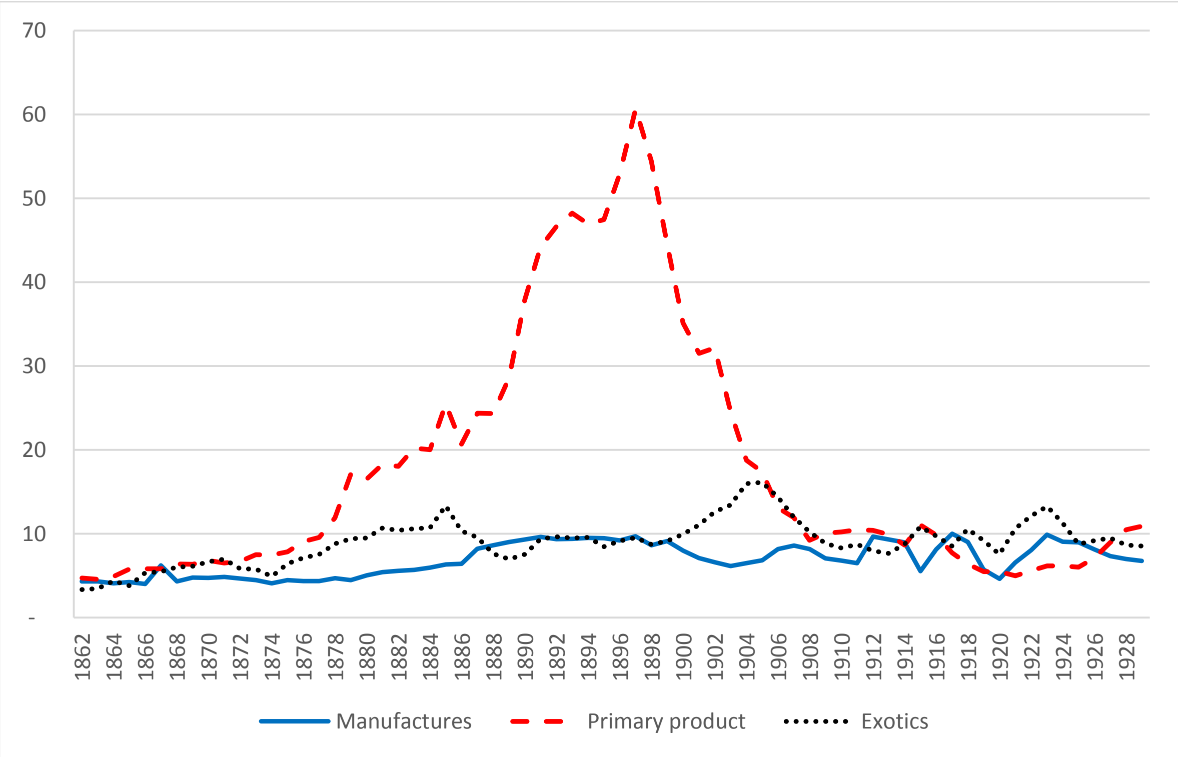


Sources: our own elaborations on FTV*plus* dataset.

We will discuss their economic implications in comparative perspective in Section 7. Here we will focus on their historical meaning. As a starting point, we can quote the results of a Bai-Perron (2003) test for structural breaks in the series. Both the NT and TRI^P series features breaks at the end of the 1880s (respectively in 1888 and 1890) and at the turn of the century (in 1898/1900 and 1900), which mark the beginning of the period of fast rise in protection and of its retreat respectively. The TRI^P has a significant break in 1878, which tallies well with the high and significant coefficient of the dummy (Table 1) but contrasts with the conventional wisdom which has maintained the limited impact of the 1878 tariff. Furthermore, the timing of the last break in the series differs – 1910 in the TRI^P series and 1919 in the NT one. This latter suggests that protection fell during the war and its aftermath, and rebounded in the 1920s, for the combined effect of the 1921 tariff and the duty on wheat. On the eve of the Great Depression, the NT was more than double its 1919 level. In contrast, the TRI^P implies that protection remained constant from the end of the 1900s to the Great Depression – i.e. the effect of the 1921 tariff was transitory and that of the duty on wheat limited (cf. Figure 4).

Consistently with the low level of protection, the welfare losses from protection were small. They remained always below 2% of GDP and exceeded 1% only for few years in the 1890s: the total losses from protection from 1862 to 1929 were equivalent to 22% of the GDP, but two thirds of them were concentrated in the period from 1890 to 1902. As said, it is possible to estimate the level of aggregate protection (and thus the total welfare losses) from duties on any product or group of products by simply assuming zero duties on all other goods. These welfare costs could then be compared with the dynamic benefits of the development of the protected activity. Following Lehmann and O'Rourke (2011), Figure 6 distinguished manufactures (i.e. the counterfactual is zero duties on primary products and exotics), primary products (zero duties on manufactures and exotics) and exotics (assuming zero duties on all other goods).

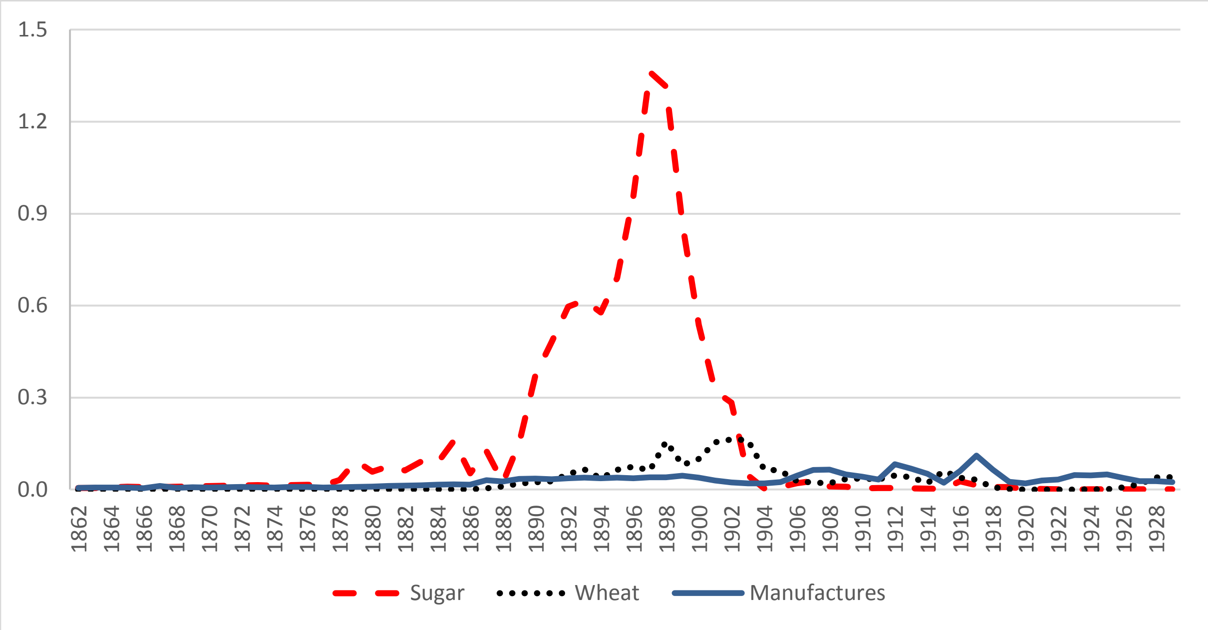
Figure 6. TRI^P, by main category of products (1862-1929)



Sources: our own elaborations on FTV*plus* dataset.

Duties on manufactures corresponded to a uniform protection below 10 per cent throughout the whole period, duties on exotics (mostly on coffee) were barely higher and similarly stable, with peaks in 1885, 1905 and 1923. Thus, changes in aggregate TRI^P reflect mostly trends in protection of primary products - i.e. of wheat and above all of sugar. The sugar industry was tiny and sugar imports never exceeded 10% of total imports, but, as Figure 7 shows, it accounted for most of the losses from protection in the late 19th century.[13]

Figure 7. DWL losses: counterfactual estimates (1862-1929)



Sources: our own elaborations on FTV*plus* dataset.

The losses from the duty on sugar in the whole period 1862 to 1929 account for about half the total losses from protection. Almost all these losses were cumulated in the twenty-five years from the first sharp increase in sugar duties in 1877 to the Brussels convention (1902), which certified the renounce by Central European countries to bounties on their exports of sugar [14]. Losses from wheat duties were relevant only in a short period of time around the turn of the 20th century, while those from the protection on manufactures were below 0.1% of GDP in all years but 1917. In a famous book, the free trader polemist Giretti (1903) called wheat growers, iron industrialists and sugar producers *I trivellatori* (The drillers) of the Italian economy. He was wrong: the sugar producers were in a class of their own.

[13] The combined value of domestic gross output of sugar beet (Federico 2002, Tab. 1A) and Value Added in sugar refining (Fenoaltea 1992, Tab. 3.1 and Fenoaltea and Bardini 2002, Tab.2.02) accounted for 0.005% of GDP in 1891 and for 0.37% in 1911.

[14] The duties on sugar was increased by a series of laws from about 40 per cent of the border price in 1876 to 575 per cent in 1895. In the same period, the excise on domestic production increased from a third of the border price to 275 per cent (cf. Corbino 1931-1938 II, p. 213, Parravicini 1958, pp. 322-3). Cf. on the Brussels convention and its further extensions, Chalmin (1984).

6. How robust is the Feenstra approximation?

Kee, Nicita and Olarreaga (2008) show that the Feenstra approximation can be written as:

$$TRI^P = [NT^2 + \sigma^2 + \rho]^{0.5} \qquad (7)$$

where NT is the import-weighted (with shares s) nominal tariff, σ^2 the import-weighted variance of tariff rates and $\rho=cov(\varepsilon_n/\varepsilon, \tau_n^2)$, where ε is the (import-weighted) average elasticity. Thus, TRI^P is positively related to the variance of tariff rates (σ^2) and to the covariance between tariffs and elasticities (ρ). As a first approximation, one would surmise that a higher level of detail corresponds to a higher dispersion of rates, and thus causes the TRI^P to be higher as well. However, this is by no means sure, as the variance must be weighted with shares on imports. Likewise, it is impossible to assess the effect of different elasticities on the parameter ρ. We thus adopt a pragmatic approach and we compute five alternative series:

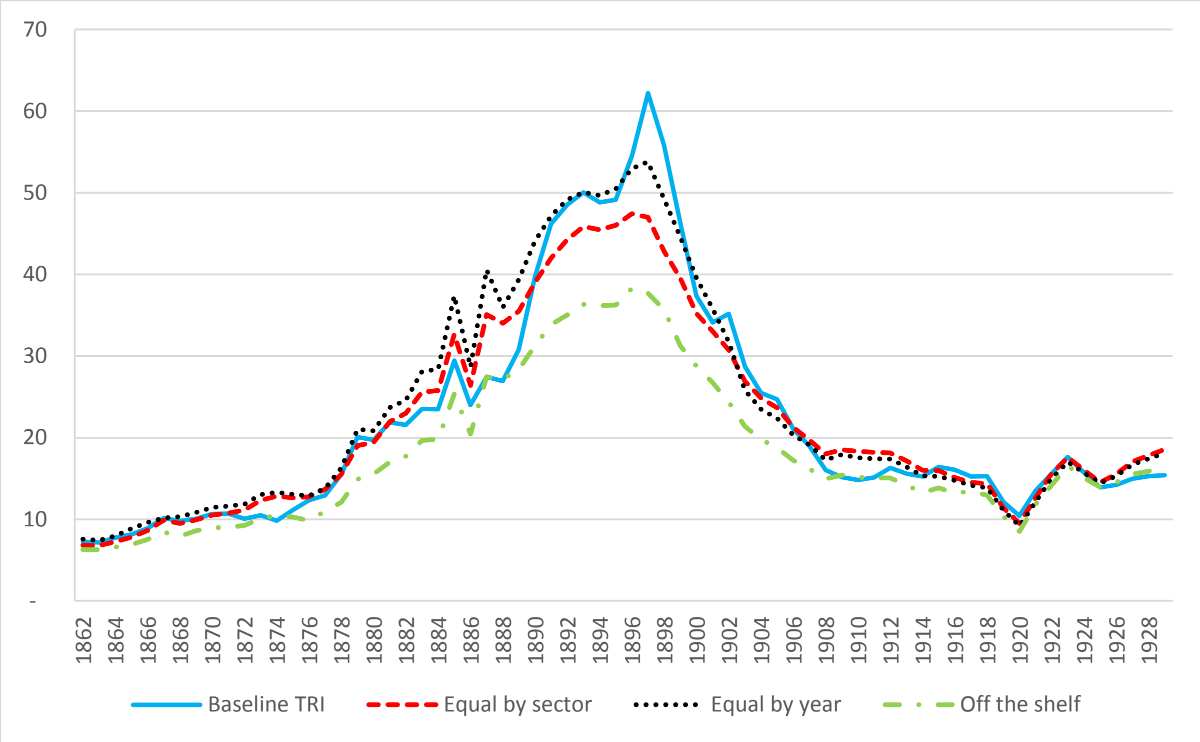
i) aggregate series, at 1-digit SITC – i.e. ten products;
ii) very detailed series, at 4-digit SITC, featuring a maximum of 586 categories;[15]
iii) time-invariant elasticities (same elasticity throughout the whole period for each 2-digit category);
iv) product- invariant elasticity (same coefficient for all 2-digit category in each year);
v) 'Off-the-shelf' elasticities for 17 categories (Stern, Francis and Schumacher 1976) – the same set used by Irwin (2010).

A visual inspection of trends (Figure 8) shows that most differences between the estimates are relatively small and Table 2 confirms this impression with some pairwise comparisons between the baseline and each alternative series.

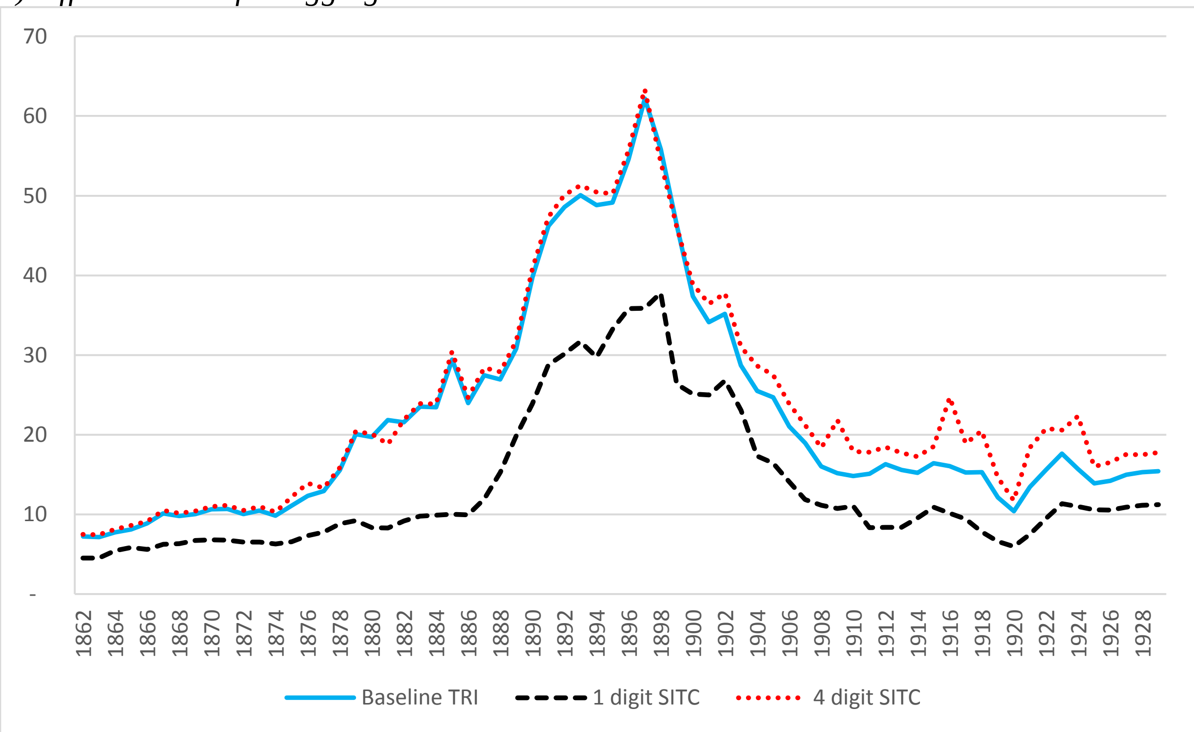
[15] The maximum is not reached in any year. For each product we use the shares S and the elasticity ε of the 2-digit SITC 'product' to which it belonged.

Figure 8. The sensitivity of estimates of TRI^P

a) different elasticities



b) different level of disaggregation



Sources: our own elaborations on FTV*plus* dataset.

Table 2. Estimates of TRI^P (1862-1929): robustness tests

	a)	b)	c)	d)
Elasticity				
'Off the shelf'	0.812	5%	0.975	-0.648
Time fixed	0.989	5%	0.973	-0.449
Product fixed	1.046	1%	0.973	-0.194
Detail goods				
1 digit SITC	0.611	5%	0.964	-0.033
4 digit SITC	1.077	No	0.991	-0.332

Legend: a) average ratio of the alternative series to the baseline TRI^P; b) cointegration of alternative series with the baseline TRI^P; c) coefficient of correlation between each alternative measure and the baseline TRI^P; d) coefficient of correlation between the ratio of each alternative measure (column a) to the baseline TRI^P.
Sources: our own elaborations on FTV*plus* dataset.

Column a) reports the average ratio of the alternative series to the baseline one over the whole period 1862-1929. As expected, the TRI^P is positively related to the level of disaggregation, as measured by the number of digits, but the difference is substantially greater between 1 and 2-digit SITC (almost 40 per cent) than between 2 and 4-digits (about 8 percentage points). In the baseline estimate, the parameter ρ is negative on average and in 38 years out of 68. In other words, Italy protected more the low-elasticity goods. The 'Off the shelf' TRI is lower than the baseline because these elasticities are even more negatively correlated with tariffs than our baseline set (the covariance is negative in 52 years and its absolute value is about double). The 'product fixed' TRI^P is bound to be higher than the baseline because in this case ρ is zero by definition. It is impossible to predict the differences between the baseline and the 'time fixed' as TRI^P is computed independently each year. If level differs, trends are fairly similar: all alternative estimates but one are co-integrated with the baseline TRI (column b) and the pairwise correlations (column c) are very high. All these results refer to the whole period: do the differences between estimates change in time? Or, more specifically, do differences depend on the (time-varying) level of protection? To address this issue, column d) reports the coefficient of correlation between the ratio of each alternative measure to the baseline TRI^P (i.e. column a) and the level of protection, as measured by our baseline TRI^P. The coefficient is fairly low in most cases and always negative. This implies that the difference between estimates is proportionally greater when protection is low.

As a whole, the results are reassuring. The baseline estimate is fairly robust and anyway the biases seem more likely in times of low protection, when errors in measurement are less damaging to historical interpretation. On the other hand, the test suggests also to be very prudent in endorsing estimates at a low level of disaggregation. This conclusion is buttressed by the results of similar tests by Irwin (2010) and Beaulieu and Cherniwchan (2014).

According to the former, an increase in number of products from 15-17 (his baseline estimate) to some thousands augments TRI^P by up to a third.[16] The number of products ('varieties') in baseline estimate by Beaulieu and Cherniwchan (2014) increases from 255 in 1870 to 964 in 1910. Cutting the number to about 200 (corresponding to three-digit SITC) somewhat, but the 1-digit estimate seems to be less than half the baseline estimate (Figure 11).

This optimistic conclusion refers to the robustness of our computation of Feenstra's approximation (or TRI^P). But, as said in Section 4, even if perfectly computed, the TRI^P might underestimate the level of protection relative to the general equilibrium TRI. Lloyd and MacLaren (2010) put forward two conditions for detecting such an underestimation, but the lack of data prevents to test the first one, about demand elasticities. The second states that TRI^P would undervalue the TRI if effective protection exceeds the nominal one, and Table 3 shows this was the case in a substantial number of instances.

Table 3. The undervaluation of TRI^P: a comparison with TRI^S

	1877	1889	1897	1913	1926
Number products (SITC 4 digits)	207	230	281	341	343
SITC effective > nominal	76	112	141	188	218
% SITC effective > nominal	36.7	48.7	50.2	55.1	63.6
% trade SITC effective > nominal	38.4	43.8	32.0	35.8	50.3

Source: Federico and Tena-Junguito (1998, 1999).[17]

As an alternative and more comprehensive test, we compare our estimates of TRI^P with the general-equilibrium ones by Federico and Tena-Junguito (1998, Tab. A3). They try a wide range of elasticities of substitution and transformation and Table 4 reports the maximum and minimum estimate range possible, jointly with their preferred (baseline) estimate.[18]

[16] Irwin (2010, Tab. 3) compares his baseline TRI (17 goods) with more detailed ones in five years benchmark years – 1880 (1,290 products), increase 18 per cent, 1900 (2,390) products + 8 per cent, 1928 (5,505 products) – 32 per cent, 1932 (5,248 products) + 7 per cent and 1938 (2,882 products) + 35.2 per cent. As expected, the TRI comes out higher by 18 per cent, 8 per cent and 7 per cent. The effect is smaller than in Italy because all TRI^P are computed with the same elasticity (- 2).

[17] We prefer to use the estimates on nominal protection by Federico and Tena-Junguito (1998) rather than the figures from the FTV*plus* data-base for consistency with the data on effective protection.

[18] Their preferred estimate assumes 5 for the elasticity of substitution in final demand and for the elasticity of transformation, and 0.7 for the elasticity of substitution in intermediate demand.

Table 4. The undervaluation of TRI^P: a comparison with the general equilibrium TRI

	TRI			TRI^P FV	Ratio TRI/ TRI^P
	Min	Preferred	Max		
1877	16.9	16.9	24.7	12.9	1.31
1889	51.5	57.1	60.8	30.8	1.85
1897	79.5	86.4	88	62.2	1.39
1913	9.3	16.3	24.6	15.6	1.04
1926	24.0	24	35.5	14.2	1.71

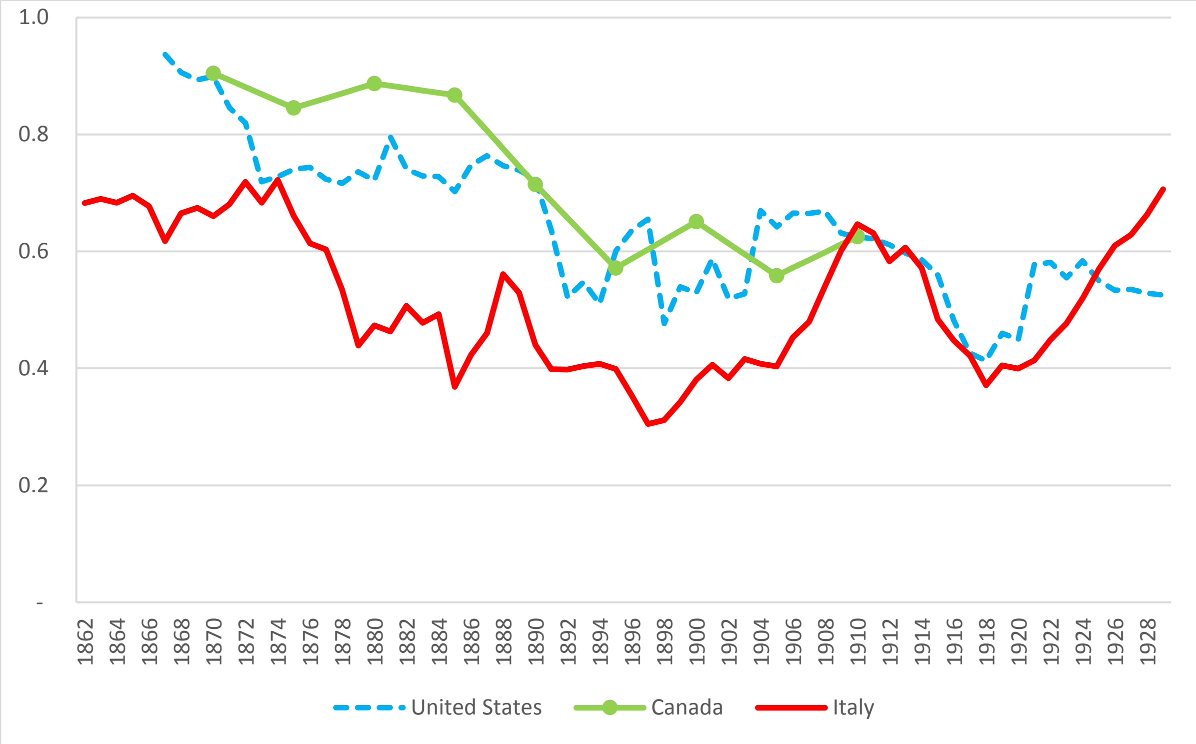
Sources: our own elaborations on FTV*plus* dataset.

As expected, all estimates of general-equilibrium TRI but one are higher than the TRI^P, on average by 45 per cent. The difference is quite small in 1877, but the TRI^P undervalues the growth of protection to 1897 (especially in the first period) and misses the (small) increase in the 1920s. Consequently, the TRI^P underestimates the welfare losses, which, according to the CGE estimate by Federico and O'Rourke (2000), were equivalent to 2.4 per cent of GDP in 1911 and possibly to 3.1 per cent in 1897. Summing up, the Feenstra approximation is fairly robust but it is likely to undervalue the level of protection relative the 'true' TRI. However, it does capture the main historical facts – the peak in protection of the 1890s and the relatively small amount of welfare losses.

7. How much biased is the NT?

With all its shortcomings, relative to the Anderson-Neary version TRI, the Feenstra approximation is arguably a better, or more precisely, a less biased, measure of protection than NT. As a general rule, a bias is the more damaging for any analytical work the less stable it is. If the ratio NT/TRI were constant in time, the coefficient of nominal protection in the growth regression (equation 1) would be unbiased. The bias would still be manageable if the two measures were linked by a stable relation. In theory, one could look for such a relation by regressing NT on TRI^P for a panel of representative countries, but so far we have series of TRI^P for Italy and the United States only. Thus, we plot the NT/TRI^P ratios for these two countries, adding a series for Canada which we obtain as linear interpolation between the benchmark estimates by Beaulieu and Cherniwchan (2014, Tab. 2).

Figure 9. The bias from nominal protection: NT/TRI^P (1862-1929)



Sources: our own elaborations on, for Canada, Beaulieu and Cherniwchan (2014, Tab. 2), for Italy, FTV*plus* dataset and, for United States, Stern, Francis and Schumacher (1976).

As expected, NT is always lower than TRI^P – on average by 27 per cent for Canada, by 37 per cent for the United States and by 48 per cent for Italy. However, these figures are not directly comparable. They refer to slightly different time periods, the level of disaggregation differs and above all the estimates for the United States and Canada use 'off-the-shelf' import demand elasticities of the 1970s rather than historical micro-founded ones as our Italian estimate (Section 4). In fact, the ratio for Italy would jump to 0.80 if we compute TRI^P series with the same level of detail (17 groups of goods) and the same set of elasticities which Irwin (2010) uses. One can add that two recent multi-country estimates of TRI suggest ratios around 0.65 [19].

The key information from Figure 9 is not the difference in levels between NT and TRIP, but its change in time. The ratio declined fairly steadily in Canada, declined with fluctuations in the United States, while in Italy it decreased in the 19th century, rebounded in the early 20th

[19] The ratio NT/TRI is 0.64 (SD 0.16) for 28 countries in the late 1980s-early 1990s (Anderson 1995, Tab.A2) and the ratio NT/TRI^P is 0.67 (SD 0.17) for 88 countries in 2002 (Kee, Nicita and Olarreaga 2004, Tab.4). This latter estimate differs somewhat from the later version in Kee, Nicita and Olarreaga (2009).

century and ended up in 1929 almost as high as in the 1870s.[20] *Ceteris paribus*, one would expect the bias to be inversely related to nominal protection - i.e. NT/TRI^P to be positively related to NT. In fact, Kee, Nicita and Olarreaga (2008) show that:

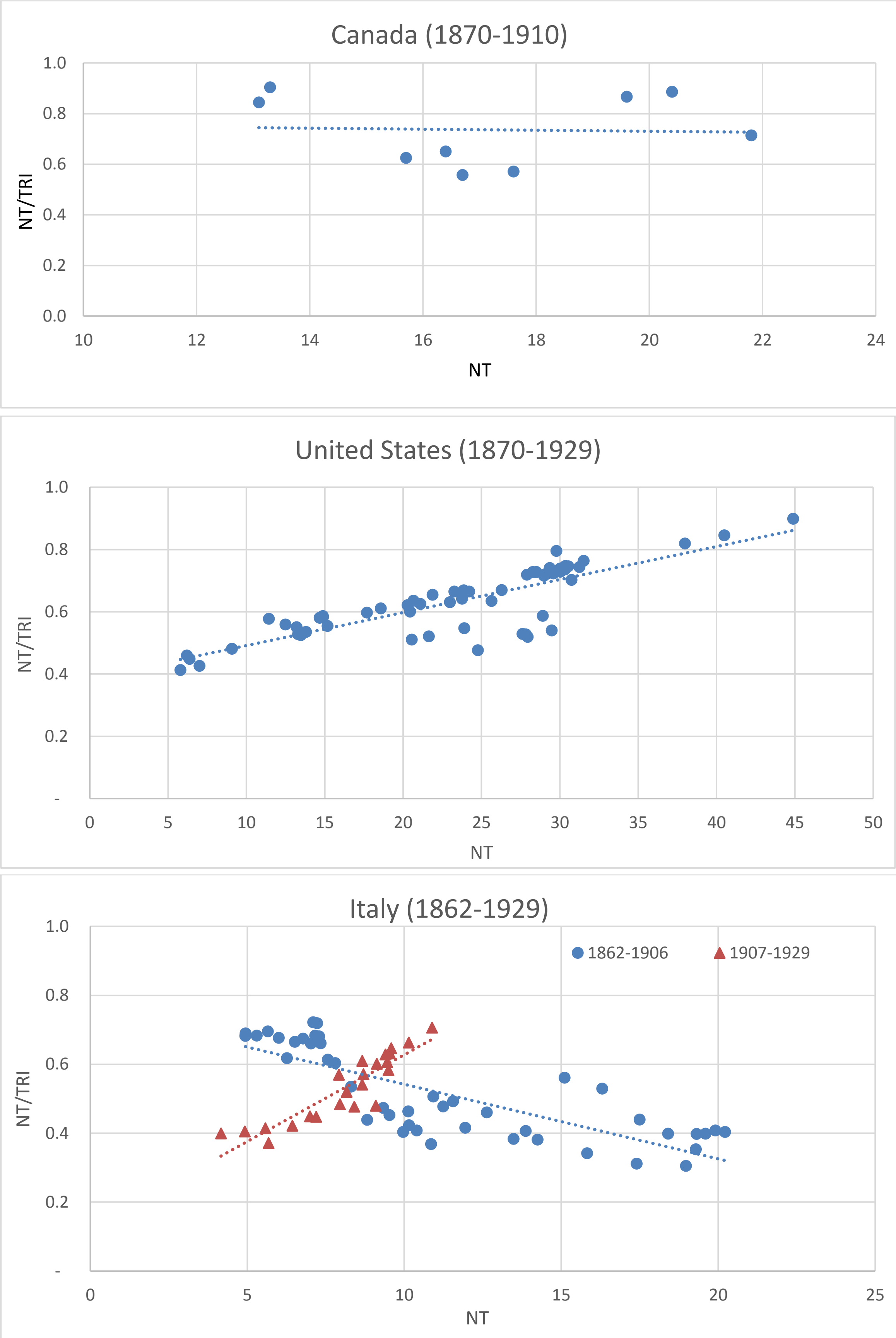
$$\ln TRI/NT = 0.5 \ln(1 + \sigma^2/ NT^2 + \rho/NT^2) \qquad (8)$$

where, as before, σ^2 and ρ are trade-weighted variance and covariance. This expectation is met in the United States and in Italy after 1907, but the ratio is negatively related to NT in Italy before 1907 and it is not related to NT in Canada (Figure 10).

These differences across countries and in time may be explained by changes in σ^2 and ρ. The variance would increase whenever changes in the tariff (i.e. in the list of products and/or in the duty on each of them) or in prices (for specific duties) causes the dispersion of duties to grow or changes in composition of imports increase the share of goods at the extreme of the distribution (i.e. with very high or very low protection). For instance, in the case of Italy, the change in composition account for about one eight of the increase in σ^2 from 1886 to 1897 and for about two third of the decline to 1913.[21] Likewise, the covariance would increase if duties grow more on elastic goods, but the effects on ρ depend on the composition of trade. In short, it is impossible to predict a priori the sign of the bias and thus suggest a procedure to correct it. Unfortunately, these biases differ across countries according to the structure of protection and thus their aggregate effect is unpredictable. In a nutshell, there is no easy fix to the problem of the bias.

[20] This description is buttressed by the results of log-linear regression with time. The rate of change is negative and significant at 1% for Canada (-1.34) and the United States (-0.67). For Italy, it is positive and not significant from 1862 to 1929, negative and highly significant until 1900 (-2.10), positive but not significant in 1900-1929
[21] We estimate this share as $[(\sum s^i_t * Var^i_{t+n}/\sum s^i_t * Var^i_t)-1] / (\sum s^i_{t+n} * Var^i_{t+n}/\sum s^i_t * Var^i_t)]$ where superscript i refers to the i-th good.

Figure 10. The bias in measuring protection and the NT



Sources: our own elaborations on, for Canada, Beaulieu and Cherniwchan (2014, Tab. 2), for Italy, FTV*plus* dataset and, for United States, Stern, Francis and Schumacher (1976).

8. Protection and economic growth in the 19th century: a new view?

As said, the results of the quantitative turn are not conclusive: we do not really know whether protection fostered economic growth or not. Does using the TRI^P instead of NT change this unhelpful conclusion? It is impossible to answer in the growth regression framework, because re-running the regressions with two countries only would be hardly meaningful. In contrast, it is possible to replicate the co-integrated VAR approach by Lampe and Sharp (2013) for Italy and the United States, in order to check whether changing the measure of protection affects the results. Table 5 sums up the results in their compact notation, while we report the full outcome in the Appendix (Table A4). For both countries, we run the model for the period up to 1913 and for the whole period up to the Great Depression. We test also separately the two periods 1862-1906 and 1906-1929 for Italy, as there is evidence of a different relation (Figure 10).[22]

Table 5. Results of the cointegrated VAR model, Italy and the United States

	NT		TRI	
	Long run	Short run	Long run	Short run
Italy				
1862-1913	Negative***	NT → y***	Negative***	TRI→ y***
1862-1929	Negative*	NT → y***	Negative**	TRI→ y***
1862-1906	Negative*	NT → y***	Negative	TRI→ y***
1906-1929	Positive***	NT → y***	Positive***	TRI→y* y → TRI***
United States				
1869-1913	Positive***	y → NT*** NT → y*	Negative***	TRI → y***
1869-1929	Positive***	NT ↔ y***	Positive	TRI → y***

*** significant at 1%; ** significant at 5%; *significant at 1%.

Substituting TRI^P to NT do change the results, and the impact is greater for the United States than for Italy. The results with the 'correct' measure of protection, the TRI^P, confirm that the relation between trade policy and economic growth was complex. The relation for the United States is negative or not significant, rather than consistently positive as suggested by the NT measure. Protection affected negatively GDP in Italy before 1906, while afterwards the long-run relation is positive, but with income causing protection rather than the other way round. Without overstressing the point, one could observe the broad coincidence in timing between this change and the change in taxation on sugar. In both countries, welfare losses

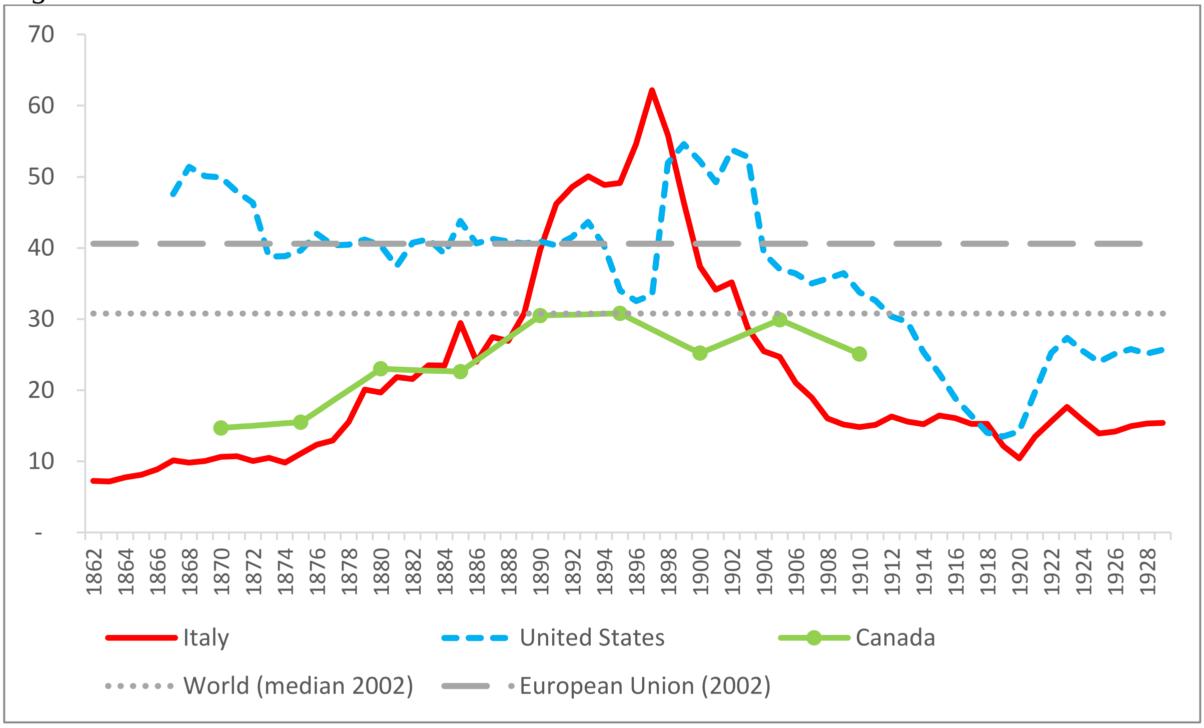
[22] Results differ slightly from those by Lampe and Sharp (2013) for the two countries as we use different GDP series and also different NT series for Italy.

were fairly small. Over the whole period from 1867 to 1929, American consumers lost the equivalent of two fifths of a year's GDP. Irwin (2010, p. 130) points out that 'the cost of protection has been low for the United States because international trade has been a relatively small part of the overall economy'. The losses for Italy were lower (Figure 5), even if the country was decidedly more open than the United States.[23]

This conclusion does not hold true for the period after 1929 the Great Depression. The big rise in overall protection entailed huge welfare losses and probably very little if any dynamic gains. It is widely assumed that the liberalization of exchanges after the war helped the advanced economy to achieve unprecedented rates of growth during the golden age, while the inward-looking strategy of industrialization in less developed countries by and large failed. Unfortunately, it is impossible to buttress this claim with estimates of levels of protection. In contrast there are some estimates for the most recent period. The average TRI, according to the (general equilibrium) estimates by Anderson (1995) was 19.5% for a sample of 26 countries in the late 1980s and early 1990s, while according to Kee, Nicita and Olarreaga (2009) the TRI^P, inclusive of their estimate of the tariff-equivalent of the NTBs, was 33.2% for 76 countries in in 2002 [24]. The two samples overlap for 21 countries and a comparison shows a 40% decline of protection (partly accounted for the different measure of TRI). [25] By the early 2000s liberalization of trade of goods is regarded to be very advanced, but the level of protection was comparable if not higher than before World War One and in the 1920s (Figure 11).

[23] The average export/GDP ratio at current prices in 1862-1929 was 10.1 per cent in Italy and 6.3 per cent in the United States (Federico and Tena-Junguito 2015a).
[24] We prefer to use these figures rather those without non-tariff trade barriers because we deem them a better yardstick for comparison with historical data. In fact, before the Great Depression, the states achieved the desired protection with duties because quantitative restrictions were beyond their peacetime administrative capabilities.
[25] This decline is confirmed by estimates for China (Chen and Ma 2012 Tab.2; Chen, Ma and Xu 2014) and Australia (Lloyd 2008) as well as by a comparison with the estimates of TRI^P by Kee, Nicita and Olarreaga (2010).

Figure 11. TRI^P 2002 and then



Sources: our own elaborations on, for Canada, Beaulieu and Cherniwchan (2014, Tab. 2), for Italy, FTV*plus* dataset, for United States, Irwin (2010) and, for European Union and World, Kee, Nicita and Olarreaga (2009).

9. Conclusion

The methodological message of this paper is simple: the ratio of custom duties to imports, although simple to compute, is a flawed measure of protection and it should not be relied upon too much (Section 8). The results of the quantitative turn have thus to be taken with a lot of caution. The TRI is much better measure, although not perfect. The Anderson-Neary (1995) version is too data intensive to be useful for most economic history research. The Feenstra approximation, or TRI^P, needs only data on trade and import elasticities, which could be estimated, as we have done, or obtained from other works. As shown in Section 6, the TRI^P is fairly robust to the details of computation. Admittedly, it still undervalues protection relative to the TRI, but by definition the bias is smaller than for nominal protection.

The historical message of the paper is more complex, as it focuses on Italy but also tries to draw some implications for the global history of trade policy before the Great Depression. Our results suggests that Italian protection was fairly low, except for very few years in the 1890s, and that this peak reflected mostly the very heavy duties on sugar. The duty on sugar accounted for a sizeable share of total welfare losses from protection, but its benefits for economic growth seem questionable, to say the least. The level of protection on manufactures, which, accordingly to Lehmann and O'Rourke (2011) is positively related to economic growth, was very low. Furthermore, the rates of effective protection on manufacturing (Federico and Tena-Junguito 1999) were quite haphazard and it extremely difficult to detect any clear strategy for industrialization. In a nutshell, Italy was not very good at implementing the 'standard model' (Allen 2011).

We tentatively argue that this overall view may hold also outside Italy. The anecdotal evidence about the history of trade policy and, for what they are worth, the series of nominal protection (Section 2) suggest that Italy could be representative of a more general pattern for Great Powers of Continental Europe. The series of TRI^P for the United States and Canada confirm that 19th century protection was low in comparison with the levels of the early 21st century. It is thus highly likely that protection was substantially lower before Great Depression than in any time after World War Two, including the 'golden age' of the 1950s and 1960s which coincided with the period of import-substituting industrialization in many LDCs. In a long term perspective, this highlights the role of the Great Depression (and World War Two) as the long-lasting shock of the 20th century, while downplaying the impact of World War One on the international economy (Federico and Tena-Junguito 2015a). Inferring the effect of trade policy on economic growth from levels of protection is clearly tricky. However, the cointegrated VAR tests, although somewhat crude, point towards a negative long-run effect. It also shows that results are sensitive to the measure of protection. In other words, the economic history of trade policy needs a systematic re-estimating of protection.

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Statistical Appendix

Table A1. List of polities

Polities	**Countries**
Asia	Ceylon, India, Indonesia, Japan, Philippines
Africa	Egypt, Gold Coast, Sierra Leone, South Africa
EU(-UK)	Belgium, Denmark, France, Germany, the Netherlands, Switzerland, Austria (Austria-Hungary), Norway, Portugal, Russia (USSR), Spain, Sweden, Italy
Great Powers	Austria (Austria-Hungary), France, Germany, Russia (USSR)
Latin America	Argentina, Brazil, Chile, Colombia, Jamaica, Uruguay
Western Offshoots	Australia, Canada, New Zealand
World	Argentina, Australia, Austria (Austria-Hungary), Belgium, Brazil, Canada, Ceylon, Chile, Colombia, Denmark, Egypt, France, Germany, Gold Coast, India, Indonesia, Italy, Jamaica, Japan, New Zealand, Norway, Philippines, Portugal, Russia (USSR), Sierra Leone, South Africa, Spain, Sweden, Switzerland, the Netherlands, United Kingdom, United States, Uruguay

Table A2. Sources of data on nominal protection

Countries	**Sources**	**Years**
Australia	Lampe and Sharp (2013)	1870-1929
Austria (Austria-Hungary)	Clemens and Williamson (2004)	1870-1913; 1922-1929 (1923 interpolated)
Belgium	Lampe and Sharp (2013)	1870-1929
Brazil	Lampe and Sharp (2013)	1870-1929
Canada	Lampe and Sharp (2013)	1870-1929
Ceylon	Board of Trade (ad annum)	1870-1929
Chile	Lampe and Sharp (2013)	1870-1929
Colombia	Clemens and Williamson (2004)	1870-1898; 1910-1929
Denmark	Lampe and Sharp (2013)	1870-1929
Egypt	Clemens and Williamson (2004)	1870-1929
France	Lampe and Sharp (2013)	1870-1929
Germany	Lampe and Sharp (2013)	1870-1929
Gold Coast	Board of Trade (ad annum)	1870-1929 (1873-1874 interpolated)
India	Lampe and Sharp (2013)	1870-1929
Indonesia	Clemens and Williamson (2004)	1870-1929
Italy	FTV*plus* dataset	1870-1929
Jamaica	Board of Trade (ad annum)	1870-1929
Japan	Lampe and Sharp (2013)	1870-1929
New Zealand	Board of Trade (ad annum)	1870-1929
Norway	Lampe and Sharp (2013)	1870-1929
Philippines	Clemens and Williamson (2004)	1870-1929
Portugal	Lampe and Sharp (2013)	1870-1929
Russia (USSR)	Clemens and Williamson (2004)	1870-1913; 1924-1928
Sierra Leone	Board of Trade (ad annum)	1870-1929
South Africa	Board of Trade (ad annum)	1870-1929
Spain	Lampe and Sharp (2013)	1870-1929
Sweden	Lampe and Sharp (2013)	1870-1929 (1891 interpolated)
Switzerland	Lampe and Sharp (2013)	1870-1929
the Netherlands	Lampe and Sharp (2013)	1870-1929
United Kingdom	Lampe and Sharp (2013)	1870-1929
United States	Sutch (2006, series Ee 429)	1870-1929
Uruguay	Clemens and Williamson (2004)	1870-1929
Argentina	Clemens and Williamson (2004)	1870-1929

Table A3. Protection in Italy, various series (1862-1929)

Years	NT	TRI baseline	TRI/NT	TRI Manufac tures	TRI Primary product	TRI Primary product (- Exotics)	TRI Exotics	DWL/GDP	Var OTRI
1862	4.94	7.24	1.46	4.32	5.80	4.74	3.35	0.02	
1863	4.95	7.17	1.45	4.31	5.73	4.58	3.45	0.02	0.06
1864	5.30	7.76	1.46	4.11	6.58	4.92	4.38	0.02	0.37
1865	5.65	8.13	1.44	4.26	6.93	5.78	3.82	0.02	0.51
1866	6.01	8.87	1.48	4.03	7.90	5.85	5.32	0.02	0.40
1867	6.26	10.14	1.62	6.25	7.99	5.82	5.47	0.03	0.27
1868	6.52	9.80	1.50	4.33	8.79	6.40	6.03	0.03	0.47
1869	6.78	10.05	1.48	4.77	8.84	6.36	6.15	0.03	0.20
1870	7.03	10.65	1.51	4.73	9.54	6.81	6.68	0.03	0.24
1871	7.29	10.71	1.47	4.84	9.55	6.51	6.99	0.04	0.21
1872	7.23	10.05	1.39	4.66	8.91	6.72	5.85	0.04	0.03
1873	7.17	10.49	1.46	4.48	9.48	7.51	5.79	0.04	-0.01
1874	7.10	9.84	1.38	4.10	8.94	7.46	4.93	0.04	-0.07
1875	7.34	11.10	1.51	4.46	10.17	7.86	6.45	0.05	0.02
1876	7.57	12.33	1.63	4.38	11.53	9.07	7.11	0.06	0.03
1877	7.80	12.93	1.66	4.35	12.18	9.57	7.54	0.06	-0.03
1878	8.31	15.53	1.87	4.69	14.80	11.91	8.79	0.08	1.70
1879	8.82	20.08	2.28	4.48	19.58	17.16	9.42	0.18	1.15
1880	9.33	19.70	2.11	5.03	19.05	16.52	9.48	0.14	1.79
1881	10.13	21.86	2.16	5.44	21.17	18.28	10.68	0.19	0.26
1882	10.93	21.56	1.97	5.59	20.82	18.03	10.41	0.18	0.29
1883	11.24	23.52	2.09	5.70	22.82	20.21	10.60	0.23	0.45
1884	11.56	23.47	2.03	5.96	22.70	20.02	10.71	0.24	0.41
1885	10.86	29.45	2.71	6.34	28.76	25.48	13.34	0.36	1.15
1886	10.16	23.99	2.36	6.43	23.11	20.67	10.34	0.22	1.33
1887	12.63	27.45	2.17	8.20	26.20	24.40	9.55	0.35	1.22
1888	15.11	26.93	1.78	8.64	25.51	24.34	7.64	0.26	1.99
1889	16.31	30.79	1.89	9.00	29.44	28.60	6.98	0.40	0.38
1890	17.50	39.78	2.27	9.31	38.67	37.93	7.55	0.65	0.55
1891	18.41	46.20	2.51	9.62	45.19	44.20	9.40	0.78	0.65
1892	19.32	48.56	2.51	9.38	47.65	46.66	9.66	0.99	0.49
1893	20.22	50.06	2.48	9.41	49.17	48.25	9.48	1.10	0.60
1894	19.91	48.84	2.45	9.53	47.90	46.93	9.59	0.96	1.27
1895	19.60	49.13	2.51	9.46	48.21	47.46	8.45	1.05	0.85
1896	19.29	54.56	2.83	9.22	53.78	52.99	9.16	1.27	0.87
1897	18.98	62.20	3.28	9.70	61.44	60.70	9.54	1.64	0.98
1898	17.40	55.82	3.21	8.64	55.15	54.46	8.72	1.67	-0.33
1899	15.83	46.27	2.92	9.13	45.36	44.43	9.15	1.15	-0.36
1900	14.25	37.37	2.62	7.99	36.51	35.13	9.94	0.85	-0.34
1901	13.87	34.13	2.46	7.10	33.38	31.50	11.05	0.68	0.16
1902	13.49	35.17	2.61	6.63	34.54	32.15	12.62	0.66	0.24
1903	11.94	28.72	2.40	6.14	28.05	24.63	13.42	0.42	-1.33
1904	10.40	25.48	2.45	6.49	24.65	18.77	15.97	0.31	-1.14
1905	9.97	24.70	2.48	6.84	23.74	17.39	16.15	0.31	-0.38
1906	9.53	21.05	2.21	8.16	19.40	13.09	14.32	0.30	-0.29
1907	9.10	18.96	2.08	8.58	16.91	11.94	11.98	0.31	-0.20
1908	8.67	16.02	1.85	8.17	13.77	9.23	10.22	0.25	-0.25
1909	9.13	15.18	1.66	7.09	13.42	10.08	8.86	0.22	-0.19
1910	9.58	14.82	1.55	6.80	13.18	10.24	8.30	0.20	-0.17
1911	9.54	15.12	1.58	6.49	13.65	10.49	8.75	0.18	-0.23
1912	9.50	16.30	1.71	9.65	13.13	10.42	7.98	0.23	-0.20
1913	9.46	15.60	1.65	9.31	12.52	9.91	7.65	0.19	-0.30
1914	8.71	15.24	1.75	8.96	12.32	8.65	8.78	0.15	-0.74
1915	7.95	16.43	2.07	5.55	15.46	11.05	10.81	0.19	-0.57
1916	7.19	16.07	2.23	8.13	13.86	9.85	9.74	0.24	-0.92
1917	6.44	15.26	2.37	10.00	11.52	7.75	8.53	0.26	-0.92

1918	5.68	15.29	2.69	9.03	12.33	6.39	10.55	0.19	-1.98
1919	4.92	12.15	2.47	5.74	10.71	5.49	9.19	0.11	-1.16
1920	4.17	10.42	2.50	4.62	9.34	5.49	7.56	0.10	-0.85
1921	5.58	13.48	2.41	6.58	11.76	4.99	10.65	0.12	2.22
1922	7.00	15.59	2.23	8.05	13.36	5.61	12.12	0.12	1.75
1923	8.41	17.65	2.10	9.88	14.62	6.17	13.26	0.15	1.49
1924	8.17	15.70	1.92	9.05	12.83	6.17	11.24	0.14	-0.52
1925	7.92	13.91	1.76	8.98	10.63	6.02	8.76	0.12	-0.74
1926	8.66	14.21	1.64	8.14	11.65	7.14	9.20	0.11	0.57
1927	9.40	14.96	1.59	7.33	13.05	8.97	9.48	0.11	0.58
1928	10.15	15.30	1.51	6.98	13.61	10.51	8.65	0.13	0.47
1929	10.89	15.41	1.42	6.75	13.85	10.91	8.53	0.12	0.48

Sources: our own elaboration on FTV*plus* dataset. Note: for years in red we computed unit values and tariff rates filling gaps in custom revenues between benchmark years (in black) with linear interpolation.

Table A4. Cointegrated VAR, full results

(Bold typeface indicates that the parameter is significant at 1%, underlined typeface at 5% and italic typeface at 10%).	(P value in square bracket. AR 1-2 test is a VEC residual X^2 LM test; *N* is Jarque-Bera normality test; *J* is Johansen cointegration test for r = 1).
ITALY (NT) 1862–1913 $\begin{bmatrix}\Delta \ln y \\ \Delta NT\end{bmatrix} = \begin{bmatrix}\mathbf{-0.330} \\ -0.407\end{bmatrix}(y + \mathbf{0.008}NT - \mathbf{0.010}t)_{t-1}$ + short run	AR: **14.658** [0.006] *N*: $\chi^2(4)$ = **223.089** [0.000] *J*: [0.75]
ITALY (TRI) 1862–1913 $\begin{bmatrix}\Delta \ln y \\ \Delta TRI\end{bmatrix} = \begin{bmatrix}\mathbf{-0.331} \\ -4.758\end{bmatrix}(y + \mathbf{0.002}TRI - \mathbf{0.010}t)_{t-1}$ + short-run	AR: *8.305* [0.081] *N*: $\chi^2(4)$ = **30.015** [0.000] *J*: [0.88]
ITALY (NT) 1862–1929 $\begin{bmatrix}\Delta \ln y \\ \Delta NT\end{bmatrix} = \begin{bmatrix}\mathbf{-0.272} \\ -1.525\end{bmatrix}(y + \mathit{0.005}NT - \mathbf{0.009}t)_{t-1}$ + short run	AR: 4.495 [0.343] *N*: $\chi^2(4)$ = **146.498** [0.000] *J*: [0.61]
ITALY (TRI) 1862–1929 $\begin{bmatrix}\Delta \ln y \\ \Delta TRI\end{bmatrix} = \begin{bmatrix}\mathbf{-0.292} \\ -3.724\end{bmatrix}(y + \mathbf{0.002}TRI - \mathbf{0.009}t)_{t-1}$ + short-run	AR: <u>11.130</u> [0.025] *N*: $\chi^2(4)$ = **15.937** [0.003] *J*: [0.77]
ITALY (NT) 1862–1906 $\begin{bmatrix}\Delta \ln y \\ \Delta NT\end{bmatrix} = \begin{bmatrix}\mathbf{-0.380} \\ -0.935\end{bmatrix}(y + \mathit{0.005}NT - \mathbf{0.009}t)_{t-1}$ + short run	AR: <u>12.077</u> [0.017] *N*: $\chi^2(4)$ = **162.069** [0.000] *J*: [0.82]
ITALY (TRI) 1862–1906 $\begin{bmatrix}\Delta \ln y \\ \Delta TRI\end{bmatrix} = \begin{bmatrix}\mathbf{-0.380} \\ -6.390\end{bmatrix}(y + 0.001TRI - \mathbf{0.009}t)_{t-1}$ + short-run	AR: 6.991 [0.136] *N*: $\chi^2(4)$ = **20.281** [0.000] *J*: [0.94]
ITALY (NT) 1906–1929 $\begin{bmatrix}\Delta \ln y \\ \Delta NT\end{bmatrix} = \begin{bmatrix}\mathbf{-0.956} \\ +5.470\end{bmatrix}(y - \mathbf{0.030}NT - \mathbf{0.011}t)_{t-1}$ + short run	AR: 2.595 [0.628] *N*: $\chi^2(4)$ = **23.065** [0.000] *J*: [0.84]
ITALY (TRI) 1906–1929 $\begin{bmatrix}\Delta \ln y \\ \Delta TRI\end{bmatrix} = \begin{bmatrix}\underline{-0.048} \\ \mathbf{+3.955}\end{bmatrix}(y - \mathbf{0.127}TRI - \mathbf{0.026}t)_{t-1}$ + short-run	AR: 6.347 [0.175] *N*: $\chi^2(4)$ = 1.783 [0.776] *J*: [0.86]
USA (NT) 1869–1913 $\begin{bmatrix}\Delta \ln y \\ \Delta NT\end{bmatrix} = \begin{bmatrix}-0.147 \\ \mathbf{+14.871}\end{bmatrix}(y - \mathbf{0.018}NT - \mathbf{0.023}t)_{t-1}$ + short-run	AR: 3.308 [0.508] *N*: $\chi^2(4)$ = **30.297** [0.000] *J*: [0.29]
USA (TRI) 1869–1913 $\begin{bmatrix}\Delta \ln y \\ \Delta TRI\end{bmatrix} = \begin{bmatrix}-0.091 \\ \mathbf{-18.671}\end{bmatrix}(y + \mathbf{0.013}TRI - \mathbf{0.016}t)_{t-1}$ + short-run	AR: 4.623 [0.328] *N*: $\chi^2(4)$ = **44.032** [0.000] *J*: [0.37]
USA (NT) 1869–1929 $\begin{bmatrix}\Delta \ln y \\ \Delta NT\end{bmatrix} = \begin{bmatrix}\mathbf{-0.462} \\ +\underline{14.000}\end{bmatrix}(y - \mathbf{0.009}NT - \mathbf{0.021}t)_{t-1}$ + short-run	AR: 4.594 [0.331] *N*: $\chi^2(4)$ = **25.031** [0.000] *J*: [0.19]
USA (TRI) 1869–1929 $\begin{bmatrix}\Delta \ln y \\ \Delta TRI\end{bmatrix} = \begin{bmatrix}\mathbf{-0.482} \\ +0.484\end{bmatrix}(y - 0.002TRI - \mathbf{0.018}t)_{t-1}$ + short-run	AR: 4.417 [0.353] *N*: $\chi^2(4)$ = **242.332** [0.000] *J*: [0.29]