9 The impact of late-nineteenth-century tariffs on the productivity of European industries (1870–1930)[1]

Jean-Pierre Dormois[2]

The last quarter of the nineteenth century witnessed a spectacular revival of tariff protectionism in Europe, following decades of continuous expansion of world trade and trade liberalisation, which brought tariff barriers down to historical lows. A first round of tariffs were passed in virtually all the Continental countries[3] at the juncture of the 1870s and 1880s, primarily to fend off the 'grain invasion' from the 'new worlds' (Kindleberger, 1975; O'Rourke, 1997) and isolate domestic farmers from outside competition: in Italy in 1878, in Germany in 1879, in France in 1881. These proved inadequate, however, and duties had to be raised and extended in the following decades (in 1887 and 1895 in Italy, in 1892 and 1910 in France, in 1902 in Germany) while other countries (those with control on their trade policy[4]) followed suit when time came to renew their trade agreements with their main partners. Only a handful held steadfastly to the free-trade stance they had committed themselves to previously (most notably Denmark, Holland and Britain).[5]

While this reversal in trade policy was primarily aimed at sheltering agricultural home production, industrialists who felt threatened were quick to pressure governments to obtain protection for their interests and compensation for the higher prices now demanded for foodstuffs and raw materials. Indeed, it was the coalition of agricultural and industrial interests that made the introduction of tariff reform successful (Gerschenkron, 1943; Lebovics, 1988). Since the 1850s the reduction of import duties had proceeded on the pattern set by France and Britain in 1860: in exchange for the removal of British duties on foodstuffs and some luxury goods, France had agreed to repeal its industrial protection. The adoption of the Most Favoured Nation clause had thereafter spread this pattern across the Continent. Fortunately a string of good harvests combined with dramatic transport-cost reduction enabled governments to remove the moving scale[6] and other hurdles to free circulation, boosting agricultural protection in those countries which had most to fear from the opening of their domestic market.

Accordingly, scholarly attention has tended to focus primarily on agricultural tariffs – in part because of their overwhelming influence on the standard of living of the bread-eating public – which, as Frédéric Bastiat

reminded his readers, made up the majority of any nation. The effects of industrial tariffs by contrast have been much more difficult to disentangle, prudence enticing economists to pay attention to the Listian argument on 'infant industries'.

Once the legitimacy of tariff protection was reasserted for industrial as well as agricultural producers, candidate industries were successfully included under the principle of 'first seated, first served'. Parliamentary committees in charge of drafting the tariff bills heard representatives of industrial interests keen to secure protection for their products and depended to a large extent on the information they supplied. This process accounts for the growing complexity of industrial tariffs at a time when manufacturing output was itself diversifying[7] as well as the 'run-for-shelter' pattern observed among industrial producers. This was illustrated later by David Low, the cartoonist who used the metaphor of the arrival of a long-awaited bus at rush hour.

The avowed aim of policy-makers and business representatives was to grant tariff protection for the whole domestic economy regardless of their status. Thus Méline stated: 'The committee has considered that it was not in a position to include or exclude any kind of work and that, consequently, all were owed equal treatment'.[8] While the egalitarian proclamation was sure to find immediate appeal among voters, the claim was essentially untruthful: 'in order to be efficient protection must be concentrated upon some articles'.[9] Except in one or two special cases, the indirect

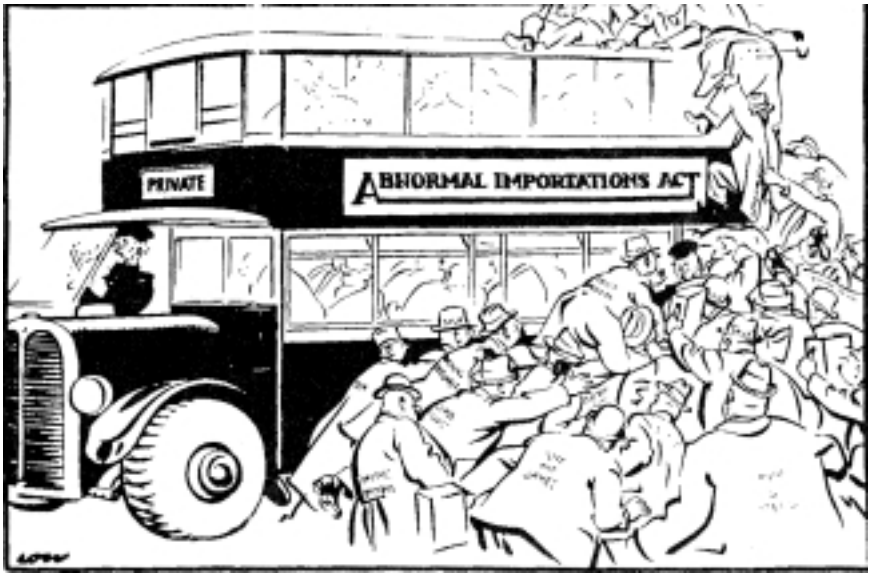

Figure 9.1 The 'Tariff Bus' at rush hour.

subsidisation of some privileged industries was bound to be supported at the expense of the rest. However, a third – strategic – reason accounts for the protection-feeds-protection pattern observed in all protectionist countries, the fact that 'despoilment becomes less visible as it spreads':

> If protection were granted to only one class of producers – iron founders say – despoilment would be so blatant that it could not be maintained. For this reason, all protected (or inspiring to be) industries tend to congregate and even admit new members into their cause; they feel instinctively that despoilment loses itself in a crowd.[10]

The intrinsic complexity of tariffs partly accounts for the difficulty of measuring their overall impact given their often-conflicting effects. Besides, a tariff sets off a chain reaction which takes time to permeate the production system and trickle through the cost structure. As a result, the full effects of a tariff cannot be expected to become manifest instantly.

Identifying the impact of tariff barriers on industrial development

Despite the delusion nurtured by politicians and business associations that – in Bismarck's words – 'foreigners paid for the tariff', most of the time the cost was passed on to the final consumer. Furthermore, there is a strong suspicion among economists that protection works against the long-term benefit of protected industries themselves as it relaxes the incentives to innovate and push productivity upwards.

International trade theory usually divides the effects of a tariff on market agents into three types – in addition to the budgetary windfall on public finance: a welfare effect (consumption squeezed as a result of higher prices), a distribution effect (rents allocated to protected industries paid for by unprotected industries) and an effect on the allocation of resources (marginal firms staying in business keep attracting capital and labour despite eroding competitiveness). In Ricardo's classic model these three effects combine to depress overall productive capacity and most economists have since acknowledged that the key to understanding the gains from trade resides in the notion of comparative advantage: unhampered competition enhances the 'discovery process' by which individuals as well as nations can specialise in order to maximise their wealth creation. By contrast, tariff barriers disturb the structure of production costs by holding up temporarily the profitability of ailing/marginal firms and industries by retaining resources, thereby thwarting the emergence of new, more innovative activities.

However, the empirical verification of whether, and to what extent, tariffs have a dragging effect on economic development and growth is notoriously difficult to establish. For simplicity's sake a tariff's overall

detrimental or beneficial impact is estimated on the basis of all-encompassing indicators such as the degree of openness or the implicit tariff rate (also referred as the – unweighted – nominal rate of protection). While these indicators are convenient tools to assess crudely the general state of competition, they do not provide adequate instruments for measuring the differential impact of tariffs on industrial performance.

Causality tests as well as pronouncements on the protective intensity of tariffs refer to an implicit counterfactual free-trade situation, which must always remain a figment of the imagination so long as CGE cannot be reconstructed straightforwardly from the available information.

Traditionally, empirical studies have therefore produced conflicting conclusions on the macroeconomic, short- and medium-term effects of protectionist policies. Giles and Williams (2000) have counted around 150 econometric studies on the relationship between the level of competition in international trade and economic growth performance. The vast majority of these refer to export trade as a measure of openness and focus disproportionately on non-European economies in the second half of the twentieth century. While the vast majority of this research has concluded for the positive role played by foreign trade on economic performance, the long-term European experience has been comparatively left aside by econometricians. In this field the received wisdom has been primarily shaped by the work of historians, despite the recent contributions by economists (Foreman-Peck, 1995b; Foreman-Peck and Lains, 2000). They tend to view in the Listian vision of 'protectionism as a learning process' the alpha and omega of the role of tariffs on economic development, claiming that both Britain and the USA attained industrial power status while pursuing protectionist policies and that their adoption by Continental countries in response to nineteenth-century globalisation was a reaction of self-defence which preserved their growth opportunities. Thus, for both Weiller (1971) and Bairoch (1972, 1976a, 1989), the classical economists' free-trade prescriptions were decidedly misguided and should be regarded as either a delusion or a devious scheme by supporters of the Manchester school. Bairoch claimed that France and Germany lost out during the Free Trade era of the 1860s and 1870s in terms of economic and trade performance, while the reintroduction of tariffs in the following decades helped them to either maintain or extend their positions in the face of the 'great depression'. Meanwhile, Britain's continuous adherence to free-trade policies is deemed to have caused substantial losses in her market share and competitiveness.

Bairoch's demonstration was based on the unqualified comparison for a number of European countries of indicators of overall performance (GNP/GDP growth, industrialisation 'levels' or 'potentials') for ten-year periods qualified as either dominantly 'protectionist' or 'free-trade' on the basis of observed aggregate rates of tariff revenue, an 'inadequate and potentially misleading indicator' as Irwin (1993: 146) rightly observes.

Besides, as emphasised by Capie (1983: 3), such an exercise produced only 'the appearance of a correlation'. One can cast doubts about the meaningfulness of indicators of macroeconomic performance when measured arbitrarily across the business cycle, and not, as is customary, from peak to peak or trough to trough. In addition to the disputable use of tariff revenue as the 'sole metric by which to rank-order . . . countries in terms of the liberality of their commercial policy' (Irwin, 1993: 147), there is some illusion in thinking that agents' and firms' response to a change of commercial policy is instantaneous or even that trade policy can alleviate or counterbalance all the other constraints bearing on domestic production. Other powerful determinants necessarily come into line, which are simply ignored in such simplistic models, however large tariff barriers loomed among macroeconomic policy instruments. Finally, one may question the reduction of the problem to a comparison of performance indicators between Britain on the one hand and Germany on the other. The difference in the degree of protection, measured by the aggregate rate of tariff revenue, between Britain, France, Germany or Italy was not so great as to warrant any expectation of spectacular distortions – any at any rate that one could hope to capture by major differences in the rate of economic growth (Figures 9.1 and 9.2).

The focus should perhaps switch to the contrasts in economic development between, say, the Netherlands or Switzerland on the one hand and Portugal, Greece or Romania (not to mention Russia) on the other. Economies could still grow and prosper while enforcing tariff policies which were detrimental to their medium- or long-term growth potential.

Obviously this type of historical conundrum – the 'tariff growth paradox' – cannot be satisfactorily solved on the basis of either fragmentary evidence or on the observation of coincidences between aggregates. In order to carry conviction on an issue over which scholars rarely switch positions, an explanatory model must lay out the causation chain which links the degree of competitiveness of one industry which can be best approximated through its effective rate of protection with its level of productivity performance. Such an enquiry must therefore be carried out at a relatively high level of disaggregation and break them down into different time periods. Certainly the use of GNP/GDP growth indicators as well as tariff rates has been popular in the investigation on the connection of openness and growth because of its straightforwardness and the wide accessibility of the relevant data (Mitchell, Maddison). Here we use an alternative model borrowed from Hall and Jones (1999), which attempts to correlate rates of effective protection by industry with indices of labour productivity relative to the 'regional' free trader, Britain.

The guiding intuition of this project is that tariffs, by relaxing competitive pressures, have stalled, at least temporarily, the process of improved resource allocation in the domestic economy, and that the loss of potential efficiency gains, at least over the medium term, can be captured in

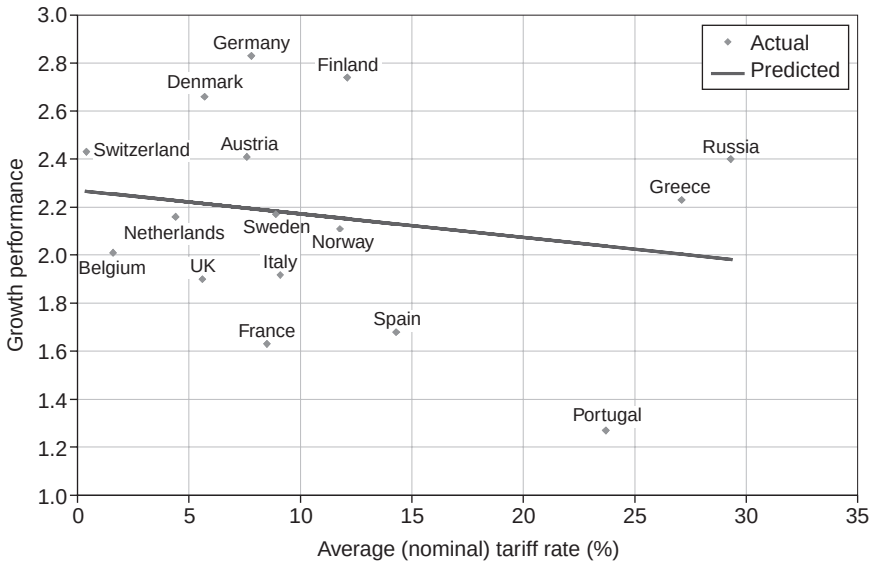

Figure 9.2 (a) Forging ahead or lagging behind: growth performance and the tariff rate.

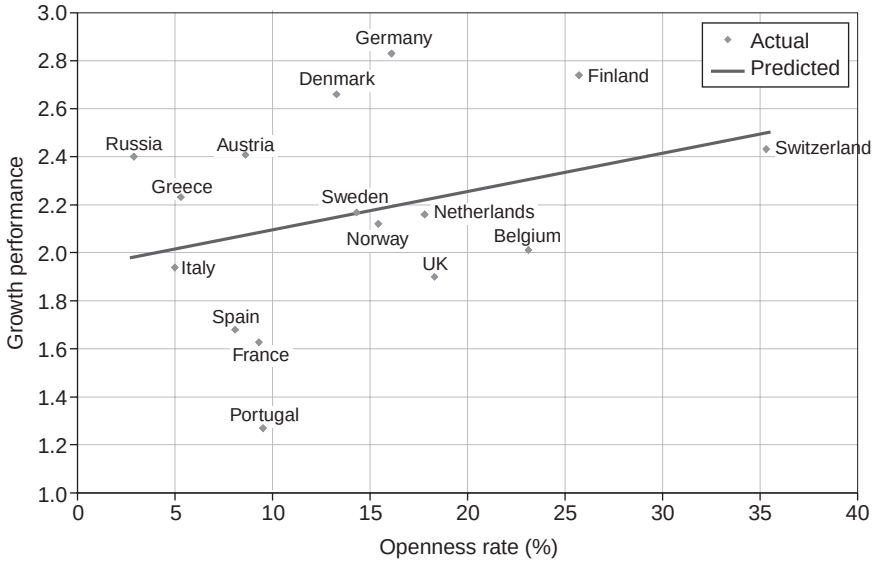

Figure 9.2 (b) Growth performance and the openness rate in 1913 (source: Maddison, 2001: 196, 377).

relative labour productivity indicators, at least over the medium term. The comparative approach is therefore essential to the operation of such a model, as is testing at regular intervals: the statistical documentation allows just that every twenty-odd years, a periodisation which fits the traditional division of the 1870–1914 period: before the 'great depression', in the midst of it and during the prosperity spell of the 'Belle Epoque'.

Relative labour productivity affords a variable less susceptible to conflicting interpretations than output growth, while the breakdown by industry presents the adequate level of analysis of the effects of protection over relatively short time spans. A two variable panel data set stratified by year and country analysis was therefore envisaged as the most straightforward way to test the model suggested by Ricardo that a protective tariff tends, all things being equal, to slow down productivity growth and therefore to depress productivity performance compared to a competitive situation. Two datasets were therefore constructed, both of the same size (four countries × twelve industries[11] × three benchmark years). The first encompassed indicators of labour productivity by industry in Europe's four major industrial economies at three regular intervals between 1870–1914 – thus separating the period of the 'great depression' from the subsequent recovery phase. The second set contains for each corresponding industry and date the observed rates of real effective protection (EPRs) so that we can observe the behaviour of:

$$\text{Labour productivity}_{ij}^{t} = a + bEPR_{ij}^{t} \tag{9.1}$$

where I indexes industry, j country relative to UK and t indexes year.[12]

Admittedly this approach constitutes a second best choice for attempting to gauge the effects of a tariff on a production. An alternative consists in working out these effects using a GCE model à la Williamson (Federico & O'Rourke, 2000). However, the accurate reconstruction of a realistic economy-wide or industry-wide counterfactual matrix is, if not entirely impossible, at least very problematic (see Foreman-Peck, in Chapter 15 of this book).

The competitive predicament of British industry offers the counterfactual situation for assessing Britain's European counterparts in so far that it had been for forty years the most closely approaching a free-trade situation.[13] Indeed, the continuation of free-trade policies after 1875 can be regarded as a credible alternative for the governments of France, Germany or Italy.[14] Relative productivity indices can be constructed for Continental Europe's industries where British performance is used as the denominator and, in turn, be linked to observed effective protection rates (EPRs).

Obviously such a procedure leaves out a number of factors, which can be regarded as determinant of productivity levels, which should ideally be part of a comprehensive model.[15] Only if these other factors are orthogo-

nal with the right-hand-side variable will the regression results be objectively meaningful. But rather than putting trade policy among the traditional 'proximate determinants' of productivity performance (capitalisation, scale of operation, labour force quality), this model hypothesises that trade policy is a key determinant of 'external' competitiveness and, as such, operates directly on the economic environment – on a different plane therefore. It figures at the end of a causation chain of what Hall and Jones labelled 'institutional infrastructures' shaping the environment in which economic activities take place and hence determine levels of efficiency (typically measured by TFP or Total Factor Productivity), of which labour productivity is a vital, as well as more accessible, element (Hall and Jones, 1999: 85).[16]

'Institutional infrastructures'
(property rights, competitiveness, corruption)
⇓
Productive organisation
(plant size, management, capital intensity, training)
⇓
Efficiency
(TFP, labour productivity)

The 'machinery' for this type of operation is more sophisticated than the casual observation of coincidences between aggregates of growth and protection; at the same time it is still more manageable than the construction of a CGE model – especially ex ante (that is, in a hypothetical free-trade situation). This approach also constitutes a departure from traditional practice as far as productivity analysis has usually eschewed the association of performance indicators with not easily quantifiable qualifications about the macroeconomic environment: most of them stop at examining the impact of proximate determinants of productivity specified in a production function framework such as capital intensity or the scale of operations.

Our panel analysis requires the construction of two data-sets for each benchmark year, one yielding real for semi-finished and finished tradables for twelve classes of goods (including one for agriculture) corresponding to standard categories of the industrial classification, the other presenting relative labour productivity indicators for similar categories, expressed in relation to British performance in the same industry. It will proceed in three steps:

1 measuring effective protective intensity of tariffs by industry,
2 evaluating labour productivity by industry and by country, and
3 summing up observed correlations.

Measuring the protective intensity of European tariffs for industry, 1870–1913

Apparent or nominal protection

If one considers nominal protection rates (also referred to as 'rates of tariff revenue'), those of the three major European powers examined here appear as relatively moderate (see Table 9.2): only Italy flirts with the 10 per cent mark. Over most of the period, rates for Germany approximated a free-trade situation if one considers, as did most contemporaries, that up to a 5 per cent *ad valorem* rate a situation could be equated with free trade.[17] Compared to the much higher rates registered in countries such as Russia, Spain or the Balkans,[18] one would not expect seriously disturbing effects from such lenient forms of protectionism, especially when they were matched by internal taxes of the same magnitude. However, once rates are disaggregated by main classes of commodities (Table 9.1), a very different picture emerges.

First, industrialists were globally short-changed by their fellow agriculturalists on 'equal protection': nowhere (except in France at the end of the period) do industrial tariffs come to be nearly as high as agricultural ones. This confirms the scope of late-nineteenth-century tariffs as having been essentially geared at sheltering primary producers (and owners of their factors of production) of foodstuffs. Second, the German tariff does not appear to have provided any sort of extensive protection to industrialists throughout the period: the tariff remained decidedly below the 'free-trade ceiling' of 5 per cent *ad valorem*[19] although a few selected sectors enjoyed relatively high protection despite the low average.

Given the intricacy of each tariff, the classes retained are not absolutely tight and that of 'raw materials' obviously encompasses goods, which have undergone preliminary transformation or conditioning – most raw materials not produced domestically were usually exempt from duty.[20] Likewise the class of manufactures comprised a wide variety of goods, some heavily

Table 9.1 Disaggregated tariff rates according to different classes of commodities

(in %)	*1873*			*1892*			*1913*		
	D	*F*	*I*	*D*	*F*	*I*	*D*	*F*	*I*
Foodstuffs* and drink	7.0	6.9	15.2	17.8	12.8	37.6	10.3	11.9	20.8
Raw materials	0.2	0.2	2.8	4.1	1.5	9.1	1.9	1.6	2.7
Manufactures	3.1	5.9	10.6	3.7	9.4	12.1	2.9	8.4	8.9
Overall	3.1	5.4	9.4	9.3	10.3	18.7	8.2	8.8	9.4

Notes
*including tropical goods.
D: Germany; F: France; I: Italy.

protected, others much more lightly. A sizeable share of the trade of the three countries was in fact already mostly intra-industrial, covering therefore semi-finished goods. Rates *ad valorem* could vary enormously from one 'product' to the next. These differentials are accounted for by the varying degree of influence exercised by interest groups and by asymmetric information between law-makers and business experts; besides, the tariff rate for most products was fixed by trial-and-error and, once a rate was set, interested parties resisted any attempt at a downward revision. Given the wide differences existing in levels of protection, it is still possible that industrial tariffs as they stood could have introduced substantial distortions in the industrial structure of these countries. Early estimates by the Board of Trade and Liepmann suggest that actual protection on finished manufactured goods could have been much higher (at least twice) than that suggested by overall nominal rates depending on the weights used (see note 18).

Obviously a variety of situations must have coexisted, depending on the degree of protection enjoyed by some particular industry. Disaggregated real effective protection affords a much more accurate instrument to evaluate the actual protectionist intensity of a tariff.

Lessons from real effective protection

Table 9.A1 in the Appendix presents the first set of EPRs covering the period 1873–1913.[21] Our measures of real effective protection tend to magnify – as is customary – the immediate incidence of Continental tariffs in terms of mark-up, and sharpen the divide between sheltered and unsheltered industries. The presence of occasional negative rates highlights the discriminatory effect in this regard. More generally, industries with low nominal protection often ended up with even lower effective protection. However, EPRs remained – save for Italian metallurgy – below the 50 per cent mark, a common minimum threshold for many sectors in Russia, Spain, Portugal or even the USA at the time (Woytinsky, 1955:

Table 9.2 Industrial tariffs, overall nominal rates, 1913

	(1)	*(2)*	*(3)*	*(4)*
Germany	8.2	7.9	13–17	17
France	8.8	8.7	21–4	22
Italy	9.4	9.7	20–5	18

Source: Bairoch (1989: 76).

Notes
1 Average tariff rate in 1913.
2 Id. 1909–13 (Bairoch).
3 Average tariff on finished goods (Liepmann).
4 Average tariff on British manufactures in 1904.

277); only fourteen industries (seven of which in Italy) enjoyed momentarily EPRs superior to 15 per cent.

In this regard the path followed by Germany on the one hand and France and Italy on the other diverged markedly; in the first case the aggregate EPR reverted at the end of the period to its initial 1870s level, while in the other two protection crept upwards, continuously diffusing itself through the output structure. As a matter of fact, EPRs produce a picture of actual protection closer to that of tariff level indices à la Liepmann;[22] for 1913, indices were 16.0 per cent for France (16.3 for manufactured goods only), 12 per cent for Germany (10 per cent) and 16.5 per cent for Italy (14.6 per cent) (Liepmann, 1938: 413–15).

As the tale of interest groups lobbying for protection would have us guess, identical industries across countries ended up securing the highest protection: metallurgy, food and drink, and textiles – this is true even for free-trade countries such a Switzerland, Belgium or the Netherlands. Those involved large influential constituencies of well-organised industrialists and workers, which could presumably carry electoral weight (Hilsheimer, 1977). The progress of representative government in this period tended to empower the same socio-economic groups across Europe (Verdier, 1994: 5). In France and Italy, contrary to Germany, the degree of protection granted to these industries shows no sign of falling once the 'great depression' abated.

By contrast, unprotected industries were likewise invariably 'small' industries, geographically dispersed as myriads of small production units. They included sawing and paper mills, tanneries, leather and joiner workshops as well as quarries and brickworks. The interests of the chemical industry proved especially difficult to accommodate given its wide range of inputs, processes and outputs.

As tariff level indices reveal, protection bore disproportionately on semi-finished goods, burdening the costs of consumer good industries, which therefore requested compensatory duties. Those were not always adequate, as the case of Italian engineering makes clear (Toniolo, 1977). As Toniolo has argued, one would think that follower countries such as Italy would have greatly benefited from developing (occasionally with the help of tariff barriers) products for final consumption rather than intermediate staples. 'Instead exactly the opposite was done' (Toniolo, 1978: 234). An import-substitution policy could have been potentially successful, but 'mature' rather than 'infant' industries were selected for preferential treatment and semi-finished staples such as cotton yarn, iron bars, flour and sugar.[23] Besides, with the unarrested expansion of intra-industry trade during this period, discrimination in favour of intermediate goods was bound to harm consumer good industries.

But perhaps this 'sensible' import substitution policy would have been impossible anyhow. What politicians were after was a 'quick fix', short-term relief for embattled industrialists who perceived their trouble

as temporary; not an industrial strategy for the future. Besides, duties on common, relatively price-elastic staples were a 'sure bet': easily identifiable and promising to yield ample returns. Customs collections were both a means and an end, the only guide at the disposal of policy-makers to evaluate the success of a tariff and a way to increase customs proceeds to government coffers.

Preferential treatment was preferably granted therefore to established old staples which further reinforced all the other forces working in favour of the status quo – witness British retardation during the same period. Our expectation would be that protectionist policies should have affected resource allocation and hence relative performance of protected industries over the medium term. Labour productivity provides one tool to chart the course of before and after of the introduction of tariffs.

Levels of production and labour productivity in Europe's industries, 1870–1913

The second step of this study consists in establishing series of labour productivity indicators by industry, which requires reviewing industrial production data by country for a period in which statistical information is still fragmentary. The drawbacks attendant upon the absence of systematic industrial censuses in this period are here again glaring. The reconstruction of comparable industrial accounts for the four countries at hand has necessitated the exploitation of data on domestic output as well as on industrial employment from national censuses.[24]

Fortunately, recent scholarship on historical national accounts offers a wealth of information, as well as checks to guide this reconstruction. For the UK and Italy we have relied extensively on the work of Charles Feinstein and Stefano Fenoaltea and Carlo Bardini respectively; their series demanded only minor reprocessing operations. For France, by contrast, despite the existence of two competitive series of industrial output for the nineteenth century[25] we have worked out our own production and productivity indicators from original data while, for Germany, we have endeavoured to revise Hoffmann's widely quoted (and criticised) figures to align them with recent revisions of German NNP by Ritschl and Spoerer (1997) and Burhop and Wolf (2005).

In spite of the 'great depression', industrial production remained robust in Europe through the forty-four years leading up to the First World War. According to extant production indices, output in volume terms was multiplied by a factor of five in Germany, by four in Italy and 2.3–2.4 in France and the UK. Except in the latter two countries, between 1882–90 growth was evenly spread out during the whole period.

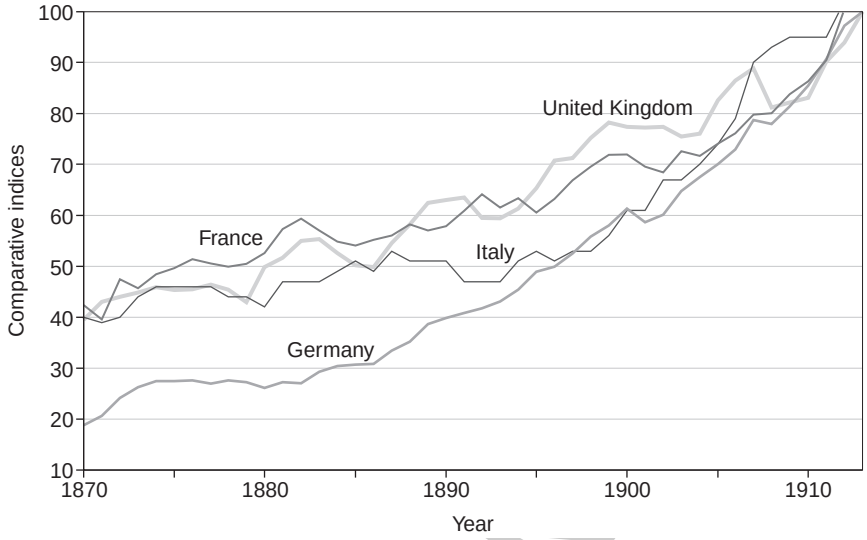

Figure 9.3 Comparative indices of industrial production, 1870–1913 (1913 = 100).

France

France's two rival series of GNP – both constructed from the output side[26] – make an informed guess difficult since the gap between the two can be substantial (close to 50 per cent by 1913). To avoid this dilemma, industrial accounts have been reconstructed for three benchmark years from the income side – a procedure not hitherto attempted. The reconstruction is based on first-hand data such as the number and distribution of the industrial population, observed wage rates and capital–output ratios. The 1896 and 1911 benchmark years, marking the end of the 'great depression' and the 'Belle époque' respectively, are documented mostly by the censuses of industrial employment taken in those two years; 1873 was selected because it represents the first 'normal' year after the Franco-Prussian war of 1870–1. Industrial classifications had to be standardised from one benchmark year to the next.

The salient features of France's active population, which reverberated on its production capacity, is the relative stability of industrial employment after 1900: this being the combined effect of stagnant demography, slowing migrations to urban centres and 'Malthusian' entrepreneurship. On this point, Méline's ambition of a 'return to the land' achieved his avowed objective of reverting to a 'more balanced economy'.[27]

Taken globally, our own reconstructed estimates of value added in industry (including mining)[28] appear remarkably close to Lévy-Leboyer's figures, despite his being worked out from the output side. By contrast,

Table 9.3 Estimates of industrial output in France (market prices), 1873–1911

(in Fm)	*Dormois*	*Lévy-Leboyer*	*Toutain*
1873	6,798	6,902	9,753
1896	9,366	8,428	10,960
1906	10,840	10,887	13,716
1911	13,451	13,665	17,084

Sources: see notes 24 and 25.

Toutain's reconstruction and ours are wide apart due to the original estimate for the base year (Markovitch) being unrealistic (Table 9.5).

Germany

Ever since Hoffmann's publication of his 'magnum opus'[29] there has been no 'successful attempt' (Fremdling, 1995) to produce a global revision of German economic growth in the nineteenth century.[30] As time wears on, a number of cracks have appeared in the master's towering edifice, based on the reconstruction of national accounts for one single year (1913) and a 'pyramid of indices' (Tipton, 1999), the components for which are particularly difficult to disentangle. Hoffmann's figures suggest a relatively backward economy by the mid-nineteenth century, a backwardness which is supposed to have lingered until the outbreak of the First World War, implying markedly inferior living standards and labour productivity performance compared to its immediate competitors, France and Britain. Such an implicit characterisation runs contrary to a vast body of evidence, starting with contemporary testimonies who acclaimed or deprecated pre-1914 German technical and industrial prowess.[31] Eminent witnesses of Germany's 'rise to industrial power' include such luminaries as Thorstein Veblen and John Maynard Keynes.[32] Most historians writing after the publication of *Das Wachstum* have either ignored or waved aside the implications of his figures for their 'meta-narrative'.[33] There is a strong suspicion therefore that Hoffmann's widely used figures may underestimate German industry's actual performance.

Sectoral indicators of performance as well as anecdotal evidence and testimonies tend to suggest that the most dynamic German industries had caught up, in terms of labour productivity, with their British counterparts as early as 1870 (Broadberry, 1997:153). Given the exceptional gains recorded by Germany in the following period, it is to be expected that its performance results should be much closer to Britain's than Hoffmann's figures suggest.[34] Broadberry and Fremdling have shown that, by the end of the nineteenth century, German industry had in fact overtaken Britain's in terms of labour productivity (Broadberry and Fremdling, 1990).

In order to offset a possible bias in any forthcoming comparison and

bridge the gap between Hoffmann's series of NNP and GNP estimates, it has been deemed necessary to reconstruct at least part of German industrial accounts for the immediate pre-1914 period (1911 has been selected as a preferred benchmark because of availability of information and matchability with other countries). This operation is limited to the industrial sector (manufacturing, mining and construction).

This reconstruction has been conducted on two fronts, the second approach serving the purpose of controlling for the soundness of the results. On the one hand, industrial value added has been reconstructed for the main branches of the sector from the income side by adding up the wage bill and capital income calculated separately.[35] With regard to labour income, the wage rate obtained by reverting to contemporary compilations diverges only marginally from Hoffmann's original calculation (in fact based on previous investigations by Hirsch[36]). Meanwhile, the employment totals retained by Hoffmann for 1913 are obviously underestimated, as a recent compilation makes clear (Hohls and Kaelble, 1989). Hoffmann's figures are based on the results of the 1907 occupational census. Data from the population census of 1 December 1910 suggests continued growth of industrial employment after 1907, logically calling for an adjustment for 1911.

Hoffmann's method for estimating capital compensation has attracted the sharpest criticisms (Holtfrerich, 1983: 126; Fremdling, 1988: 35–6; Tipton, 1999: 12). Hoffmann's complicated method for estimating profits is based on the use of pre-war tax returns for the Land of Baden and the sectoral distribution of equity observed in 1936. Given the vicinity and closeness in industrial structure, it has been assumed that the capital-output ratios observed in Austria at the time, as derived from the 1910 industrial census (Fellner, 1916) ,could supply the missing information on capital returns for German industry.

The aggregation procedure of value added estimates by branch yields a gross total of M 22bn, up 11 per cent from Hoffmann's own (19.6bn), a difference that can be accounted in great part by the missing capital depreciation in Hoffmann's estimates (which opted for a net definition of value added while our comparison requires gross estimates), as well as the difference between factor cost and market price evaluation. In order to extrapolate forwards (to 1913) and backwards (to 1870), Wagenführ's 1933 industrial index has been used with the help of moving weights (Hoffmann used fixed weights).

Italy and Britain

For the two remaining countries in the sample, the establishment of data on output and employment has been limited to the manipulation of existing series and their adaptation to the standard classification adopted for the other countries.

For Italy we have relied extensively on Fenoaltea's reworking of the Istat output data for 1891 and 1911 (Fenoaltea, 1992; Fenoaltea and Bardini, 2000). The figures for 1911 have been extrapolated to 1913 using Vitali's production index. In order to obtain estimates for the starting year, 1871, we have applied Fenoaltea's correction for 1891 to this former date. The recent revisions of the data by Fenoaltea has substantially modified the descriptions of Italy's industrial profile during this period. In particular they suggest a path of industrialisation as expressed by the industrial index somewhat different from the one implied by Giorgio Fuà's earlier calculations on the basis of the Istat series. Incidentally, the 'compromise index' which has been retained here, is remarkably close to the one defended by Gerschenkron (1962: 75–6).

For Britain, the scholar treads on safer ground: British sources since the end of the nineteenth century have been both more numerous and more thoroughly searched. Feinstein's magisterial reconstruction of British national accounts for the 1855–1965 period (Feinstein, 1972) remains unchallenged.

For the end-of-period comparison, we have reverted to the data supplied by the second census of production of 1912 – belatedly published after the First World War, which presents the advantage of matching output with employment indicators. The occasional gaps in statistical information can be bridged with the results taken from its immediate predecessor, the first census of 1907 which are relatively close. Furthermore, the quasi-stability of industrial prices between 1912 and 1913 allows for a direct extrapolation of 1912 estimates to 1913 using the production index. This index, originally compiled by Paul Rousseaux (1938), serves to extrapolate backwards industrial output to 1871, 1875, 1891 and 1896, yielding output and productivity indicators expressed in 1913 prices. Reflation being extremely hazardous given the paucity of industrial prices, a comparison will necessitate the conversion of the industrial output figures for France and Italy at constant 1913 prices.

While Italy's record has suggested a roller coaster of a trajectory for industrial production in the period – 'the Kuznets cycle' (Fenoaltea, 1988, 2005) – Britain's has impressed upon most analysts the idea of a stability verging on which has fuelled a lengthy debate about the existence of a 'climacteric' (Dormois and Dintenfass, 1998).

Table 9.4 Conflicting estimates of industrial value added for Italy, 1871–1913

Lit. million	*1871*	*1891*	*1911*	*1913*
ISTAT	1,623	1,960	4,335	4,745
Fenoaltea	n.a.	2,268	4,946	n.a.
Here	1,811	2,268	4,945	5,416

Comparing labour productivity in Europe 1870–1913

Estimating indicators of output per worker for three or more benchmark years serves a double purpose. First, when examined in a purely national framework, it helps to document the internal development of different industries. Second, it allows for transnational comparisons for identical industries. With the construction of productivity indices, it can chart the changing paths of industrialisation in different countries. In these calculations, British industries have been taken as the standard since one may regard British protection on manufactured goods relative to Continental countries as nil.

Labour productivity indicators are expressed as the ratio of output (or gross value added) (obtained on pages 00–00) to labour force, taken from the contemporary occupational censuses. The benchmark years have been selected so as to have census dates match years for which the reconstruction of industrial value added was feasible.

However, concessions have had to be made to take into account the idiosyncrasies of national censuses; for instance, adjacent years were also considered as valid (O'Brien, 1995).

Thus, for the 1870s, performance as recorded in France and Germany in 1873 is supposed to be directly comparable to indicators recorded in Britain in 1871. Likewise for the 1890s, the comparison was split between 1891 (for a comparison between Britain and Italy) and 1896 (for a comparison with France and Germany). The detailed examination of the panel of productivity indicators is reserved for a later occasion. Suffice it to say that they present a great homogeneity which is interpreted here as being a guarantee for its reliability. However, in order to compare term-to-term, and for each industry in the sample, indicators need to be converted into a single currency. The pound sterling, the most internationally traded currency, has been chosen as the most expedient for this multi-bilateral comparison. There remains the choice of the 'converter' or exchange rate to be used.

Table 9.5 Census dates with corresponding dates for estimating value added

	France	*Germany*	*Italy*	*UK*
Census years	1872, 1876	1875	1871	1871
Value added estimated for	1873	1873	1871	1871
Census years	1896	1895	1891	1891, 1901
Value added estimated for	1896	1895	1891	1891, 1896
Census years	1911	1907, 1910	1911	1911
Value added estimated for	1911	1911	1911	1912

Why use the official exchange rate?

In international comparisons of output and productivity, standard procedure normally rules out the use of official (also called 'commercial') rates of exchange because of the interference of international capital transactions in the setting of the exchange rate between currencies at any given time. Correct procedure specifies the use of purchasing power parity (PPP) exchange rates which can be computed at various degree of aggregation using price ratios.

Unfortunately for the period under examination, the available price information is very sparse for industrial commodities or of dubious quality for such an operation as calculating factory-gate price ratios. Wholesale prices are generally accessible for a limited range of commodities but these incur transaction costs and sales margins. Factory-gate prices, by contrast, are a by-product of production censuses and these were relatively underdeveloped in the pre-1914 era. Only in the 1920s did statistical agencies start to collect price information of this type. From 1926 onwards the Economic and Financial Department of the League of Nations (then headed by Alexander Loveday) started to publish crude 'real' exchange rates. By coupling these effective exchange rates with the appropriate price indices, we can hope to verify how close official exchange rates came to approaching purchasing power parity in the pre-1914 period.

For any European country, *E*, and for 1929, one currency unit, *N*, was equivalent to *X* 1929 US dollars:

$$N_E = X_{\text{US}} \cdot R_{\text{PPP}} \tag{9.2}$$

where R_{PPP} represents the exchange rate at PPP.

One can assume that the movement of prices for internationally traded commodities was similar across countries over the period 1913–29. For year *t*, the value of N_E can be expressed relative to 1929 via the price index *PI*.

Thus,

$$N_E(1913) = N_E(1929) \cdot PI_E(1913) \text{ and } X_{\text{US}}(1913) = X_{\text{US}}(1929) \cdot PI_{\text{US}}(1913)$$

Hence,

$$R_{\text{PPP}}(1913) = \frac{N_E(1929)}{X_{\text{US}}(1929)} \cdot \frac{PI_E(1913)}{PI_{\text{US}}(1913)} = \frac{1}{R_{\text{PPP}}} \cdot \frac{PI_E(1913)}{PI_{\text{US}}(1913)} \tag{9.3}$$

This operation may seem hazardous given the volatility of exchange rates in the post First World War period. However, this procedure offers better guarantees than the use of more recent alternatives: Maddison's 1991 international dollars or Milton and Kravis's PPP exchange rates for 1950.

Price indices for tradables indexed on 1913, as computed by the

Table 9.6 Dollar equivalents at PPP of major European currencies, 1913

	1929	*1913*	*PPP rate*	*Official rate*
	in 1929 $		*in 1913 $*	
Mark	0.2382	0.324	0.2454	0.2405
Franc	0.0392	0.2433	0.1843	0.1907
Lira	0.053	0.252	0.1909	0.1906
Pound	4.8763	6.4855	4.9132	4.8685

Economic Department of the League of Nations for 1929, were 136 for Germany, 621 for France, 476 for Italy, 133 for the UK and 132 for the US (League of Nations, *Annual Statistical Abstract*, 1935: 26). PPP equivalents were likewise computed for 1929 (League of Nations, *Annual Statistical Abstract*, 1930: 101) and can therefore be retropolated using equation (9.6). They yield PPP equivalents for 1913, which end up remarkably close to the official exchange rates.

Thus, the use of official exchange rates does not seem to introduce major distortions for the purpose of pre-1914 cross-country comparisons. These figures vindicate Maddison's and Prados de la Escosura's argument that the use of official exchange rates for pre-1914 countries with relatively stable currencies is preferable to the construction of PPPs based on dubious price information.

Furthermore, this observation has the backing of those monetary historians in whose eye it is at this date (1913) 'unlikely that variations between official and PPP exchange rates were substantial' (McCloskey and Zecher, 1985: 66). In a fixed exchange rate regime, the possibilities of arbitrage worked in such a way as to foster a peg close to the real exchange rate. Trade competition even on an admittedly limited range of actually traded commodities contributed to this process by enhancing price convergence the world over (Williamson and Bordo, 2002). This alignment mechanism could operate even in the absence of direct competition, which remained therefore to some extent 'virtual'. On this basis, McCloskey and Zecher (1984: 124) conclude that 'before 1914 . . . prices as well as interest rates can be regarded as world rather than national phenomena'.

The record of achievement

In the following section, indicators of labour productivity were converted in a common currency, the pound sterling, using the exchange rates and then indexed on British performance in identical industries. At the disaggregated level (Table 9.A3), the relatively large number of indices superior to 100 suggests that British pre-eminence was far from being

Table 9.7 Aggregate indices of labour productivity in industry, 1910–13 (UK = 100)

	Here	*Burger*	*Dormois and Bardini*	*Maddison*	*Crafts*	*Bairoch*
	1911–12	*1910*	*1910*	*1913*	*1910*	*1913*
Germany	101	79	82	81	87	93
France	81	67	79	90	80	83
Italy	50	60	46	57	46	49
Sweden	n.a.	n.a.	75	80	87	101

systematic. This observation is reinforced by the fact that British labour productivity indicators for 1912 ignore firms with five employees or less and tend therefore to be biased upwards.

At the aggregate level, and for the end period, the present results fall within a narrow band of obtainable data by other authors (Table 9.7).

The only notable difference between this and other series of indices regards, of course, the German index, for which other authors have used Hoffmann's estimates at face value. The present figures confirm that, in terms of efficiency, German industry performed on the whole on a par with Britain's (Broadberry, 1997: 153). Meanwhile some German industries out-performed their British counterparts in a number of productions, including the heavy '*Montanindustrie*' as well as clothing and paper manufacture, this superiority apparently going back to the beginning of the period. By contrast, most French and Italian industries trailed behind and even seem to have lost ground vis-à-vis their two other competitors between 1870 and 1914. Could this be in any way related to the introduction of steep industrial tariffs in these two countries?

The correlation between levels of protection and of labour productivity

The relationship between protection and labour productivity is necessarily an indirect one. First, trade protection is only one among many factors affecting the institutional environment and, hence, the behaviour of agents – although, as Clemens and Williamson (2001) observe, 'historically liberalism comes as a package'. Second, due consideration must be lent to the time dimension. Given that the calculation of value added is made at market prices (and not factor costs) and that this difference cannot be eliminated by the use of PPP exchange rates, the short-run immediate effect of a tariff is to inflate the turnover of a protected industry and hence its value added (Verdoorn law). From one year to the next, labour productivity with unchanged manpower is likely to be higher than it would have been in the absence of a tariff. This implies that a tariff's

impact in the sense predicted by international trade theory may become apparent only over the medium or even long term, as buyers adjust to higher prices or producers become less efficient. It is to be expected that low or moderate duties will take longer to generate adverse effects on an industry's productive capacity.

In order to verify these intuitions, panel analysis has been conducted in three sequences. The first examines the concomitant behaviour of the two variables for all industries (twelve branches) for each of the three benchmark years. In the second the relationship has been investigated in more detail for the Italian case in 1911, for which indices of performance are available for a broader range of products (sixty-eight branches). Likewise, an Anglo-French comparison in 1930 affords the possibility of verifying the correlation at a more disaggregated level. In the third sequence, we have sought to illuminate the mechanism by which a tariff affects structural change and hence slows down productivity gains over-time. In so far as tariff barriers were intended to maintain employment in marginal firms or uncompetitive industries, their impact on relative labour productivity performance was two-fold: on the one hand, they propped up value added (the numerator) in the short run but, as new opportunities arose for redeploying resources and upgrading output, they forewent growth opportunities, depressing the industry's overall performance. On the other hand, by maintaining existing employment levels (the denominator) protection acts as a brake on productivity growth to the point when production methods become obsolete while preventing the transfer of resources to new emerging industries. The relative stability in terms of productive structure can directly be linked to the relative level of protection.

We have attempted to capture this tendency to obsolescence by observing the change in the distribution of industrial employment among various industries and linking them to observed levels of protection. The French and German cases lend themselves to this experiment because of the greater level of detail of their occupational censuses at 10–12 years' interval (1896–1906 for France and 1895–1907 for Germany).

Given the imprecision of the data inherent to any empirical investigation of this type, results appear as remarkably meaningful. One has to take into account that tests of significance requirements for cross-sections are less stringent than for time series. Correlation coefficients appear quite satisfactory in the first case and highly satisfactory in the second and third cases. The French and German cases illustrate that it was mainly through the maintenance of existing production structures that protection contributed to depress the productivity performance of existing industries.

A global approach at twenty-year intervals

A first batch of regressions to ascertain the degree of correlation between labour productivity performance and protection levels embraced all three

Continental countries relative to Britain for three selected benchmark years. Thus EPRs for 1871 were paired with observed productivity indices for Italy in 1871, France in 1873 and Germany in 1875 using two thirty-six-entry panels constructed earlier in the chapter (pages 00–00).

These simple linear regressions produced results much more significant than any other obtained by comparable means (Cameron *et al.*, 1999). Given the weakness of the R^2 for the 1870s – a period of virtual free trade in manufactured commodities – the first regression can probably be disposed of. For the other two periods coefficients appear much more significant than those obtained by the Bank of England survey linking labour productivity gains to openness rates over the period 1970–97 ($R^2 = 0.029$). Here, not only are coefficients of the right sign (i.e. negative) but the coefficients are much more satisfactory.

At first sight, these results seem to vindicate, for the period 1870–1913, the contention by Cameron *et al.* that 'the more open were industries to trade, the higher their gains in terms of productivity', here illustrated by the observation that the more protected industries fared worse in the productivity performance league.

The French and Italian cases under scrutiny

Higher nominal tariffs on manufactured goods in France and Italy after 1890 (see Table 9.1) provide a hint that industrial protectionism in these two countries could have had more profound repercussions than in Germany, where industrial duties remained, on the whole, lower and much less pervasive. Besides, from the first regressions emerged the suspicion that the end-of-the-century tariffs imposed on their 'beneficiaries' the kind of penalty suggested by international trade theory. In order to carry conviction, the investigation must be carried at a greater level of disaggregation. Unfortunately, the nineteenth century's limited nomenclature does not allow such a detailed analysis. Only for Italy in 1911 and for France in 1930 can the systematic comparison of industrial branches' performance be carried out.

In the first case, labour productivity indicators could be computed for sixty-eight branches and aligned on their British equivalents for 1912 (the

Table 9.8 Regression results for three benchmark years

Decades	*1870s*	*1890s*	*1910s*
Correlation coefficients	−0.2172	−0.3325	−0.3331
t-statistic	1.6829	4.2256	4.2434
Coefficient of the tariff variable	0.2033	0.4757	0.4712
Standard error	3.39	3.29	2.82
Degree of freedom	35	35	35

British Census of that year displaying returns for a total of 108 branches[37]). The labour productivity indices were then matched by *EPR*s as registered in 1900. At first, the correlation coefficient turned out somewhat disappointing (−0.1354), inferior therefore to those obtained previously. But three outliers were identified and eliminated from the sample, either on the ground of an abnormal rate of duty (sugar and spirits) or an abnormal level of productivity performance (fish curing). With such restrictions, the correlation coefficient leaps to −0.5623, by far the most satisfactory index obtained so far. The equation took the following form (standard errors in parentheses):

$$\text{Labour productivity}_{ij} = \underset{(6.09)}{85.8} - \underset{(0.14)}{0.156}EPR_{ij}$$

In the second case we have relied on the numbers drawn from a comparison of productivity performance in French and British industry in 1930 (Dormois, 2004). Comparative labour productivity indicators for eighty-eight branches were arranged so as to match the two-digit product classification of the trade data (fifty-four tradables, of which forty-one were manufactures). While the same test for 1911/12 (twenty-seven products) produces only disappointing results ($R^2 = 0.005$), the regression results for 1930 appear much more satisfactory (despite the fact that the handful of British duties introduced during the First World War couldn't be factored in).

$$\text{Labour productivity}_{ij} = \underset{(3.40)}{99.6} - \underset{(0.212)}{0.1435}EPR_{ij}.$$

Linking the dynamic composition of the labour force to tariff protection

Concentration on the labour force distribution under a protectionist tariff regime (the denominator of labour productivity indicators) shifts the

Table 9.9 Regression results for German, Italian and French manufacturing

Year of comparison	*Relative to UK*			
	Germany 1907	*Italy 1911*	*France*	
			1911	*1930*
Correlation coefficient	−0.69	−0.562	−0.024	−0.735
t-statistic	11.2	14.02	4.076	29.38
Coefficient of the tariff variable	73.02	85.5	1.425	45.74
Standard error	6.517	45.89	0.35	10.79
Degree of freedom	26	68	104	40

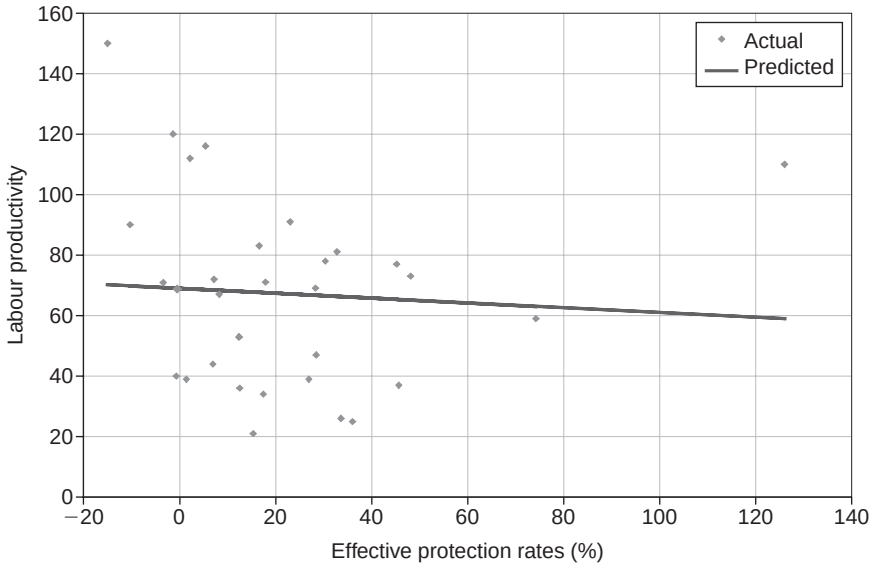

Figure 9.4 Italian labour productivity related to tariff protection.

attention to the effect of a tariff in slowing down the redeployment of labour from less to more productive forms of activity. It also serves to verify whether late-nineteenth-century tariffs fulfilled the promise of their promoters: the 'defence of national jobs' – the maintenance of the existing employment levels and structure. In carrying out this investigation, it has been assumed, first, that technological, productivity-enhancing innovations concentrated in progressive industries which can be distinguished from traditional, technologically stagnant industries, and that either progressive or, alternatively, declining industries clustered in particular branches of the industrial classification. Second, we supposed that, in a period of intense technological change such as the post-depression years of the turn of the twentieth century, protected industries experienced over the medium term, all other things equal, a greater relative stability of their workforce than unprotected industries, which had to deal with more rapid expansion or contraction of their workforce. The range of new industries emerging in the last decade of the nineteenth century is well known; this was also a period when first-generation firms in the staple industries such as basic metallurgy and textile manufacture (especially spinning mills) faced their first serious crisis.

To carry out this investigation, we have relied on the survey of employment change between 1896 and 1906 in France and 1895 and 1907 in Germany included in the occupational censuses. Each survey covers seventy standardised branches in manufacturing between the two dates and changes were indexed on the base year. Here again the regression of

these indices on protection rates yielded interesting results: correlation coefficients were −0.31 in the French case, where protection rates for 1900 (a high-duty period) were taken into account and −0.438 for Germany, where reference was made to the 1892 tariff returns.

The respective equations took the following form (standard error in parentheses):

$$y = 1.306 - 0.011x \text{ for France over the period 1896–1906}$$
$$(0.05)\quad(0.003)$$

$$y = 1.668 - 0.038x \text{ for Germany over the period 1895–1907}$$
$$(0.056)\quad(0.006)$$

In each case y denotes the magnitude of structural change in employment for each industry and x the effective rate of protection. Despite a weaker correlation coefficient, the French case appears to be stronger, as Figure 9.4 shows.

In the German case, the anomalous behaviour of iron and steel manufacture – one of the few substantially protected industries – casts doubts on the meaningfulness of the relation. German low average protection on

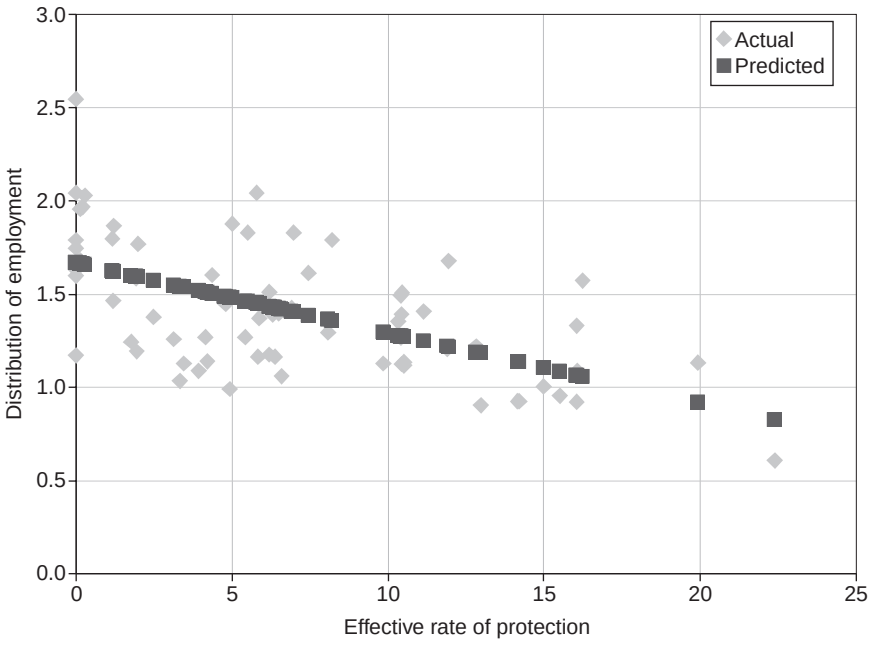

Figure 9.5 The influence of protection on France's structural distribution of employment, 1896–1906.

Table 9.10 Regression results for the influence of tariffs on the dynamic labour force composition

Period	*Germany 1895–1907*	*France 1896–1906*
Correlation coefficient	0.583	−0.309
t-statistic	2.973	2.613
Coefficient of the tariff variable	1.668	1.306
Standard error	0.29	0.252
Degree of freedom	69	69

manufactured goods, as well as concentration on a few items, is bound to make the traceability of the structural effects of the tariff difficult.

$$y = 1.306 - 0.011x \text{ for France}$$
$$(0.05) \quad (0.003)$$

$$y = 1.668 - 0.038x \text{ for Germany}$$
$$(0.056) \quad (0.006)$$

However inconclusive with regard to the extent to which protectionism slowed down growth opportunities, this exercise has added one more piece of evidence for the prosecution: the directly observable effects of a tariff need time to deploy themselves and affect on the structure of employment, as its repercussions on the product mix cannot be expected to materialise on short notice.

International trade is one area where economic 'laws' seem particularly difficult to verify empirically – witness the 150-odd recent empirical studies on the relationship between trade and growth, and there is perhaps a certain naivety in believing that any insight by a great economist can be submitted to a simple verification using such undiscriminate variables as GDP growth and overall tariff rates. Besides, no sensible free-trader ever claimed that a free-trade policy constituted a cure-all, short-cut recipe for growth and development. Labour productivity indices should provide a more sensitive tool to help resolve the riddle that mounting tariff protection had disastrous effects in Europe in the 1930s, while it supposedly sustained economic growth before 1914. Disentangling the short-run from the longer-run effects of trade barriers cannot be expected to be a straightforward affair, all the more so that diminishing returns are bound to set in – just like in any system of protection.

At the time of the 1887 Italian tariff debate (and the subsequent Franco-Italian trade war) Vilfredo Pareto railed almost weekly in the *Giornale degli economisti* against the 'protectionist sophistry' voiced by politicians and his economist colleagues. Using only plain logical deduction he

reached more or less the same conclusions that the present study has tried to demonstrate – only by more economical and elegant means. It is therefore fitting to use one of his pronouncements as an epitaph to the present story:

> Protection does not create wealth; quite the opposite: it destroys it. What it gives to some has to be taken away from others and it is absurd to hold on to the belief that everyone can be better off without anyone having to pay for it.[38]

Appendix 9.1

Table 9.A1 Real effective protection rates by industry (in %)

France	*1873*	*1892*	*1913*
Mining and quarrying	5.56	10.06	10.23
Iron and steel	1.14	2.04	16.7
Engineering	4.59	8.24	12.25
Non-ferrous metals	4.16	7.96	11.56
Chemicals	4.14	18.09	11.61
Textiles	16.4	22.09	17.21
Clothing and apparel	5.15	5.85	14.94
Leather	−0.73	−1.52	2.44
Paper and print	1.17	4.95	12.86
Food and drink	1.21	8.02	8.73
Wood and furniture	−0.52	8.18	10.88
Building materials	3.52	5.16	3.06
Luxury and other goods	0	0	8.6
Average (weighted)	4.67	9.13	12.23
Germany	*1874*	*1892*	*1913*
Mining and quarrying	−1.12	3.54	2.97
Iron and steel	7.08	10.48	14.05
Engineering	4.97	3.36	6.9
Non-ferrous metals	5.89	17.33	9.56
Chemicals	6.3	6.61	11.37
Textiles	1.17	10.75	7.82
Clothing and apparel	7.88	4.84	8.07
Leather	6.8	4.7	−3.28
Paper and print	2.77	2.43	−1.26
Food and drink	9.23	11.31	16.45
Wood and furniture	0.67	3.04	5.34
Building materials	7.31	12.06	8.04
Luxury and other goods	0	0	0
Average (weighted)	4.95	6.26	4.09
Italy	*1873*	*1892*	*1913*
Mining and quarrying	−1.95	−2.04	1.78
Iron and steel	9.64	49.51	46.51
Engineering	−1.02	−11.06	−5.55
Non-ferrous metals	5.03	24.3	17.53
Chemicals	19.5	25.53	40.89
Textiles	8.55	14.6	26.9
Clothing and apparel	9.05	20.27	20.51
Leather	3.72	17.01	15.24
Paper and print	4.79	4.99	5.34
Food and drink	33.53	34.55	35.04
Wood and furniture	8.13	0.11	7.05
Building materials	−0.07	9.87	16.84
Luxury and other goods	1.74	−5.24	−4.6
Average (weighted)	11.68	12.36	14.26

Table 9.A2 Labour productivity indices by industry (UK = 100)

Germany	*1871/5*	*1895/6*	*1907*	*1911/12*
Mining and quarrying	89.3	126.3	114.0	138.6
Basic metallurgy	102.8	125.3	122.5	113.8
Engineering	92.1	136.4	139.5	137.4
Chemicals	97.7	106.0	77.8	95.8
Textile	49.3	88.4	81.0	87.4
Clothing and apparel	92.1	133.1	126.8	126.2
Leather	46.3	99.8	87.0	82.8
Paper and printing	113.6	103.3	108.7	88.0
Food and drink	76.4	97.1	53.8	58.3
Wood and furniture	103.6	91.4	68.2	66.2
Building materials	97.7	71.4	86.9	90.5
Construction	166.6	170.4	94.4	95.1
Utilities	50.5	46.3	83.0	48.2
Manufacturing	93.7	103.6	104.2	101.2
France	*1871/3*	*1896*	*1906/7*	*1911/12*
Mining and quarrying	69.7	80.8	73.1	72.5
Basic metallurgy	80.0	82.8	87.2	79.3
Engineering	74.4	66.0	91.8	94.3
Chemicals	132.9	137.3	88.2	83.9
Textile	66.7	71.5	78.9	90.9
Clothing and apparel	138.8	137.1	121.5	137.1
Leather	98.2	75.3	69.5	65.1
Paper and printing	103.4	94.0	93.9	90.9
Food and drink	133.5	120.3	66.3	70.0
Wood and furniture	113.9	112.8	82.7	75.6
Building materials	92.2	67.0	86.7	89.2
Construction	125.4	123.4	87.5	102.6
Utilities	95.2	74.1	50.6	50.9
Manufacturing	89.6	79.9	74.1	81.1
Italy	*1871*	*1891*	*1911/12*	
Mining and quarrying	83.1	85.5	45.9	
Basic metallurgy	39.3	88.1	71.3	
Engineering	56.6	78.4	56.9	
Chemicals	27.7	47.0	66.8	
Textile	58.3	32.3	33.6	
Clothing and apparel	28.4	15.9	18.2	
Leather	43.2	38.8	27.1	
Paper and printing	136.5	119.2	94.9	
Food and drink	47.6	67.9	52.4	
Wood and furniture	46.6	30.3	38.2	
Building materials	88.3	42.0	53.1	
Construction	55.3	68.8	51.0	
Utilities	86.9	82.9	84.9	
Manufacturing	50.8	42.9	42.3	

Table 9.A3 Nominal and effective protection rates for France, 1930

	Nominal	*Effective*
Raw inputs	**12.6**	**14.4**
Raw hides	14.68	14.68
Animal products	6.52	6.52
Fish bones, fat and whale oil	8.54	8.54
Stone and fuels	25.65	44.99
Iron ore	0	0
Quarrying products	0.1	0.1
Fruit and seeds	7.14	7.14
Spices and medicinal plants	1.2	2.51
Common lumber	6.2	18.8
Tropical timber	0.15	0.46
Fibres	0.09	0.1
Drugs	0.33	0.33
Dyestuffs	0.35	0.35
Scrap and waste	7.11	7.11
Semi-manufactured goods	**17.59**	**25.44**
Corn and flour	39.67	44.08
Tropical produce	6.05	6.05
Vegetable oil	2.46	2.46
Drinks	7.8	17.34
Sugar	7.49	41.6
Metals	8.2	18.21
Precious metals	4.85	10.32
Other non-ferrous metals	9.78	21.72
Manufactured goods	**11.76**	
Metal goods	11.91	25.33
Jewellery, gold and silver plate. clock-making	10.7	22.77
Machinery and appliances	11.2	21.55
Tools and instruments	14.59	29.18
Firearms and ammunition	18.45	32.36
Vehicles	18.51	35.6
Scientific instruments	13.0	23.7
Chemicals	5.14	14.70
Artificial dyes	16.18	38.53
Colours	13.61	32.41
Soap, perfume, wax, starch, glue, paraffin	20.87	90.76
Rubber	14.61	45.65
Match and lighters	6.1	13.5
Yarn	2.95	11.34
Woven cloth	16.86	76.62
Lace	9.99	23.78
Garments and underwear	15.4	41.63
Felt and artificial flowers	14.7	50.5
Umbrellas	20.5	78.6
Manufactured paper	15.96	44.34
Prints and photography	11.1	19.48
Leather goods	6.3	21.71
Asbestos and mica	17.94	37.38
Miscellaneous house appliances	17.51	50.02
Fancy goods	23.4	52.0
Cork	56.9	132.2
Furniture	12.46	25.42
Musical instruments	22.63	51.43
Basket ware	4.56	10.61
Brush and	18.2	40.5
Pottery and glass	15.91	28.92
Coral, meerschaum, insulating material	28.6	45.3

Table 9.A4 Labour productivity indices, nominal and effective protection rates, Italy 1911

	LP index	*nominal*	*effective*	*share of VA*
Coal mining	39	2.5	1.4	0.09
Basic metallurgy	59	28.1	74.2	8.16
Iron and steel	90	0.1	−10.3	1.28
Non-ferrous metals	53	10.4	12.4	6.88
Metal goods	69	11.2	28.3	14.52
Rails and rolling stock	72	9.7	7.2	0.21
Engineering	67	11.9	8.2	4.98
Shipbuilding	69	0.3	−0.13	8.75
Watch-making, instruments	70	1.5	−3.4	0.58
Chemicals	71	11.0	17.9	1.48
Rubber	77	4.7	45.2	0.13
Textiles	39	12.9	26.9	18.58
Silk	34	8.36	17.45	7.54
Cotton	47	13.62	28.4	5.52
Wool	91	11.02	23.0	1.48
Flax, hemp, jute	25	17.25	36.0	1.98
Other fibres	112	1.04	2.17	2.06
Clothing	21	13.2	15.3	21.02
Leather	40	5.2	−0.7	11.05
Paper	116	7.7	5.4	2.74
Printing and publishing	120	1.8	−1.4	0.11
Food and drink	78	17.8	30.3	9.42
Grain milling	73	28.25	48.09	5.19
Bakery	81	19.24	32.75	0.64
Preserves	83	9.73	16.57	1.44
Milk products	150	3.4	−15.0	0.78
Sugar refining	110	65.1	126.0	0.38
Drink	37	26.8	45.63	0.21
Tobacco	26	16.8	33.63	0.77
Timber and furniture	44	7.7	6.9	12.17
Glass and stone	53	10.4	12.4	6.88
Miscellaneous	36	10.3	12.5	0.53

Notes

1 An amended and extended version of 'Protectionnisme et productivité du travail en Europe avant 1914', *Revue de l'OFCE*, 82 (2002), pp. 11–47.

2 Member of Institut Universitaire de France and director, Institut d'Histoire Contemporaine, Université Marc-Bloch, Palais Universitaire, F – 67084 Strasbourg. Email address: dormois@umb.u-strasbg.fr.

3 Italy in 1878, 1887 and 1895, Germany in 1879, France in 1881 and 1892, Romania in 1885, Spain, Portugal and Greece in 1892, Russia and Serbia in 1893, Bulgaria and Sweden in 1895, Norway in 1897.

4 Some countries such as Japan and Romania had been forced under 'unequal treaties' to adopt free-trade policies.

5 See Bairoch (1989: 78).

6 A mechanism by which tariff duties on grain imports could be adjusted seasonally depending on the domestic price of the commodity.
7 The 'Méline tariff' of 1892 harbours 1,313 entries, not taking into account variations in size; the revised 1895 Italian tariff of 1877.
8 Méline, *Rapport général*. . .: 9, cited in Dijol, 1910: 333.
9 Lotz, 1904: 516.
10 Bastiat, 1854: 143. Author's translation.
11 Industries producing non-tradables such as construction and public utilities are excluded.
12 A 'full' panel regression and a fixed-effect model would include dummy variables for country and perhaps year.
13 The last industrial tariffs were repealed in the 1860s, and during his third administration Gladstone trimmed the last remaining protective duties (see Irwin, 1993: 148).
14 On the basis of comparative rates of tariff revenue, German trade policy was in fact more liberal than Britain's through the 1870s.
15 This is the whole problem of 'ceteris paribus'. Reverse causation also needs to be considered: the contention that it was precisely because decision-makers were all too aware of their country's deficiencies that they promoted protectionist legislation. The major hurdle to such a reasoning is the absence of objective measurement instruments at the disposal of the political personnel. Besides, business organisations and their constituents took profits into considerations rather than efficiency as such.
16 As other authors have noted, levels of 'external' are positively correlated to 'internal' competitiveness.
17 The 'unequal treaties' imposed on Japan and the Ottoman empire (and its successor states in the Balkans) generally imposed such caps on import duties.
18 See Pedro Lains in Chapter 14 of this book.
19 See Béatrice Dedinger, this volume, Chapter 11.
20 Although France taxed its coal imports (as did Spain and Russia).
21 The choice of the first benchmark year was dictated by the need to neutralise the fallout effects of the Franco-Prussian War of 1870–1 and the revision of recording procedures by the *Centralbureau* of the Zollverein.
22 Arithmetic mean of *ad valorem* rates of duties for seventy-eight items (of which forty-three are manufactured, and eighteen are semi-manufactured).
23 In this context the *a posteriori* justification that late-nineteenth-century protectionist tariffs were inspired by the Listian argument seem especially misguided.
24 Details are including in Chapters 5–8 of Dormois, 2006.
25 Lévy-Leboyer and Bourguignon, 1990 and Jean-Claude Toutain, 'La croissance française 1789–1990: nouvelles estimations', *Economies et société*, HEQ Series, 11 (1997).
26 That is, with an end-of-period estimate extrapolated backwards with production and price indices.
27 Jules Méline, *Le retour à la terre et la surproduction industrielle* (Paris, Hachette, 1905).
28 Mining has traditionally been considered as being part of the 'primary' sector in France.
29 Walter G. Hoffmann *et al.* (1965).
30 Ritschl and Spoerer (1997) have tackled the problem of converting his NNP estimates into GNP estimates for the twentieth century.
31 For a review of contemporary comments in the German press, see Volker Hentschel, *Wirtschaft und Wirtschaftspolitik in wilhelminischen Deutschland. Organisierter Kapitalismus und Interventionsstaat* (Stuttgart, Klett-Cotta, 1978).
32 Thorstein Veblen, *Imperial Germany and the Industrial Revolution* (New York,

Macmillan, 1915); J. M. Keynes, *The Economic Consequences of the Peace* (London, 1919), Ch. I and IV.

33 See Henderson, 1975; Helmut Böhme, *Deutschlands Weg zur Großmacht. Studien zum Verhältnis von Wirtschaft und Staat während der Reichsgründungzeit 1848–1881* (Cologne, Kiepenheuer & Witsch, 1974).

34 Maddison's comparative figures of GDP, GDP per capita and per employee for Germany bear the stamp of Hoffmann's making.

35 For detailed procedure, see Dormois, 2006: chapter 5.

36 J. Hirsch, 'Wandlungen im Aufbau der deutschen Industrie', in B. Harms (ed.), *Strukturwandlungen der deutschen Wirtschaft*, Bd 1, Berlin, pp. 191–226.

37 The difference is accounted for by the inclusion in the British census of mining and quarrying, construction, the utilities, arsenals and other government departments. Otherwise, industrial divisions are very similar across countries.

38 Vilfredo Pareto, 'Curiosités doctrinale et vérités objectives', in Giovanni Busino (ed.), *Mythes et idéologies* (Geneva, Droz, 1966), pp. (author's translation).