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Bairoch Revisited. Tariff Structure and Growth in the Late 19th Century

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Abstract:
This paper revisits Bairoch's hypothesis that in the late 19th century tariffs were positively associated with growth, as recently confirmed by a new generation of quantitative studies (see O`Rourke (2000), Jacks (2006) and Clemens-Williamson (2002, 2004)). This paper highlights the importance of the structure of protection in the relation between trade policy and its potential growth-promoting impact. Evidence is based on a new database on industrial tariffs for the 1870`s. The results show that income, factor endowment, and policy independence are important to explain regional asymmetries between tariffs and growth. At global level, increased protection, measured by total and average tariffs on manufactures, implied more un-skilled inefficient protection and less growth, and this is especially true for the poor countries in the late 19th century. Protection was only positive for a "rich club" if we include in this group New Settler countries which grew rapidly in the late 19th century and imposed high tariffs mainly for fiscal reasons.

1. Introduction

In the explanation of economic growth, any attempt to isolate one single factor among the complex mix is a hard task, and this certainly applies to the economic impact of commercial policies too. Many economic historians have supported the idea that during the late 19th century protection was instrumental to the development of continental

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Europe. Bairoch's (1972, 1976, 1989, 1993) hypothesis that tariffs were positively associated with growth mainly applied to European countries, but it has also been extended to other high-tariff land-abundant countries like the rich European offshoots[1].

Recent econometric studies carried out by O´Rourke (2000) and Jacks (2006) tend to confirms propositions regarding the positive correlation between tariffs and growth in the late 19th century.[2] Both works use a limited sample of 10 countries, mostly rich European or land-abundant countries with good institutions, and this fact has been criticized, even if they are more concerned in exploring the variation in the time series of economic growth than in analyzing cross section influence. Other studies that follow a similar time series strategy point out that the relationship between average tariffs and growth (significant or not significant, positive or negative) depends crucially on the countries included in the sample. A larger sample of countries has shown that correlation between tariff average and growth might vary considerably in different countries, according to different levels of wealth and degrees of political independence (see Williamson 2006b).[3] Likewise, Irwin (2002b) shows that rich land-abundant countries may be outliers in the relation between tariffs and growth, because often relied on customs duties to generate a large proportion of their government revenue: they tended to

[1] This positive relation between tariffs and growth in Europe in the late 19th century has been sustained by many authors, including Milward –Saul (1977), Pollard (1982) but notably Bairoch (1972, 1976, 1989, 1996). For an extended discussion on the good reputation of late 19th century protectionism, see Tena (2005).

[2] Even if O´Rourke diverges in many points from Bairoch, it is generally agreed that in the late 19th century tariff and growth were positively associated: "It appears that Bairoch hypothesis (that tariffs were positively associated with growth in the late 19th century) holds remarkably well, when tested with recently available data, and when controlling for other factors influencing growth." O`Rourke (2000), p. 473.

[3] O´Rourke (2000) p. 478, remembers that: "Lessons from the late 19th century core cannot automatically be extended to the late 19th century periphery: as always more research on Southern and Eastern Europe, as well as the developing world , should be high on the agenda of cliometricians". For the 20th century see Dejong and Ripoll, 2006; and for both 19th and 20th century Clemens and Williamson (2001, 2004) and Vamvakidis (2002).

impose high tariffs, but without following an import substituting extrategy. And Tena (2005, 2006) remarks that rich European tariff average is often distorted by revenue tariffs not designed to protect domestic producers, and that we should focus on the relation between manufacture tariffs and growth.

The most notable feature of this historical literature is its reliance on economy-wide average measures of protection. On one side, these data are readily available for a wide variety of countries, and average tariffs are easily calculated: all one needs to do is to divide total customs revenue, by the total value of imports. On the other side, the simplicity of tariffs average makes it impossible to reach a deeper understanding of the causal mechanism linking tariffs and growth. In fact, as De Long (1995) and Irwin (2001a) emphasised for the late 19th century, the central question to investigate here is how tariffs alter domestic relative prices in order to shift resource allocation between higher and lower productivity sectors. In this case the emphasis will be put on the dynamics of economies of scale, learning-by-doing, and technical innovation that various sectors can develop as a consequence of temporal protection.

In a very recent paper Lehman-O´Rourke (2008), asking whether agricultural and industrial tariffs had the same impact on growth in the late 19th century, found robust results that manufacture, rather than agricultural tariffs, were related with growth. Their paper uses panel data, but limits the analysis to the same “rich countries club” than O´Rourke (2000). Also, it focuses on five-year periods, picking up the short to medium run impact of protection rather than the longer-run effects (p.14).

This paper addresses the same issue but differs from the earlier literature in two respects. Firstly, we focus on the relation between efficient or inefficient tariff structures and long-run growth; secondly we pay special attention to the different levels and geographical diversity of tariffs structure around the world. This approach is made possible

because we use a new and improved database which expands the number of countries, and offers a much more detailed desagregation of manufacture tariffs ranked according their skill intensity.

The paper is structured as follows. The next section provides a general view of the relevance of the issue of regional asymmetry in the tariff-growth debate. Section 3 presents the intuitive model which relates tariff structure and growth, based on total tariff average, industrial tariffs average, and the skill industrial tariff bias. Section 4 describes the sources and the variables used in the new data base used in this study. Section 5 discusses the main results of the correlation model, while the last section looks at how, in general, these results match the model predictions that countries with relatively higher tariffs in industry grow more slowly, apparently because high tariff countries protected the non-skill intensive sectors more than skill intensive ones. The last section provides some concluding remarks, including the relevance of these findings in rejecting some of the interpretations offered by the previous literature.

2. Did Tariff Structure Explain Regional Asymmetries in the Tariff-Growth Relation?

The starting point is the confirmation and discussion of the regionally asymmetrical relationships between tariff average and growth discovered by Williamson et al. The tariff-growth relationship may be ambiguous because high tariffs in sectors with positive externalities may induce high rates of growth, while high tariffs in sectors with no positive externalities may induce low rates of growth. So, in theory, there is no reason to find a systematically unambiguous relationship between average tariffs and growth in different groups of countries, and regional asymmetry may be partially explained by different tariff structures.

This paper assumes that in the late 19th century the regional asymmetries were mainly influenced by the starting level of income per capita, relative factor abundance, and political independence. The division between rich and poor countries is a general proxy for different economic structures, and institutional factors that may determine, both the tariff structure bias and the relationship between tariffs and growth. Rich nations in Europe, with good institutions, were able to develop tariff policies which was less dependent on pressure groups. That would imply moderate and efficient tariffs on manufactured products[4]. The tariff policies of politically-independent poor countries, with less transparent institutions, weak enforcement of political rights, and lower parliament and executive independence, instead, was more likely to be influenced by lobbies. The result would be a policy of relatively higher, but more inefficient tariffs in industry (biased in favour of non-competitive industrial sectors without pro-growth effects). Land-abundant new settlers tended to impose high tariffs for reasons involving public finance and political economy[5]. In terms of public finance, the taxation of imports goods reduced the cost of tax compliance in relation with other alternatives, and this is especially true for countries with low population density. Other means of raising revenue (excise taxes, land taxes, income taxes and the like) simply may not have been as feasible or as easy to enforce in countries with a widely dispersed population, particularly in the late nineteenth century. In terms of political economy, if the majority of the

[4] Core European countries had moderate manufacture tariffs and high revenue tariffs levied on just a few key primary commodities (such as alcoholic beverages, coffee and tea, sugar and tobacco). Revenue tariffs may have some protective effects but affect differently growth than broadly based tariffs designed to protect domestic producers (Tena 2006).

[5] This argument is developed by Irwin (2002 b). In Figure 3 and 4 (of that paper), Irwin shows the existence of a clear positive association between land abundance (ratio of productive land over population) either with trade tax dependence (ratio of costume revenue over total revenue) or with total tariff average. This evidence supports the idea that in these cases, high tariffs were nor based upon an import substitution strategy.

population owns land (or if the government is controlled by landowners), they may have the interest and the opportunity to avoid direct taxes on land in favour of high taxes on high revenue-generating imported products or manufactured luxury goods.[6]

The picture was very different in the European colonies in Africa and Asia that implemented typical free trade policies, normally imposed by their metropolis. Many of these countries which had created much closed economies in mid-19th century, became pro global-low tariffs countries at the end of the century.[7] Even independent countries such as Japan or China, under British influence, adopted in the second half of 19th century treaties which limited their tariffs to 5 per cent. Similarly, other Asian countries, such as for instance India and Indonesia, were forced by their colonial masters to adopt liberal trade policies. Also in Africa, even if French, Portuguese and Italians colonies typically discriminated in favour of their respective colonial power, the progressive extension of European control resulted, in general terms, in a further diffusion of liberal trade policies at the end of the 19th century.[8] This partial exogenous determination of their commercial policy would reduce the influence of local pressure groups, which in theory would press for higher tariffs, and

[6] See Irwin (2002.b) and Bértola-Williamson (2006).
[7] Following Bairoch (1989) : countries like Abyssinia, Afghanistan, China, Iran, Japan, Liberia, Siam, Arab Peninsula, Iran, Japan, Siam and Turkey (Ottoman Empire) were not formal colonies at the end of the 19th century shared one important characteristic: "European Powers" obliged them, directly or indirectly, to open up their national markets" (p. 155).
[8] See Findlay –O´Rourke (2007, p.401), "Countries like Japan gradually increase their tariff beginning in1889, but tariffs remained low prior to 1911, when the first autonomous (and protectionist) tariff was introduced (see Bairoch 1989, p.157)".

would lead to a more neutral incidence of tariffs on the assignment of resources.[9]

Consequently, the question of whether a significant relationship between initial tariff average and growth exists, and whether this relationship is positive or negative, depends critically on the countries included in the sample.

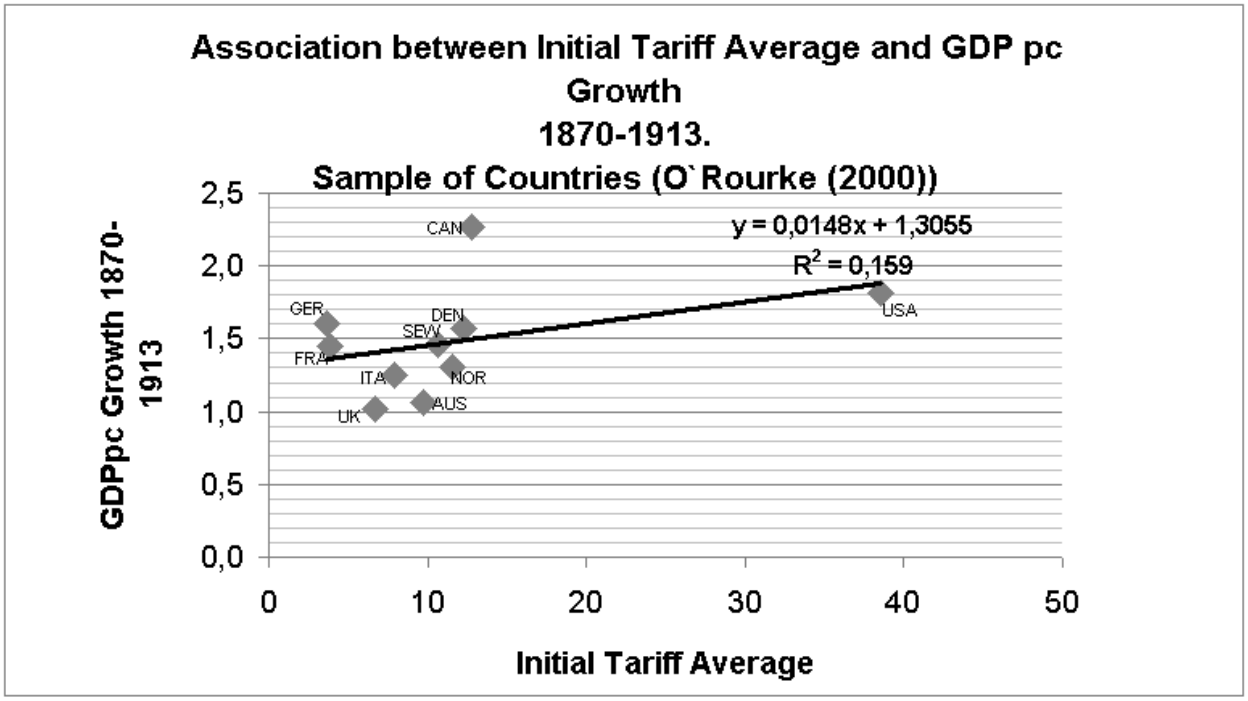
In order to assess regional degrees of protection and their relation with growth we first provide a graphical analysis of the correlation between the initial degree of protection and the subsequent rate of growth. The initial tariff average used here, and in previous works, is measured as customs revenues divided by the total value of imports for the years 1865-1875; accumulated GDP per capita growth for 1870-1913, as usual, is in real terms 1990 international Geary-Khakis dollars provided by Maddison (2001). The world has been divided between rich and poor according to arbitrary but explicit criteria: those countries which, in 1870, had a Maddison GDP per capita below half of that of the richest country in the world (the United Kingdom) are classified as "poor". Besides, taking into account what has been said above, a subdivision has been introduced for the rich, separating land-abundant countries from the rest (according to the established literature). At the same time, poor countries have been divided according to their tariff policy independence (in line with Williamson (2006) and Bairoch (1976, 1989)). As a consequence, this paper analyses forty one countries divided in four geographical regions (See Table 2 Appendix): eight *Rich European* countries (DumReg1: Austria, Belgium, Denmark, France; Germany, the

[9] Other authors, including Bairoch (1989), and, more recently, Williamson (2006b), Findlay and O'Rourke (2007), mentioned the importance of free colonial trade policy in the process of deindustrializing the colonies. But this debate is still open: "these trade laws led first to the disappearance of existing crafts and later curbed the process of reindustrialization" (Bairoch (1989), p. 127). Global terms of trade forces produced rising primary product specialization and de-industrialization in colonial countries at the end of the 19th century (See Lewis (1989) and Williamson (2006b).

Netherlands, Switzerland and the United Kingdom); six *Rich New Settlers* (DumReg2: Argentina, Australia, Canada, New Zealand, Uruguay and the USA); fourteen *Poor Political Independent* countries from the European Periphery and Latin America (DumReg3: Greece, Hungary, Italy, Norway, Portugal, Romania, Russia, Spain, Sweden, Brazil, Cuba, Peru and Colombia), and thirteen *Poor Political Dependent,* most of then African an Asian colonies and protectorates (DumReg4: Burma, Ceylon, China, Egypt, India, Indonesia, Japan, Morocco, Tunisia Philippines, South Africa, Thailand and Turkey). As Table 2 in the Appendix shows, we do not have a complete dataset for all countries listed: therefore, for some regressions the number of observations varies from a minimum of 28 to a maximum of 37.[10]

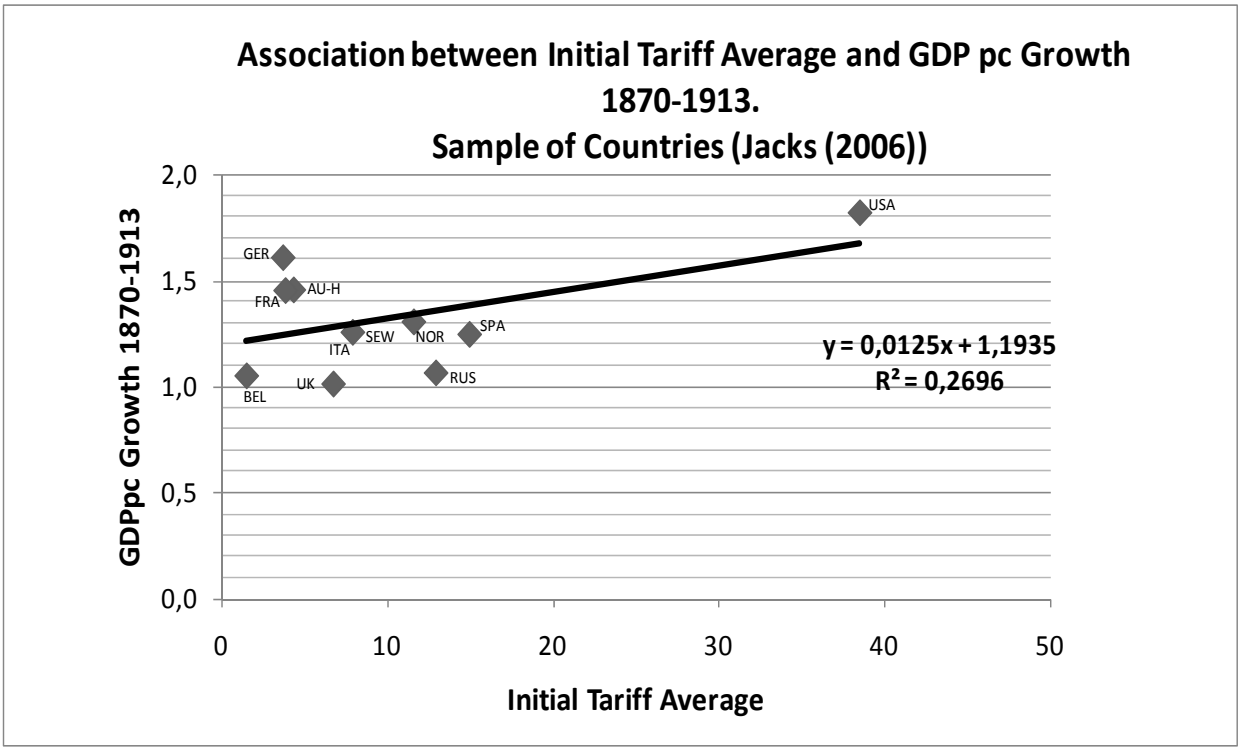
[10]Exceptions to the regional criterium adopted are Argentina has been included in the group of rich new settlers (despite its GDPpc in 1870 is slightly below half UK GDPpc in the same year, according to Maddison (2003). This is due to the fact that Argentina is generally considered as a rich new settler that shares similar characteristics as an expansionist economy with strong imports of labour and capital and trade tax dependence. See O'Rourke -Williamson (1999), Irwin (2002 b).

Figure 1



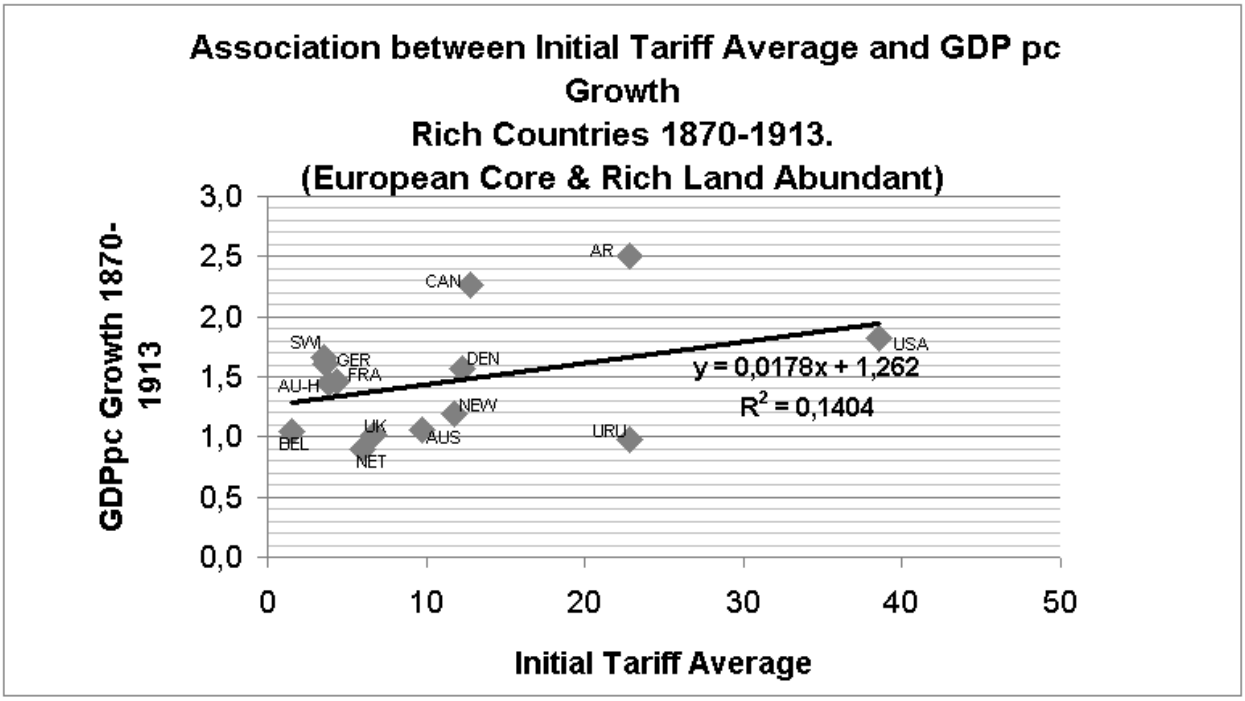
***Sources**:* Initial Tariff (75NT) and GDP Growth (7013GDPGR) in Table 2, Appendix 2.

Figure 2



***Sources**:* Initial Tariff (75NT) and GDP Growth (7013GDPGR) in Table 2, Appendix 2.

Figure 3

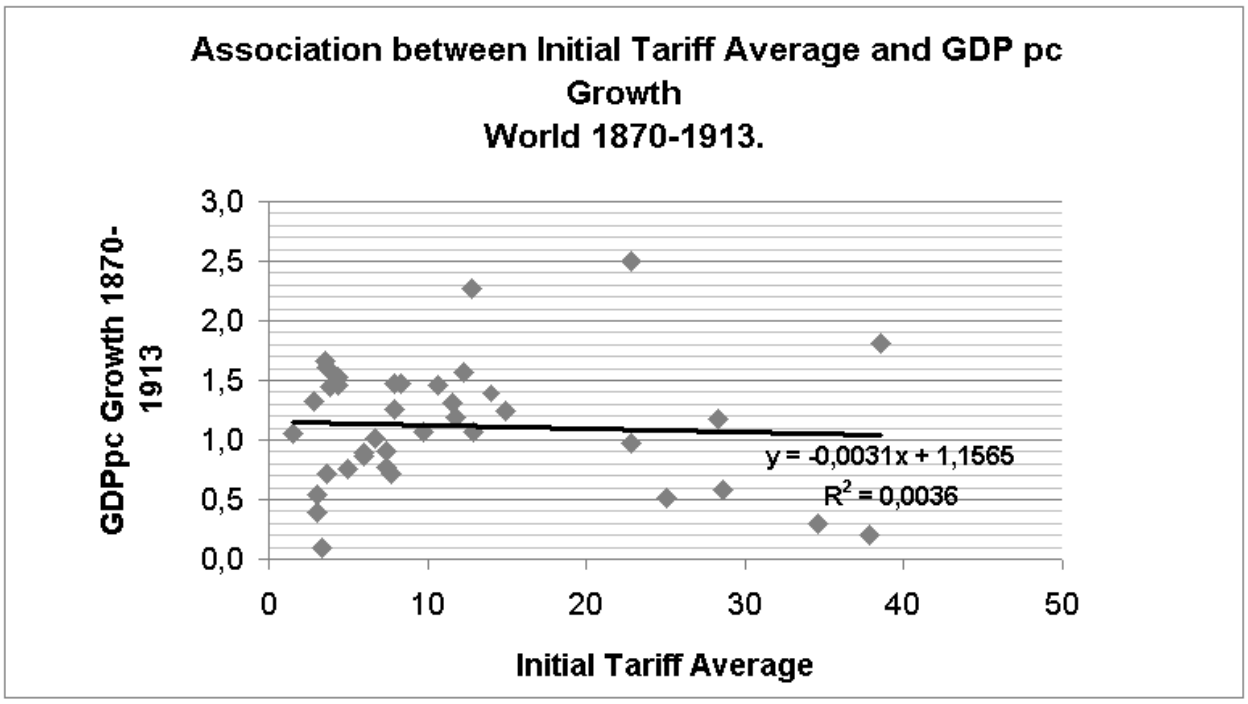


***Sources**:* Initial Tariff (75NT) and GDP Growth (7013GDPGR) in Table 2, Appendix 2.

To emphasize the regional asymmetry of the tariff-growth association, we first provide Figures 1 and 2, which confirm the positive association between the initial tariff average in 1865-1875 and real GDP per capita growth between 1870-1913, for the same group of countries used by O`Rourke (2000) and Jacks (2006) respectively. O`Rourke uses Australia, Canada, Denmark, France, Germany, Italy, Norway, Sweden, the United Kingdom and the United States, whereas Jack uses: Austria-Hungary, Belgium, France, Germany, Italy, Norway, Russia, Spain, the United Kingdom and the United States. It is important to take into account that most of the countries included in the sample are rich European and land-abundant countries. The selection of the country sample apparently is arbitrary and solely determined by the availability of historical data. In fact, it has been criticised by several authors (see Irwin (2002a,b), Williamson (2006b) and Tena (2006)). The strong bias towards rich countries typical of the previous literature is confirmed by using an

alternative sample explicitly containg only rich countries (New Settlers and European countries) as showed in Figure 3. In both cases the regression is strongly influenced by the tariff-growth data of the USA.

Figure 4

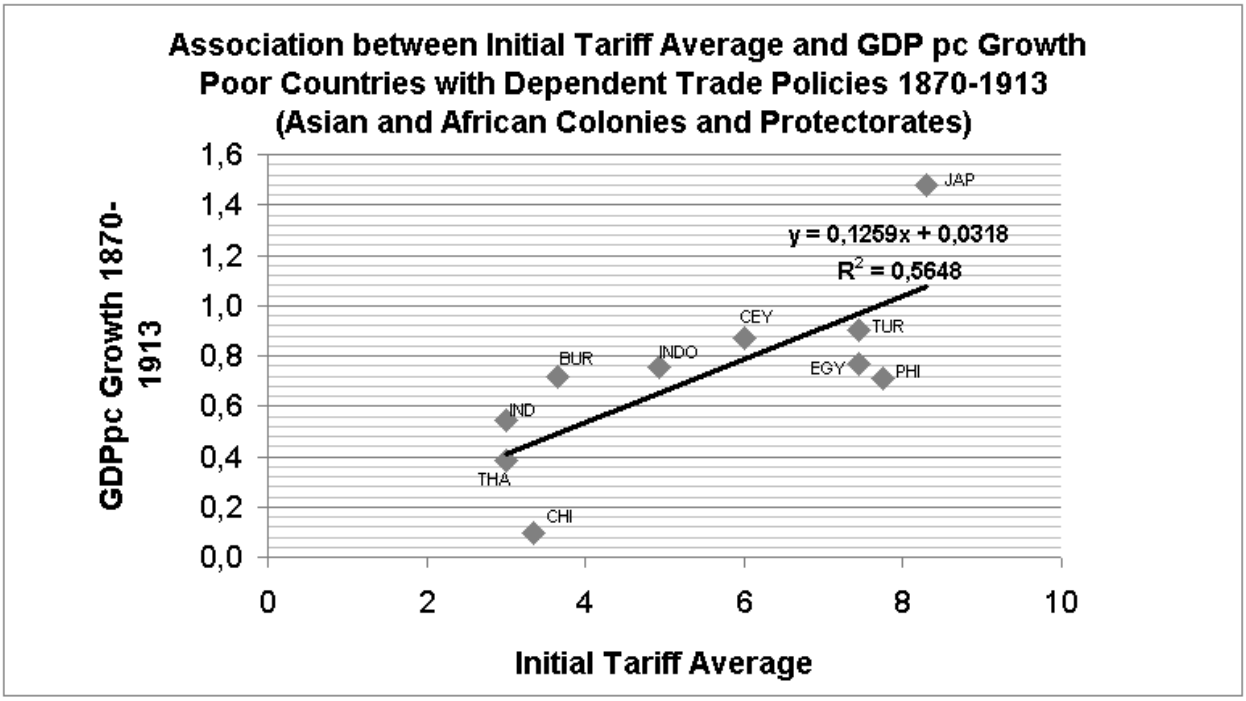


***Sources**:* 75NT and 7013GDPGR in Table 2, Appendix 2.

As Figure 4 shows, however, once the whole sample of 38 world countries is considered, no positive or negative association between tariffs and growth emerges. A better representation of the world including rich and poor with colonies and independent developing countries thus provides a different picture of the tariff-growth relationship. Following Williamson et al. (2001, 2004, 2006), the strategy of this paper is to accept the existence of regional asymmetry, and propose an organization of world countries in clubs following the criteria mentioned above. Thus, the poor are divided according to their political independence, or, in other words, their capacity to develop an independent commercial policy from

the metropolis. This may be an important issue for most Asian and African countries with the status of colonies or protectorates in the late 19th century[11].

Figure 5



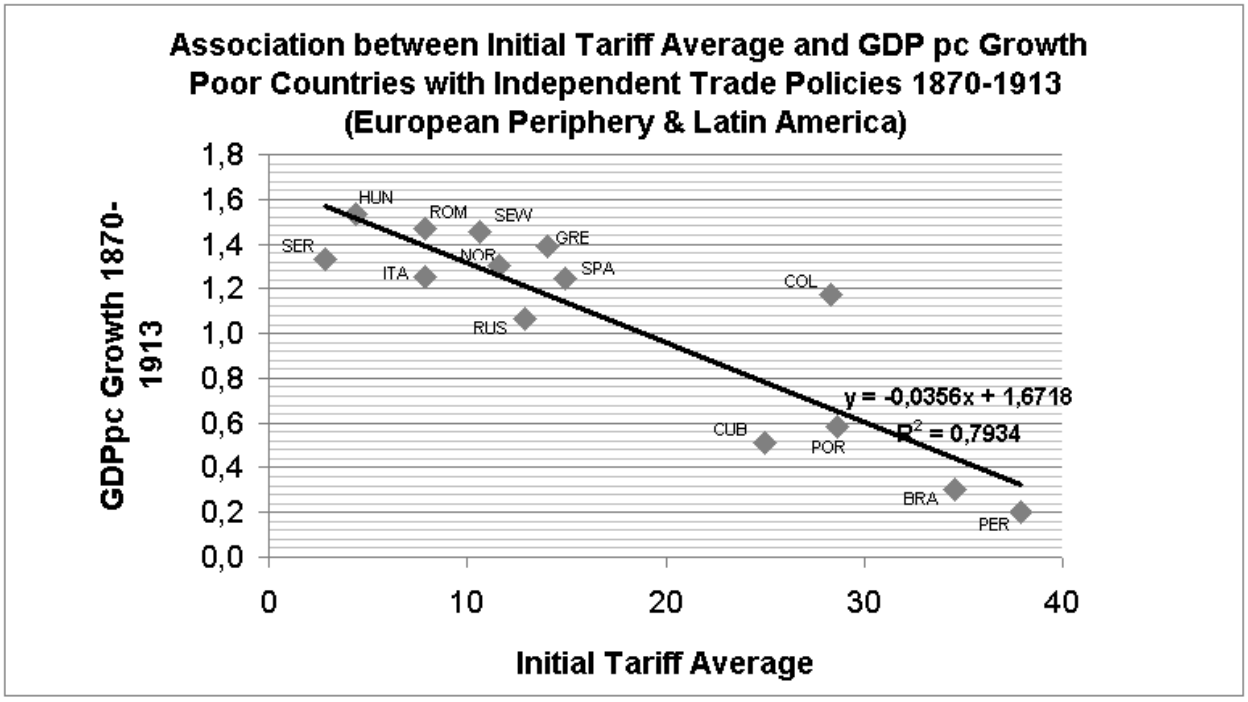
***Sources**:* Initial Tariff (75NT) and GDP Growth (7013GDPGR) in Table 2, Appendix 2.

Figure 5 shows a stronger positive association between tariffs and growth for poor non-independent countries. These Asian and African countries had a low tariff average level (between 3 and 8 per cent) because their tariff policies enjoyed very limited independence from the core European metropolis. This exogenous determination of their commercial policy made it possible to control local pressure groups that

[11] There is no doubt that for late 19th century political autonomy and independence needs to be more accurately defined. By instance Commonwealth countries as Canada, Australia, New Zealand had not exactly plain independent commercial policy from the metropolis but they developed an autonomous commercial policy for most of the period. Here we follow Williamson et al (2001, 2006a).

wanted higher tariffs and led to a more neutral incidence of tariffs on the assignment of resources.[12]

Figure 6



***Sources**:* Initial Tariff (75NT) and GDP Growth (7013GDPGR) in Table 2, Appendix 2.

On the contrary, Figure 6 shows that for peripheral independent countries the relationship between tariff average and growth appears consistently negative. Politically independent poor countries had commercial policies designed by their own governments and parliaments. The European periphery and Latin America had high tariffs, especially for traditional industrial products without comparative advantage, even if some of then linked with technologies developed from the First Industrial Revolution. From the second half of the 19th century many poor independent countries developed some low-skill manufactures, as traditional textile and metal, imposing high tariffs especially in non-competitive sectors. Even if they reduced some manufacture tariffs,

[12] For a similar approximation for the African and Asian colonies see Williamson (2006a) and Bairoch (1989, 1996).

during the liberalization period around the 1850's and 1860's, at the beginning of 1870's they still had a level of manufacture protection that was more than three fold that of the European rich countries. During this period they developed well-established and organized lobbies which demanded high tariffs to defend national industry from the competition of rich countries manufactured exports. When protection get back to fashion in 1880s and 1890s peripheral governments were too weak to stop rent-seeking in the economy and most of them increased manufacture tariffs in non-competitive sectors. These results could reflect both the existence of poor underlying institutions, and a negative association between protected industrial sectors and long-run growth.[13]

3. The Causal Mechanism Between Tariffs and Growth. Tariff Structure and Institutions.

In order for tariffs to have a positive effect on growth it is necessary that over time protected manufacture sectors increase productivity more rapidly than less protected sectors because productivity growth should overcome the accumulated protection welfare losses. As Rodriguez–Rodrik (2000, p.264) highlights: "Such models are in fact formalizations of some very old arguments about infant industries and about the need for temporary protection to catch up with more advanced countries". In this case the emphasis is on the dynamics of economies of scale, learning-by-doing, and technical innovation that protected sectors can develop as a consequence of temporal protection. However it is questionable to assume that, without further qualifications, late 19th

[13] The average of the unweighted manufacture tariff for Rich Europe and Poor Indepent countries in 1875 was 7, 6 and 24, 4, respectively. See Appendix Table 2. For an extensive discussion on Latin America protectionism see Coatsworth-Williamson (2004) and Bertola –Williamson (2006). For the European periphery see Federico-Tena (1998, 1999) and Tena (1999, 2006).

century manufacturing as a undifferentiated sector responded to the criteria above. In this sense, a more reasonable assumption that we can make is that a country which focuses protection on highly-skilled manufacturing industries will probably have higher rates of growth than if protection were focused on low-skilled manufacturing sectors.

This opens the question of how decisions about protecting low or high-skilled sectors were taken. The literature on endogenous protection has long recognized that a country's tariffs are an outcome of a political rent-seeking game mainly determined by the type of institutions developed in the country (Krueger (1974, 1999), Magee,-Brock and Young (1989), Trefler (1993), Grossman and Helpman (1991, 1994) and Magee (2002)). In fact, we can observe that countries or governments fall prey to "rent seekers" and usually protect sectors because they are more interested in barring foreign competitors than promoting growth.

In a very recent paper Nunn and Trefler (2006), following Grossman and Helpman's (1994) protection-for-sale model, develop a new approach to examine the causal mechanism between tariffs and long-term growth for the late 20th century, introducing externalities into the model.[14] In the new model, tariffs affect future growth via externalities and these externalities vary across industries. High tariffs reduce welfare, and probably growth, if they are not distributed in favour of industries which generate positive externalities at an economy-wide level. Nunn and Trefler contribution links to the previous literature on the institutions-protection dynamic, by suggesting that only countries with developed institutions, able to put a lid on lobbying, will favour tariffs in skill-intensive industries against non-skill intensive industries. So, this model assumes

[14] For the positive externalities of some sectors on general productivity see Antweiler-Trefler (2002), Irwin (1994).

that good institutions encourage politicians to be closer to pro-growth policies. [15]

Following Nunn and Trefler, this paper adopts the hypothesis that a country with "good" institutions will provide higher tariffs in industries that generate positive externalities. These externalities would have to operate at an economy-wide level, coming either from either general economic and/or technological sources, rather than from manufacturing alone.

Following the tradition of the tariff-growth literature, and especially Nunn-Trefler (2006), equation (1) expresses the dependent relationship between the annual average rate of growth of GDP per capita and, as explanatory variables, tariff average, manufacture tariffs, tariff structure, and the quality of institutions:

$$\ln Y_{C1}/Y_{C0} = \beta_0 Y_{C0} + \beta_E E\tau_{c0} + \beta_{SB} SBv\,\tau_{c0} + \mathbf{X}_{c0}\beta X + RegDum + \varepsilon_c \quad (1)$$

In this equation we consider only long term growth so we take t = 0 to be the initial year (1870) and t = 1, the final year (1913).

The dependent variable is $\ln Y_{C1}/Y_{C0}$ (measured as the accumulated real GDP per capita growth rate). $\beta_0 Y_{C0}$ refers the initial GDP per capita in 1870 used as the classical variable of control for convergence in this type of exercise. $E\tau_{c0}$ is the tariff total or manufacture average (we will use both) in country c and initial year 0 (1875). Let $SBv\,\tau_{c0}$ be the tariff structure showed by the skill-bias of tariffs in country c in initial year 0 (1875), and $X_{c0}\beta X$ as country-specific variables related with the quality of institutions. We also introduce regional dummies as regional fixed effect related with the level of development, land abundance or political independence, with only two values 0 and 1.

[15] There are many Olsonian "collective action" arguments and national case studies to support this argument (see Irwin (1994) and Magee –Brock-Young (1989), Federico - Tena (1999) and Tena (2005).

In the case of the initial tariff average ($E\tau_{c0}$) we will use the weighted total tariff average "75NT" and the unweighted tariff average for manufacture"75UNTMAN" as presented in Table 2 in the Appendix. For the initial tariff structure ($SBv\ \tau_{c0}$) we will use the initial manufacture skill bias constructed following Nunn and Trefler's (2006) procedures. The first proxy used is presented as "75Corr-Skill", and defined as the cross-industry correlation between skill intensity ranking estimated for 1875, showed in Table 1, and the respective ranking of ad valorem tariffs of the same sectors. Most of the countries in our sample have a negative correlation sign between the skill and tariff ranking showing in general that tariffs are usually higher in no skill-intensive industries and lower in skill-intensive industries (see correlation in Table 3 Appendix). The second proxy used is "75Diff-Skill" that is constructed choosing an arbitrary "cut-off" in the ranking of skill-intensive industries and calculated as the simple difference between the unweighted tariff average of the sectors situated in the "up cut-off" and those of the "down cut off" for every country. This cut-off has been chosen in relation with the largest differences in the skill intensity sectors around the mid point of the ranking (see Table 1 below). For the institutional variables, two types of index have been used: one that relates the level of democracy of a country POLITY2 (numeric), range = -10 to 10 (-10 = high autocracy; 10 = high democracy) ; and another which measures the grade of independence of the executive government, XCONST (numeric). The last institutional variable would be used as proxy variable of good institutions in relation with the independence of the government from pressure groups.

4. New Data on Industrial Tariffs, Skill-Bias and Institutions

With the exception of Bairoch (1989), there are no comparative studies of industrial tariff levels of the 1870s by country. Bairoch (1989) includes a table of comparative industrial tariff averages in 1875 for 14 countries ("Author's computation based on tariff duties and prices for 14 different manufactured products" p.42). But he does not offer information on the manufactured items included, or the method used (tariffs, prices and weights). A more accurate attempt of estimation of manufacture tariffs by country was developed very recently in Lehman-O´Rourke (2008). This work offers a time series estimation for the years 1875-1913 of weighted agricultural, manufacturing, and "exotics tariffs for the same 10 countries sample used in O´Rourke (2000). The procedure is dividing customs revenues by total imports in 16 identical commodity categories for every country and classified as belonging to either.[16]

The estimation presented here has been devised adopting the following procedure (for details of the estimation of the industrial tariff data base see Appendix). In the first place, British sources offered the ad-valorem tariffs of 26 industrial products in 1875 for 32 countries; secondly, those 26 industrial products have been assembled in 16 industrial sectors for which it has been estimated their relative skill intensity, based on the general structure of USA industrial wages in 1890 (using secondary sources) and other sources of textile wages in 1885 in Spain (from the USA Consular Reports).

The ad valorem tariff sources used in this estimation were taken firstly, from the study directed by Robert Giffen and presented to the House of Commons in 1877 and 1881. The data were developed by the

[16] The authors do not make explicit how many of these identical 16 categories are manufactures. Apparently they get a weighted manufacture tariff average dividing costumes revenues by imports on the total category for every country. The estimation of the Unweighted tariff average is not possible under this procedure. As elasticity of import demand of manufactures use to be quite high, weighted tariff average undervalued the manufacture tariff average of countries and years with higher tariffs.

UK Statistical and Commercial Department Board of Trade, with the title: "Import Duties on British Goods (Foreign Countries) and Rates of Duty (Foreign and Colonial) on British Manufactures or Produce". Secondly, from the Annual Statement of Trade (1876) and Board of Trade (1878). The first work relates tariffs and prices imposed upon 15-24 manufactured articles in 32 countries. The second prices and duties for an additional 9 manufactured articles obtained from a similar group of countries. This material provides us with a complete series of homogeneous data of the tariff average for around 26 industrial products in 32 countries (for sources, products and technique used see Appendix).

A detailed work has been developed also for the classification of the mentioned manufacture tariffs in a raking according to their respective skill intensity. In the literature, relative skill intensity by sectors is estimated by using ratios of workers with more than 12 years of schooling over the total. To our knowledge, no data of this kind is available on the ratios of skilled workers in different industrial sectors at the end of the 19th century.[17] Skill intensity measures, are apparently quite stable to temporal and geographical changes and we have made the assumption that capital is uniformly distributed between sectors and in consequence that sectors with relatively higher salaries have a higher proportion of skilled workers.[18] This means that we assume that higher "median" wage sectors will rank higher in our estimations of skill intensity.[19]

[17] The oldest compelling available source is the UK census of 1951, which offers figures for skilled, semi-skilled and un-skilled blue-collar (male-female) and the number of white collar workers by sectors. See the recent paper by Beltran-Ferry&Pons (2007) which includes an estimation of skill intensity based on this data.

[18] This may produce errors in some circumstances because the temporal scarcity of some skills may offer high salaries independently of productivity. For this reason we prefer our broader measure of skill intensity represented by 75 Diff-Skill.

[19] Nunn and Trefler (2006) show how the use of alternative skill-intensity rankings at the same time as those of the USA (1972), South Africa (1997) and Brazil (1972) had no effect at all on the final results of their correlation coefficient between skill intensity and growth.

Table 1

Skill intensity ranking

Ranking	Description	skill intensity	
1	Ships	13,01	
2	Machinery hardware&c	12,65	
3	Paper Manufactures	11,65	
4	Silk thrown	11,58	
5	Iron Steel Manufactures	11,29	
6	Leather and Manufactures	11,00	high cut-off
7	Copper lingots, Cakes, Slabs	10,01	
8	Alkali Chemical products	9,64	
9	Apparel	9,27	
10	Woollen & Worsted Manufactures	7,9	low cut off
11	Linen Manufactures	7,8	
12	Cotton Manufactures	7,74	
13	Jute Canvas and Sacking	7,04	
14	Woollen yarns(stuffs all wool)	6,2	
15	Linen Yarn	5,9	
16	Cotton yarns undyed	5,8	

Sources: The wages used to construct this "skill intensity" ranking came from two different sources: the wage distribution for male production workers in 12 manufacturing industrial sectors in 1890 in Iowa (covering the 165 largest cities) offered by Claudia Goldin and Frank Katz (1996, Appendix Table 1, p.46); and the patchy but abundant information on wage distribution in the textile sector (cotton, wool, hemp, jute and silk) in Barcelona in 1884 (included in Scheuch (1885)).

The wages used to construct the skill intensity ranking showed in Table 1 came from two different sources (see sources at the bottom of the table). In the first case, the complete wage structure makes it possible to estimate the "median" wage of the sector. In the second one, extensive but incomplete information on wages for different textile sectors allows constructing incomplete professional samples by sector, but it suggests the use of a simple wage average instead of the "median" average for the estimation skill intensity ranking of the different textiles sectors.

For the institutional variables, the level of democracy of a country, POLITY2 and the level of independence of the executive government, XCONST, the data came from the Polity IV data base. It contains coded

annual information on regime and authority characteristics for all independent states (with a total population greater than 500,000) in the global state system and covers the years 1800-2004. [20]

5. Evidence on Tariffs and Growth

The recent paper mentioned above of Lehmann-O´Rourke (2008) use panel data exploiting the variation in agricultural and industrial tariffs for a sample of ten countries, most of them rich, in late 19th century. Attention is focused, on the association of manufacture and agricultural tariff structure with the ups and downs of economic activity of the rich countries.[21] The work developed here pay a greater emphasis on manufacture tariff structure and long-run growth, of rich and poor countries according to the skill intensity structure of their manufacture sector. Therefore we have designed an extended and homogeneous ad valorem tariff data base for around 26 industrial products for 32 countries in 1875, and later we have assembled these data in 16 industrial sectors, ranked according to their relative skill intensity bias. This model, for the first time, privileges the industrial tariff structure, the geographical coverage of data, and the long-run relationship between tariffs and growth. In order to capture this effect, regional dummy fixed variables or different clubs of countries will be employed alternatively. The econometric strategy of this paper is to run a simple cross-section model with interaction terms and fixed regional effects in order to capture the income and regional influence in the association between tariffs and long-

[20] See description of variables in POLITY IV Proyect.
[21] This is clearly notice in Lehmann-O´Rourke (2008) conclusions of their paper "By Focusing on five-year periods, in common with much of the empirical literature, we may have been picking up the short to medium run impact of protection, rather than the longer run effects" (p.14).

run growth.[22] Furthermore, an intuitive theoretical model of endogenous growth is provided which relates both sides of the equation. We expect that, in general terms, most of the countries of our sample will impose high tariffs in industries that generate no positive externalities and slow growth. In a cross section study like this, the reduced number of observations limit the simultaneous introduction of several control variables and explanatory variables altogether in a single regression equation. Average tariff (75NT), manufacture tariffs (75UNTMAN), structure of protection (75Diff Skill) may not be put in one regression because there is a high correlation between them. Only the initial GDP per capita (70GDPpc) and the variable that proxy good institutions (75XCONST) would be used, in the same regression, with the regional dummies, as control variables. [23]

[22] Cross sectional regression with initial measures of export of natural resources, openness, tariffs explaining long-run growth are common in this literature. See by instance well-known empirical growth studies, such as Sachs and Warner (1999), Edwards (1992, 1998) or Irwin (2002b).

[23] The explanation why not show one regression in which all variables are put in once is related with the high vicariate correlations coefficients between variables showed in Table 3 of the Appendix. Exception to this high correlation is the low coefficient showed between 75xConst and 75Diff-Skill.

Table 2
Tariff Structure and Economic Growth with Regional Fixed Effects

Dependent Variable: Growth in real per capita GDP, 1870 to 1913

	1	2	3	4	5
Initial per capita GDP	-0.0004	-0.005	-0.005	-0.006	-0.005
(70GDPpc)	0.005***	0.001***	0.001***	0.001***	0.005***
Initial Total Tariff Average	-0.023				
(75 NT)	0.005***				
Initial Manufacture Tariff Average		-1.526			
Unweighted (75 UNTMAN)		0.013**			
Initial Tariff Skill Bias			2.033	2.039	
(75 Diff Skill)			0.002***	0.003***	
Goods Institutions				0.046	0.099
(75XCONS)				0.225	0.013**
Dumy Abundant Land	0.663	0.621	0.574	0.575	0.356
(DumLand)	0.008***	0.006***	0.008***	0.010***	0.119
Dumy Rich	0.542	0.727	0.684	0.723	0.674
(DumRich)	0.039**	0.001***	0.002***	0.007***	0.009***
Dumy Political Independence	0.793	0.848	0.954	0.83	0.479
	0.000***	0.000***	0.000***	0.004***	0.051*
Number observations	38	33	32	28	32
R^2	0.558	0.626	0.671	0.675	0.503
R^2 (Adjusted)	0.489	0.556	0.608	0.582	0.407

Note: P-values underlined
**** significant at 1%; **Significant at 5%; *Significant at 10%*
Sources: Appendix Table 2

Table 2 tests the comparative explanatory power of the total tariff average, manufacture tariff and skill industrial tariff respectively for long-run growth in 1870-1913.[24] Variables are not logged and the respective regressions include three additional dummy variables with regional fixed effects related with the level of development, land abundance or political independence (with only two values 0 and 1, rich countries = 1, the rest = 0; rich land abundant countries = 1, the rest = 0; political independent countries = 1, the rest = 0) following the discussion of previous sections about the importance of the level of development, factor endowment and

[24] Basic variables and sources of Table 2 are defined and extensively commented in Appendix Table 2 and Section 4.

political independent variables in the explanation of regional asymmetry found between tariffs and growth by the literature. Regression 1 shows that these regional fixed effects, are relevant in the regressions between the tariff average and late 19th century growth. The regional fixed effect dummies allow extending the explanatory power of the initial average tariff on growth from the small group of O'Rourke rich countries to a more representative world of 38 countries. Furthermore, the results would show that in a larger world, with rich and poor countries included in the sample, the sign of this relationship change from positive to negative. What is more important, as regression 2 shows, the countries which imposed higher tariffs to the manufacture sector were those that had the worst growth performance, and this relationship is stronger than showed by the total tariff average. Exploring further the association between manufacture tariffs and growth, regression 3 offers some evidence to support the idea that there are a positive relationship between the efficiency of the structure of manufacture protection and growth. The efficiency of the structure of protection in this work means higher tariffs in the more skill intensive manufacture sectors, and it is measured by the initial tariff skill bias (our variable 75Diff Skill). The coefficient of correlation between manufacture tariffs (75UNTMAN) and tariff skill bias (75Diff Skill) is very high and negative (-0.91), which does not allow us to include both variables in the same regression, but would support the idea that those with higher manufacture tariffs were those with the most inefficient structure of manufacture protection. That would suggest too, that countries which apparently put more emphasis on an import substituting strategy, and imposed higher tariffs on manufacture sectors, were those that had a more inefficient manufacture tariff structure and a worse growth performance. This evidence would fit with the initial hypothesis that more protected countries were more interested in barring foreign competitors than in promoting growth, which is consistent with the

suggestion that tariffs may be the outcome of a political rent-seeking game in which the quality of institutions may play an important role as a causal variable. Nevertheless we should decide between good tariff structure or good institutions, as the main responsible of the good growth performance, because of the potential endogenous connexion between both variables. Our interest is to find a direct connection between a good manufacture tariff structure and their potential positive externalities on the wide economy as main explanatory variable for growth. Regression 5 in Table 2 shows, on one hand, the coefficient of "good institutions", explained by a variable as the level of independence of the executive government (75XCONST), is very low but positive and significant. On the other hand, regression 4 offers a combination of both variables, good institutions and good tariff structure, in the same regression. The result shows that tariff structure and not institutions is the main variable explaining late 19th century growth, which is consistent with the argument explained above.[25]

[25] That's would be possible because the Coefficient of Correlation between the skill bias (75diff Skill) and our measures of good institutions (75XCONST) and (75POLT2) are very low around 0,20 and 0, 08 respectively.

Table 3
Initial TotalTariffs and Growth Regressions with Interaction Terms

Dependent Variable: 1870-1913 GDP per capita Growth

Variables	Eq. 1		Eq. 2	
	Coeff.	Prob.	Coeff.	Prob.
Constant	1.121	0.000	1.557	0.000***
Initial per capita GDP (70GDPpc)	0.000	0.948	0.000	0.265
75NT*Dummy R1	-	-	0.023	0.017**
75NT*Dummy R2	-	-	0.021	0.005***
75NT*Dummy R3	-	-	-0.024	0.042**
75NT*Dummy R4	-	-	-0.100	0.020**
75NT*Dummy rich (R1+R2)	0.024	0,035**	-	-
75NT*Dummy poor (R3+R4)	-0.015	0,081*	-	-
Number of Observations	37		37	
Prob>F	0.00***		0.00***	
R-squared	0.42		0.44	
Adj R-squared	0.32		0.33	

Table 4
Initial Manufatures Unweighted Tariffs and Growth Regressions with Interaction Terms

Dependent Variable: 1870-1913 GDP per capita Growth

Variables	Eq. 1		Eq. 2	
	Coeff.	Prob.	Coeff.	Prob.
Constant	1.182	0.000	1.824	0.000
Initial per capita GDP (70GDPpc)	0.000	0.980	0.000	0.077*
75UNTMAN*Dummy R1	-	-	0.008	0.001***
75UNTMAN*Dummy R2	-	-	0.018	0.000***
75UNTMAN*Dummy R3	-	-	-0.022	0.004***
75UNTMAN*Dummy R4	-	-	-0.107	0.002***
75UNTMAN*Dummy rich (R1+R2)	0.022	0,0698*	-	-
75UNTMAN*Dummy poor (R3+R4)	-0.012	0,018**	-	-
Number of Observations	33		33	
Prob>F	0.00***		0.00	
R-squared	0.38		0.53	
Adj R-squared	0.31		0.44	

Table 5
Initial Skill Bias Tariffs and Growth Regressions with Interaction Terms

Dependent Variable: 1870-1913 GDP per capita Growth

Variables	Eq. 1		Eq. 2	
	Coeff.	Prob.	Coeff.	Prob.
Constant	1.039	0.000	1.151	0.000***
Initial per capita GDP (70GDPpc)	0.000	0.392	0.000	0.645
75DIFF_SKILL*Dummy R1	-	-	-2.821	0.529
75DIFF_SKILL*Dummy R2	-	-	-3.172	0.046**
75DIFF_SKILL*Dummy R3	-	-	1.556	0.035**
75DIFF_SKILL*Dummy R4	-	-	-16.408	0.188
75DIFF_SKILL*Dummy rich (R1+R2)	-3.259	0,039**	-	-
75DIFF_SKILL*Dummy poor (R3+R4)	1.291	0,066*	-	-
Number of Observations	32		32	
Prob>F	0.00		0.015**	
R-squared	0.00		0.40	
Adj R-squared	0.00		0.28	

Table 6
Initial Skill Bias Tariffs and Growth Regressions with Interaction Terms

Dependent Variable: 1870-1913 GDP per capita Growth

Variables	Eq. 1		Eq. 2	
	Coeff.	Prob.	Coeff.	Prob.
Constant	1.597	0.000	1.611	0.000
Initial per capita GDP (70GDPpc)	0.000	0.314	0.000	0.332
75DIFF_SKILL*Dummy R1	-	-	-2.213	0.603
75DIFF_SKILL*Dummy R2	-	-	-2.731	0.073*
75DIFF_SKILL*Dummy R3	-	-	2.269	0.003***
75DIFF_SKILL*Dummy R4	-	-	-9.223	0.587
75DIFF_SKILL*Dummy rich (R1+R2)	-2.710	0,063*		
75DIFF_SKILL*Dummy poor (R3+R4)	2.239	0,003***	-	-
75POLT2	0.013	0.421	0.014	0.409
Number of Observations	28		28	
Prob>F	0.00***		0.02**	
R-squared	0.00		0.49	
Adj R-squared	0.00		0.34	

Tables 3 to 6 present a test to the regional asymmetry of the different explanatory variables used above (Total Tariffs, Manufacture Unweighted Tariffs, Skill-bias Tariff, and Good Institutions). The econometric strategy used in these tables was to introduce four different regional dummies, with interaction terms, for each of the respective independent variables. On one hand, in equation 2 we introduce our four different regional dummy variables: Dummy R1: Rich European Countries; Dummy R2: Rich New Settlers; Dummy R3: Poor Political Independent Countries and Dummy R4: Colonies and Protectorates. On the other hand, in equation 1 we offer a regional division of the world between the "rich club" (Dummy Rich (R1+R2)) and the "poor club" (Dummy poor (R3+R4). As expected, following the main hypothesis of the paper, results show how the relationship between tariffs and growth is only slightly positive and significant for the *rich country club* and negative and strongly significant for the rest. This happened for total and for manufacture tariffs (NT and UNTMAN respectively) and in both equations. In equation 1, we present the word divided in two separate clubs according the level of development (Dummy rich (R1+R2) and Dummy poor (R3+R4), and in equation 2 the impact of every regional dummy. Results show a positive sign for the rich Europeans and Land abundant (Dummy R1 and Dummy R2) and negative sign for the poor Independent (Dummy R3) and for the poor Dependent Countries (Dummy R4) respectively. Therefore, in line with previous findings, Table 3 and 4 show that the influence of tariff average and tariff manufacture on growth at the end of the 19th century was negative for the world globally, as table 2 show, but that the impact was different for rich and poor countries. It would confirm that Bairoch and O'Rourke's tariff-growth positive hypothesis apparently only works in the case of the rich countries club.

Despite a general positive correlation between the protection of skill-intensive sectors and growth applying to the entire sample, still

regional asymmetry persists, as showed in Tables 5 and 6. Results in Table 2 fit with the general expectations that countries that protected the more skilled industrial sectors were those with the best growth performance. However, regional correlations introduced in equation 1 of Table 5 and 6, show that this mainly happened in the “poor country club”. To the contrary, rich countries appear to have a negative relationship between the efficiency of the structure of protection and growth performance, even if coefficients are significant only if the interval of confidence is reduced to 5 or even 10%. This appears to be as a paradox, as it means that, in the case of the rich countries, those that protected more the unskilled manufacture sectors, ended-up with better growth performance. However, at a deeper level of disaggregation, negative sign is only significant for the New Settlers land abundant countries (Dummy R2), but not for the rich European countries (Dummy R1). To explain this result one can consider that New Settlers economies may be outliers because their special factor endowment created the conditions to impose high tariffs for reasons involving public finance and political economy, as we discussed in the introduction. For these countries growth was exogenous to protection in general, while the structure of protection was oriented towards low-skilled sectors because their relative lower elasticity of demand led to maximisation of tax revenues.

6. Conclusions

The potential dynamic relationship between tariffs and growth can better be appreciated in the long run, and this paper highlights the importance of the structure of protection and regional asymmetry in this long term relationship. In theory, there is no reason to find a systematically unambiguous association between average tariffs and

growth in different groups of countries, and regional asymmetry may be partially explained by different tariff structures.

The paper's main methodological innovation is the use of a new database of industrial tariffs for 32 countries in the 1870`s. This new evidence allows, by first time, to include manufacture protection and manufacture tariff structure as explanatory variables alongside tariff average, and different regional dummies. Results show that, at a global level, income, factor endowment, and political independence are important variables to explain regional asymmetry in the association between tariffs and growth. Under these conditions, an increase in protection, measured by total and manufacture tariff averages, implied more protection of un-skilled and inefficient sectors and less growth, and this is especially consistent with the behaviour of poor countries in the late 19th century. Protection apparently was positive for the "rich country club", but had a limited impact growth.

Comparative advantage in low-skilled sectors might be an engine to growth, therefore higher protection of those sectors might appear as a legitimate option. However, international trade theory and historical experience show that tariffs never focus on relative low cost sectors with comparative advantage in the present. Tariffs in non comparative advantage sectors in the present may have a positive relationship with growth in the future, if high tariffs are imposed in sectors with dynamic positive externalities. Endogenous growth literature assumes that this might be the case if "good institutions" succeed in controlling rent-seeking.

In this paper tariff skill-bias runs through measures of good institutions, and reduces the possibility that the skill-bias of the protection structure is capturing the broader effect of "good institutions" on growth. In broader terms, this paper proves that the initial total and manufacture tariff negative relation with growth is related with the tariff structure, and

shows how those that protected skill intensive sectors had a better growth performance than those who did not and this is specially true for the poor countries. Tariff structure provides a better causal mechanism explanation of the 1870-1913 growth than the initial tariff average, independently of income level. The paper also proves strong regional asymmetry behaviour of tariff on growth in the world between the rich and the poor.

This works thus rejects the established view that, as a general statement, tariffs were positively associated with long-run growth in late 19th century, as has been maintained recently by O'Rourke (2000), Williamson (2001, 2006a), Jacks (2006). European and Latin American peripheral countries demanded high tariffs to defend national industry from the competition of manufactured imports from rich countries. Tariff structure was the result of a rent seeking policy competition between inefficient sectors trying to defend national manufactures more than a governmental tariff import-substitution strategy. An inefficient manufacture tariff structure did not foster positive externalities at an economy wide level, and this was especially true for the developing world. That is probably the reason why total, and especially manufacture tariffs, usually appear associated with a negative growth in the world in late 19th century.

Protection, in general, seems negatively correlated with growth, but had apparently a slight positive impact for the "rich country club". This result, in strict sense, is consistent with Lehman-O'Rourke (2008) very recent paper, highlighting that manufacture tariffs were positively related with growth in the developed world late 19th century: "it could well be that what was true in our sample of more or less affluent economies was not true for poorer regions of the world as well" (p.13). Strong regional asymmetries suggest that the association between protection and growth depends on what was protected. This paper suggests that in late 19th century, as today, it is necessary not only to look at the different impacts

of agricultural vs. industrial protection, but at the efficiency in the configuration of manufacture protection too. Much work is still to be done about the reasons of the different configurations of tariff structures, but also about the different impact of tariff policy in different economic context, to understand more about the dynamics mechanism of causality between tariffs and long-run growth.

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APPENDIX

Estimation of the Industrial Tariff Data Base in 1875

There is some well known contemporaneous estimation of comparative manufactures tariff averages by country before the First World War. The League of Nations (1927) offers comparative index numbers for more than a dozen of countries in 1913, but only Liepmann (1938) develops a complete disaggregated study by sector with an explicit methodology for the same year. Another relevant study, less commonly used by economic historians, is that of the Board of Trade (1905) which offers estimations of tariff averages in 20 countries for 32 manufactured articles.

For 1870`s, there is not a single systematic study, so to develop the necessary quantitative variables on cross country industrial sector tariffs, a new panel of data has been constructed on the ad-valorem tariffs of 26 industrial articles in 1875 for 32 countries based on British sources. Following League of Nations and Liepmann recommendations we offer both the Unweighted and the Weighted tariff average. For the first, it has been estimated a simple arithmetic average of the 26 industrial articles for every country, for the second, the relative importance of every article in total British exports is used as weight (See Colum 3 of Table 1 in this Appendix). This technique involves, in the first place, making a list of the principal classes of goods and assigning a rough “weight” to each group according to its comparative importance in British exports. A few leading articles or classes of articles are then chosen from each group as representative of the whole group, and the average tariff rates of duty on these leading articles for each country are taken as fairly representative of the tariff treatment of the whole group. These tariffs should be expressed using the standard British monetary, capacity, mass or weight

units for the corresponding articles (for special calculations see the technical specifications below points (a), (b) and (c) in Table 1 of this Appendix).

The sources present the incidence of import tariffs on the principal manufactures exported from United Kingdom (the main world manufacturer exporter in 1875) in more than 32 countries. This estimation uses British fob export prices instead of national cif import prices in the denominator for the estimation of the ad valorem tariffs. On the one hand, this would imply an over bias but in the case of manufactured articles with low freight factors, practical implementation of fob instead of cif prices makes little difference to the final results.[26] On the other hand, especially for poor countries, British export values are closer to real market prices in frontier than the low accurate import unit values that most of the poor countries had in their respective official trade statistics in 1870.[27]

To obtain the sector tariff average the unweighted tariff of the articles belonging to the sector was used. In this way, a complete series of homogeneous data of the tariff average for 14-16 industrial sectors in 32 countries has been obtained (for the sectors see Table 1 of text, for the countries see Table 2, of this Appendix). This method (which is adopted below) has the advantage of applying a uniform standard to all countries, both as regards the list of articles on which the duties are calculated, and the relative "weight" attached to each article. The unweighted manufacture tariff by country assumes an artificial standard

[26] The League of Nations (1927) used cif import and fob export prices for the estimation of total tariff average and concluded that *" the results obtained under the two systems are in fair accordance , but those from method B (fob export prices) tend to be slightly higher (on the average circa 8 per cent)"*, p.6. In the case of the estimation of manufactures fob the accordance between the two systems is probably very close because manufacture freight factors are much lower than for primary products.

[27] For the accuracy of international foreign trade values see Federico- Tena (1991) and Tena (1992).

import demand structure for every country which has not been biased by tariffs.[28]

Sources:

Ad valorem rates, Import Duties and Prices of manufactures export in 1875:

The data on prices were presented with the respective tariffs by the UK Statistical and Commercial Department Board of Trade, with the title: "Imports Duties on British Goods (Foreign Countries) and Rates of Duty (Foreign and Colonial) on British Manufactures or Produce". And also in Import Duties on "British Goods (Foreign Countries) Return of the Estimated Average *ad valorem* Rate of Import Duty Levied in The Principal European Countries and in the United States, on certain Articles of British Produce or Manufacture" both in *British Parliamentary Papers vol. LXXVI.181. Session 1877*. This study has been complemented with other estimations on prices especially for textiles (for instance Cotton Manufactures and Woollen and Worsted Manufactures) but also for an additional 9 manufactured articles for the year 1876, from the "Annual Statement of Trade: Return of the Values of the Exports of British and Irish Produce 1854-1880". *British Parliamentary Papers vol. LXV; Session 1882*.
With this material a complete series of additional homogeneous data of the tariff average for 16-14 industrial sectors in 32 countries has been obtained (for the final sector aggregation see Table 1 of Appendix 1). This study was directed by Robert Giffen and presented to the House of Commons in 1877 and 1881.

Technical specification for some articles used for 1875,

(a) In the same way as for cotton piece goods, for cotton yarns 40 yards to the lb has been assumed (see British Parliamentary Papers (1905), p.291,).
(b) Cotton piece goods are entered in UK Trade Accounts by the yard whereas most duties are imposed by weight or graduated according to the weight per square metre of the tissues. An "average account" of 5 yards to the lb has been assumed. See British Parliamentary Papers (1905), p.291.
(c) In the case of Woollen and Worsted Piece Goods average weights have been estimated varying from 18ozs to the yard for heavy broad woollen piece goods and worsted coatings to 5ozs to the yard for Mixed Worsted Stuffs. See British Parliamentary Papers (1905) p.291.
(d) Equivalence for measurement of Mass or Weight: 1 Ton= 20CWT ; 1CWT= 112Lb = 50,8Kg; 100yard = 20Lb;1onz = 1/16 Lb; 1 lb= 0,453Kg.
(e) Official equivalence for monetary units: 1 Pound = 20 shillings = 240d; 1 shilling = 12d.

Database disposal to researchers under request.

[28] The unweighted average was recommended by Loveday in his work on "tariff levels" for The League of Nations (1927) and was also supported by Liepmann (1938). The League of Nations (1927) estimated a tariff manufacture unweighted average using 110 manufactured articles (excluding semi-manufactures). Liepmann (1938) used the unweighted average of fob export prices for 144 products in which he used a separate index for semi-manufactures (44 articles) and manufactures (62 manufactured articles).

Table 1: Groups, Articles and Prices Taken as Representatives of British Manufacture Exports 1875

Group	Representative Articles	Value of British Exports Of these groups of Manufactures in 1876 (Thousand Pounds)	Average export Values of these Articles 1876
1	2	3	4
Cotton yarns (a)		12782	
	1. Cotton single unbleached		9d/Lb
	2. Cotton single undyed		20d/Lb
	3. Cotton double undyed		23d/Lb
Cotton Manufactures (b)			
	4. Cotton piece bleached	31454	1988,08 d/Cwt (d)
	5. Cotton piece printed	18494	2661,93 d/Cwt (d)
Woollen &Worsted Yarn	6. Woollen and worsted yarn undyed	4417	60d/Lb
Woollen&Worsted Manufacture©	7. Woollen stuffs all wool	18603	4594,35d/Cw (d)
Linen Yarn (Lbs)		1450	
	8. Linen yarns unbleached		20d/Lb
	9. Linen yarns single		26d/Lb
	10. Linen yarns double		46d/Lb
Silk (Thrown)	11. Silk Thrown	1081	800d/Lb
Jute Manufactures			
	12. Jute Canvas and Sacking	1212	4d/Lb

Iron and Steel Manufactures			
	13. Pig Iron	2842	1200d/Ton
	14. Bars &Angle	17382	1680d/Ton
	15. Rails including steel rails	10225	1680d/Ton
Machinery Hardware &c			
	16. Textile Machinery (l/Ton)	1383.059	2,45 lb/Cwt
	17. Locomotive Machinery (l/Ton)	556.058	2,25lb/Cwt
	18. Sewing Machinery (l/Ton)	518.329	6,75lb/Cwt
Copper Manufactures			
	19. Copper lingots, Cakes, Slabs	983	19200d/Ton
Leather and related Manufactures		2945	
	20. Ox & Cow Hides		26d/lb
	21. Calf Skins		46d/lb
Alkali Chemical products		2223	
	22. Bicarbonate Soda		228d/Cwt
	23. Soda caustic		280d/Cwt
	24. Crystals of Soda		82d/Cwt
Paper Manufactures		1020	
	25. Paper for writing		6d/Lb
	26. Paper for printing		4d/Lb

Table 2

Variables and data used in the tariff –growth regressions

COUNTRY	75NT	70GDPpc	7013GDPGR	75NTMAN	75UNTMAN	75DifSkil	75CorrSkill	75POLT2	75XCONS	75INST	DumLand	DumRich	DumInd	DumReg
AU	4.3	1862.6	1.45	21.6	14.1	-0.03	-0.08	-4.00	3.00	-0.50	0	1	1	1
BEL	1.5	2691.5	1.05	8.2	5.8	-0.04	-0.36	6.00	7.00	6.50	0	1	1	1
DEN	12.3	2003.2	1.57	14.9	9.9	-0.05	-0.14	-3.00	3.00	0.00	0	1	1	1
FRA	3.8	1875.7	1.45	21.3	15.1	-0.07	-0.23	7.00	7.00	7.00	0	1	1	1
GER	3.7	1839.1	1.61	13.1	8.7	-0.07	-0.25	-4.00	3.00	-0.50	0	1	1	1
NET	6.0	2756.8	0.90	2.0	1.3	-0.01	-0.10	-3.00	6.00	1.50	0	1	1	1
SWI	3.6	2102.1	1.66	3.1	4.5	0.00	0.10	10.00	7.00	8.50	0	1	1	1
UK	6.7	3190.4	1.01	1.0	1.0			3.00	7.00	5.00	0	1	1	1
AR	22.8	1310.6	2.50	17.3	18.5	-0.13	-0.40	-3.00	3.00	0.00	1	1	1	2
AUS	9.7	3273.2	1.06	6.5	6.0	0.03	0.24	10.00	7.00	8.50	1	1	1	2
CAN	12.8	1694.5	2.27	9.8	11.7	-0.03	-0.17	4.00	7.00	5.50	1	1	1	2
NEW	11.7	3099.7	1.19	5.7	6.7	-0.05	-0.68	10.00	7.00	8.50	1	1	1	2
USA	38.5	2444.6	1.82	61.1	52.0	-0.30	-0.60	10.00	7.00	8.50	1	1	1	2
URU	22.8	2180.8	0.98	0.0	0.0			-3.00	1.00	-1.00	1	1	1	2
GRE	14.0	880.0	1.39	10.8	12.6	-0.09	-0.51	9.00	7.00	8.00	0	0	1	3
HUN	4.3	1091.6	1.53	21.6	14.1	-0.03	-0.08	-4.00	3.00	-0.50	0	0	1	3
ITA	7.9	1499.4	1.26	15.4	10.2	-0.02	-0.14	-4.00	3.00	-0.50	0	0	1	3
NOR	11.6	1432.3	1.30	11.0	5.4	-0.08	-0.33	-4.00	5.00	0.50	0	0	1	3
POR	28.6	975.0	0.58	30.5	36.4	-0.33	-0.53	-7.00	3.00	-2.00	0	0	1	3
ROM	7.9	931.0	1.47	4.5	7.0	0.04	0.34	-7.00	3.00	-2.00	0	0	1	3
RUS	12.9	943.3	1.06	63.0	40.1	-0.18	-0.19	-10.00	1.00	-4.50	0	0	1	3
SPA	15.0	1207.1	1.25	50.2	34.5	-0.19	-0.46	-1.00	7.00	3.00	0	0	1	3
SWE	10.6	1661.5	1.46	14.9	9.1	-0.07	-0.30	-4.00	5.00	0.50	0	0	1	3
SER	2.8	599.0	1.33	0.0	0.0						0	0	1	3
BRA	34.6	713.0	0.30	36.7	33.6	-0.26	-0.70	-6.00	1.00	-2.50	0	0	1	3
CUB	25.0	1568.0	0.51	56.8	36.7	-0.38	-0.39	3.00	3.00	3.00	0	0	1	3
PER	37.9	749.0	0.20	24.7	37.3	-0.35	-0.65	-1.00	3.00	1.00	0	0	1	3
COL	28.3	749.0	1.17	29.1	40.8	-0.38	-0.69	-3.00	3.00	0.00	0	0	1	3
SOU		857.9	1.46	8.1	9.0	0.00	-0.51	4.00	7.00	5.50	0	0	0	4
IND	3.0	533.1	0.54	2.7	2.8	0.02	0.36				0	0	0	4
JAP	8.3	737.4	1.48	0.0	0.0			1.00	7.00	4.00	0	0	0	4
TUR	7.4	825.0	0.90	7.7	6.3	-0.02	-0.49	-10.00	1.00	-4.50	0	0	0	4
PHI	7.8	776.0	0.71	0.0	0.0						0	0	0	4
JAM		535.1	0.30	10.3	12.5	0.00	-0.20				0	0	0	4
THA	3.0	712.0	0.39								0	0	0	4
BUR	3.6	503.9	0.72								0	0	0	4
CEY	6.0	851.4	0.87	4.1	3.9	0.02	0.21				0	0	0	4
CHI	3.3	530.0	0.10					-6.00	1.00	-2.50	0	0	0	4
EGY	7.4	648.7	0.77								0	0	0	4
INDO	4.9	654.5	0.75								0	0	0	4
MAR		563.0	0.54	5.7	9.2	0.02	-0.04	-6	1		0	0	0	4
TUN		632.7	0.78	4.6	7.3	0.01	-0.04				0	0	0	4

Recognition of Variables used in Table 2

75NT	Tariff Average of the 12 years thas go from 1865 to 1875 most of them from Clements-Williamson Data base
70GDPpc	Maddison (2003) 1870 Real Per Capita Gross Domestic Product.
7013GDPGR	Acumulated rate of growth between 1870 and 1913.
75NTMAN	Weighted Industrial Tariff of 1875, using total manufacture British export shares from Data Base Appendix 2.
75UNTMAN	Unweigted Industrial Tariff Average from Data Base Appendix 2
75Dif Skil	75 Diff-Skill" is calculated as the difference between the simple average of the ad valorem tariffs of the respective skill-intensive sectors ("up cut-off") and the non skill-intensive sectors ("down cut off") by country
75Corr Skill	75Corr-Skill", a correlation between skill and tariff rankings of the industrial sector by country
75POLT2	POLITY2 (numeric) Range = -10 to 10 (-10 = high autocracy; 10 = high democracy) in 1875
75XCONS	XCONST (numeric): Executive Constraints: operational (de facto) independence of chief executive in 1875
75INST	An average of 75XPOL2 and 75XCONS
DumLand	Dummy Land: Rich New Settlers = 1; the others = 0;
DumRich	Dummy Rich: countries with GDP per capita bigger than half UK in 1870 =1; the others=0.
DumInd	Dummy Independence: Countries with Independent Comercial Policy=1; the others=0
DumReg	Dummy Regions: Rich Europe=1; Rich Land Abundant=2; Poor Independent Countries=3; Poor Dependent Countries=4.

Method and sources: see section 4 of the text and Appendix

"ESTIMATION OF THE INDUSTRIAL TARIFF DATA BASE IN 1875"

Table 3

Matrix Correlation Between Variables of Table 2

	75DIFfSKILL	75NT	75UNTMAN	75XCONS
75DIFfSKILL	1.00	-0.87	-0.91	0.23
75NT	-0.87	1.00	0.84	-0.23
75UNTMAN	-0.91	0.84	1.00	-0.27
75XCONS	0.23	-0.23	-0.27	1.00

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