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**OPENNESS, PROTECTIONISM AND BRITAIN'S
PRODUCTIVITY PERFORMANCE OVER THE LONG-RUN**

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OPENNESS, PROTECTIONISM AND BRITAIN'S PRODUCTIVITY PERFORMANCE OVER THE LONG-RUN

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Abstract: We explore the links between openness and economic performance in Britain between 1870 and 1999. The key findings are: (1) As a result of the openness of the British economy, agriculture was unusually small in nineteenth century Britain, allowing resources to be deployed in the higher value added industrial and service sectors. This benefit of openness is rarely considered alongside the costs to British industry of retaining open markets when tariffs were being raised against British exports. (2) Many writers criticise the cosmopolitan service sector for neglecting domestic industry. However, this ignores the importance of the outward orientation of services for service sector productivity, and the growing importance of services for productivity performance overall. (3) The trend of British industrial performance was not improved by protection when it was applied in the 1930s, despite the claims of the tariff reformers. Furthermore, protective attempts to avoid de-industrialisation after World War II had an adverse effect on productivity performance in industry and in the aggregate economy.

JEL classification: N10, N70, F02, F13

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I. INTRODUCTION

The historical literature contains a range of views on the links between openness and productivity performance in Britain since the late nineteenth century. For one group of writers, British prosperity has been founded on participation in the international economy, with a policy of free trade seen as beneficial irrespective of any protectionist policies pursued by other countries (Imlah, 1958; Capie, 1983; 1994; Edelstein, 1982; Irwin, 1996). For others, however, the roots of British relative economic decline can be traced back to the continued adherence to liberal principles when other countries were abandoning them. Within this group, there are those such as Aaronovitch and Smith (1981) and Bairoch (1993), who see protectionism as a way of restructuring the economy onto a more favourable development path, and others who see the abandonment of free trade in Britain as a second-best policy at particular times, necessary as a response to the rise of protectionism abroad (Marrison, 1996; Kitson and Solomou, 1990). Although there are now large literatures on tariff reform before 1914 and the adoption of the general tariff in the 1930s, few writers have attempted to link these issues to the debates over de-industrialisation and “globalisation” since the 1970s. This paper uses a data set covering the long period from 1870 to 2000, adopting an explicit quantitative approach to facilitate comparisons between sub-periods. Particular attention is paid to the contribution of different sectors to Britain’s comparative productivity performance, since misleading conclusions can be drawn from a consideration of only part of the economy.

Sections II and III set out the broad trends in productivity performance and the degree of openness of the British economy during the period 1870-2000. Although debates over protection often make reference to different sectors of the economy, most international comparisons of productivity work only in terms of aggregate productivity measures. Here, we

draw on the data presented in Broadberry (1998) to examine the links between openness and productivity performance at the sectoral level. Although Britain was overtaken by the United States during the 1890s and by Germany during the 1960s, the sectoral patterns of changing productivity performance are very different from those emphasised in the conventional literature. In particular, we point to the importance of the later structural shift out of agriculture in the United States and Germany and to overtaking in services rather than in industry. In all three countries, trends in openness followed a U-shaped pattern with high levels of openness before World War I and after World War II, separated by a protectionist interlude. However, whereas the pre-World War I level of openness was surpassed by the 1970s in Germany and by the early 1980s in the United States, this was not the case in Britain, even by 1990.

Sections IV to VI consider shorter periods in the light of the long run evidence, paying particular attention to sectoral issues. First, we see that as a result of the openness of the British economy, agriculture was unusually small in nineteenth century Britain, allowing resources to be deployed in the higher value added industrial and service sectors. This benefit of openness is rarely considered alongside the costs to British industry of retaining open markets when tariffs were being raised against British exports. Second, many writers criticise the cosmopolitan service sector for neglecting domestic industry. However, this ignores the importance of the outward orientation of services for service sector productivity, and the growing importance of services for productivity performance overall. Third, the trend of British industrial performance was not improved by protection when it was applied in the 1930s, despite the claims of the tariff reformers. Furthermore, protective attempts to avoid de-industrialisation after World War II had an adverse effect on productivity performance in industry and in the aggregate economy.

II. BRITAIN'S LONG RUN PRODUCTIVITY PERFORMANCE

Table 1 presents sectoral estimates of comparative labour productivity levels for the US/UK and Germany/UK cases over the period 1870-2000, derived from Broadberry (1997b; 1997c; 1998; 2006). The United States and Germany were Britain's main trading rivals during most of this period. The concept of labour productivity used here is output per person engaged. For the whole economy, labour productivity in the United States was about 90 per cent of the British level in 1870, and the United States overtook Britain as the aggregate labour productivity leader during the 1890s and continued to forge ahead to the 1950s. Since then, there has been a slow process of British catching-up, but by 1990 there was still a substantial aggregate Anglo-American labour productivity gap of more than 30 per cent, which increased again during the second half of the 1990s, as US productivity surged with the diffusion of ICT (Jorgenson and Stiroh, 2000). Turning to the Germany/UK comparison, for the whole economy, German labour productivity in 1871 was about 60 per cent of the British level, and had still reached only about 75 per cent of the British level by World War I. After a setback across the war, Germany again reached about 75 per cent of the British level by the mid-1930s, rising to about 80 per cent by the late 1930s. After another setback across World War II, Germany continued to catch-up, overtook Britain only during the mid-1960s and by 1979 had a labour productivity advantage of more than 25 per cent. However, this German advantage has been much reduced during the 1980s and 1990s.

The sectoral patterns of comparative productivity performance are quite varied. Here the nine-sector analysis provided in Broadberry (1998) has been simplified onto a three-sector basis, distinguishing between agriculture, industry and services, as in Broadberry and Ghosal (2002) and Broadberry (2005). Industry includes mineral extraction, manufacturing,

construction and the utilities, while services includes transport and communications, distribution, finance, professional and personal services and government. Both Germany and the United States caught-up with and overtook Britain in terms of aggregate labour productivity largely by shifting resources out of agriculture and improving their comparative productivity performance in services rather than by improving their comparative productivity performance in industry (Broadberry, 1998).

Broadberry (1993) first established that comparative labour productivity in manufacturing has remained stationary in both the US/UK and the Germany/UK cases since the late nineteenth century, and Table 1 shows that this result generalises to industry as a whole. By contrast, in both cases the aggregate labour productivity ratio moves broadly in line with the labour productivity ratio for services. Although both Germany and the United States have improved their labour productivity performance relative to Britain in agriculture, there has also been a dramatic decline in the importance of agriculture, which can be seen in Table 2. Whereas in 1870 agriculture accounted for about half of all employment in Germany and the United States, by 1999 this had fallen to under three per cent. The shift out of agriculture has nevertheless had an important impact on comparative productivity performance at the aggregate level. This is because in the late nineteenth century Britain already had a much smaller share of the labour force in agriculture, which has had a substantially lower value added per employee than in industry or services. Hence the large share of resources tied up in agriculture in the United States exercised a significant negative influence on the aggregate US productivity performance relative to Britain in the late nineteenth and early twentieth centuries, and as the importance of agriculture declined this negative influence was removed. Similarly, the relatively large share of resources in German agriculture had a negative effect on Germany's aggregate productivity performance relative to Britain until after World War II.

Note that Germany in 1950 had a bigger share of the labour force in agriculture than Britain in 1871.¹

The labour productivity differences in Table 1 may be explained in part by differences in capital intensity. So before we turn to measures of openness, it will be useful to provide estimates of comparative levels of total factor productivity (TFP), where TFP measures the productivity of labour and physical capital, weighted by their respective shares in income.² Comparing Table 3 with Table 1, we see that although capital explains a part of the labour productivity differences between the three countries, it is not sufficient to eliminate differences in TFP, some of which may be explained by openness.

For the US/UK case, trends in comparative TFP and labour productivity at the aggregate level are similar, but with TFP differences generally smaller than labour productivity differences. One point worth noting here is that whereas the United States overtook Britain before World War I in terms of labour productivity, it was only between the wars that the United States gained a TFP advantage. This would be consistent with the emphasis of Abramovitz and David (1973; 1996) on the importance of capital rather than TFP in American economic growth during the nineteenth century. It is also consistent with McCloskey's (1970) claim that Victorian Britain did not fail, in the sense that the United States was still catching-up in terms of aggregate TFP levels. In services, too, note that US overtaking of Britain also occurred later in terms of TFP than in terms of labour productivity. For the Germany/UK case, again comparing Tables 1 and 3 we see that trends are very similar

¹ Conventional shift-share analysis fails to capture the importance of structural change because it is based on the assumption that the high rates of productivity growth in the shrinking agricultural sector would still have been achieved even if labour had not left the sector. See Broadberry (1998) for an alternative calculation.

²The share of capital declines from 0.4 before World War I to 0.25 after World War II. These shares are derived from Matthews et al. (1982), Kendrick (1961) and Hoffmann (1965).

for comparative TFP and labour productivity at the aggregate level, with differences in TFP generally smaller than differences in labour productivity. Note that in industry, Germany had caught up with Britain in terms of TFP as well as labour productivity before World War I.

III. TRENDS IN OPENNESS

1. International trade and protection

The most commonly used measures of the degree of openness are the shares of imports and exports in GDP. Trade ratios can be calculated both for goods and for goods and services. For the United Kingdom, the figures in Table 4 show a period of increasing openness before World War I, while trade ratios declined during the period between the wars. The early post-World War II period, although relatively open compared to the interwar period did not match the degree of openness seen before World War I. Even by the late 1980s, the British export trade ratios had not regained their pre-1914 levels.

Since we shall be concerned with Britain's policies and performance in an international context, it will be helpful to consider the trade ratios in the United States and Germany, Britain's main trading rivals over most of this period. In both Germany and the United States, trade ratios declined between the wars and rose again after World War II. In contrast to Britain, however, the pre-World War I degree of openness was decisively surpassed, by the 1970s in the case of Germany and by the 1980s in the case of the United States. This is also true for trade in goods compared with GDP in goods production which, given the rise of non-tradable services over time, is sometimes regarded as a better indicator (Feenstra, 1998).

It is natural to link the U-shaped pattern of the trade ratios to changes in the level of protection. Figures on the ratio of duties to total imports are given in Table 5. Although this ratio gives an imperfect measure of changes in tariff rates, most writers find that it captures the broad movements (Capie, 1994: 31-32). For Britain, it is necessary to exclude revenue-raising duties on tobacco and petroleum to obtain an accurate picture of the pattern of protection, particularly since World War II. The trend towards free trade in Britain during the nineteenth century is clearly visible, using both the total and adjusted customs revenue to import value ratios. The retreat from free trade in the interwar period is equally clear, culminating in the General Tariff of 1932. For the post-World War II period, however, it is important to remove the customs duties on tobacco and petroleum, which should not be seen as protective (Lindert, 1991). Then the return to openness is more apparent.

For the United States, data are available on the ratio of duties to dutiable imports, as well as the ratio of duties to total imports. Although the former ratio is somewhat higher, the trend is very similar to that for the ratio of duties to total imports. A declining level of protection in the first half of the nineteenth century was sharply reversed during the Civil War decade, and although there was a further downward drift in the level during the period 1870-1913, protection remained high by international standards before World War I. The United States remained protectionist between the wars, with the Fordney-McCumber and Hawley-Smoot tariffs of 1922 and 1930, respectively, before becoming increasingly liberal under the GATT system during the post-World War II period.

German data on the ratio of customs duties to total imports are given in Table 5 for the period after the formation of the German Reich. Although there was a small increase during the 1880s, the degree of protection was much closer to the British than to the

American level. Alternative data on the unweighted average level of duties confirm that the scale of the retreat from free trade in Continental Europe towards the end of the nineteenth century should not be exaggerated (Liepmann, 1938). Thus, for example, Capie (1983: 26) reports an average *ad valorem* rate of duty of 8.4 per cent for Germany in 1910. The rise of protectionism in Germany between the wars, particularly with the growth of bilateralism under the Third Reich, is clearly visible in Table 5. Equally clear is the firm embrace of a liberal trading policy after World War II. Given the strong trading links with other European countries, European integration via the EEC has resulted in very low ratios of customs duties to imports in Germany. However, Weiss (1988) offers a qualification to this view, noting the growth of subsidies to a number of German industries, thus to some extent undermining the liberal regime (Giersch et al., 1992).

2. Trade blocs

In this section we examine trends in British exports to see how Britain came to be increasingly dependent on Empire markets between the late nineteenth century and the mid-twentieth century. The key factor was the growth of protectionism in the United States and Germany during the late nineteenth century, which before World War I culminated in a division of the world into spheres of influence by the three major manufacturing countries (Taussig, 1892; Schlote, 1952; Hoffman, 1933). A survey of many of the pre-1914 international combines is given in Plummer (1951: 4-10). The chemical industry was one of the most prone to international combination, with formal agreements in alkalis and explosives. As Reader (1970: 60) puts it, "In deciding how to share markets, the principle generally followed in each group, was that the British member..... should have the markets of Great Britain and the British Empire; the European member or members, Europe. Markets elsewhere in the world were a matter for negotiation. The USA, the richest, stood alone by

reason of the formidable nature of the natives. Latin America, where both British and European connections were strong, was apt to be looked upon by American companies, particularly in the explosives trade, as being covered by a businessman's version of the Monroe Doctrine..... For the purposes of market-sharing the Russian Empire was generally taken as a province of Europe and the Chinese as a dependency of the British."

The upshot of these trends was a clear move towards concentration by British producers on Empire markets from the late nineteenth century. Furthermore, as Schlote's (1952) data in Part A of Table 6 show, this was a new departure, since there was no clear upward trend in the Empire share of British exports between 1830 and 1870. The trend towards concentration on Empire markets, particularly the Dominions of Australia, New Zealand, the Union of South Africa, Canada and Newfoundland, accelerated in the interwar period. The upheaval in the British trade data caused by the independence of the Irish Free State does not affect these trends, since the share can be calculated on both the old and the new basis in Parts A and B of Table 6. Continuing to 1990 in Part B of Table 6, the share of British exports to the original six members of the EEC as well as the share to "British countries" can be seen. Clearly the rise to dominance of Empire markets (peaking at 55% in 1951) was the other side of a serious decline in the importance of Continental European markets during the interwar and transwar periods. Imperial Preference was clearly no small sideshow for the British economy in the twentieth century. Indeed, as Drummond (1974: 426) notes, Imperial economic matters took up more Cabinet time than any other aspect of economic affairs between the wars. As late as 1970, more British exports were going to "British countries" than to the EEC. Since Britain joined the EEC in 1973, however, trade with "British countries" (including the Republic of South Africa and the Irish Republic) has dramatically declined in importance.

3. The protectionist period

Although the highest levels of protection for the UK economy were seen in the 1940s, it is important to recognise that protectionism was quite significant until the late 1970s.

Protectionism was the order of the day throughout the years when relative economic decline was at its peak. Table 7 underlines the slowness of the retreat from protectionist policies in three ways. First, it is shown that in the late 1950s, virtually across the whole manufacturing sector tariffs were considerably higher than in West Germany. Second, we see that average tariff rates for UK manufacturing were still as high in the early 1960s as they had been in the 1930s. Third, a measure of trade costs relating to UK-France and UK-Germany trade flows is seen to have remained above the 1929 level until the 1970s. The 1970s fall in trade costs was driven by trade liberalization; had this taken place earlier, for example, through accession to the EEC at the Treaty of Rome, trade costs could have been below the 1929 level much earlier.

IV. FREE TRADE BRITAIN, 1870-1914

Before 1914, Britain's continued commitment to openness despite growing restrictions abroad had beneficial effects on aggregate productivity performance through the shift of resources out of low value added agriculture and high productivity in Britain's cosmopolitan commercial and financial service sectors. These factors are rarely given sufficient weight in the literature on British growth, which focuses on the difficulties faced by British industry as a result of tariffs faced in foreign markets and dumping by foreign producers in the British market. This section will consider in turn the situation in industry, agriculture and services before turning to an aggregate perspective.

1. Industry

The disadvantage faced by British industry in foreign markets on the eve of World War I is easily demonstrated in Table 8. Part A shows *ad valorem* tariff rates on a number of British exports in 1903. The countries are listed in descending order of the degree of protection, as measured by the weighted average tariff rate across 31 commodities, using British export weights. The average tariff faced by British industrial exporters ranged from 131 per cent in Russia to 3 per cent in the Netherlands. Part B is taken from Grunzel's (1916) study of tariffs on a multilateral basis in 1913, with tariffs presented in terms of German marks per hundred kilograms. An average of tariffs on this basis would not be meaningful, but it is clear from the ordering of countries for individual commodities that the averages in Part A, based on British export prices and values, do indeed broadly reflect the multilateral situation. The United States was clearly a country with very high industrial tariffs, Germany was moderately protective and Britain was a free trade country. Notice also from Part B that Germany had a high tariff on wheat, the key agricultural product, a theme that will be taken up in the next section.

2. Agriculture

Although the fact that free traders in nineteenth century Britain pointed to the benefit to consumers of cheap grain prices arising from free trade in corn has been widely noted, the implications for productivity in domestic agriculture have not really been spelled out (Imlah, 1958: 145-146). In Britain, the main impact of the grain invasion from the New World was a shift of the product mix away from grain towards higher value-added pastoral products, coupled with higher capital intensity in what remained of the British arable farming sector (Ó Gráda, 1994: 149-156; Brown, 1987: 25-26, 33). As a result, the high levels of labour productivity that already characterised British agriculture during the Industrial Revolution were raised still further, and the relatively small British agricultural sector continued to

achieve output per worker levels on a par with the United States before World War I. The highest levels of labour productivity were recorded in the parts of the New World concentrating on pastoral products, especially Australia, New Zealand and Argentina (Rostas, 1948: 80). In much of continental Europe, however, the response to the grain invasion from the New World was an intensification of agricultural protection from the 1870s to World War I (Bairoch, 1989: 51-69). With grain prices maintained artificially high by tariff barriers, low productivity continental farmers were able to remain in business. Given the weight of agriculture in overall economic activity at the time, this had important consequences for aggregate productivity performance which lasted well into the post-World War II period.

3. Services

One of the outstanding features of the period between the mid-nineteenth century and World War I was the emergence of Britain as the centre of the world system of trade and payments. As a result, Britain's cosmopolitan service sector generated between 20 and 25 per cent of total exports between 1870 and 1913, as can be seen in Table 4. The major service sectors generating exports were transport and communications (particularly shipping), distribution (particularly wholesale merchanting) and financial services (particularly insurance and merchant banking). Imlah (1958: 70-75) provides figures on the net credits generated by these three sectors, which made a substantial contribution to the current account of the balance of payments, fluctuating between about 7 and 9 per cent of GDP. For Germany, by contrast, the much smaller and less productive service sector generated a net surplus on the current account of 2 to 3 per cent of GDP.³

³ Figures from Hoffmann (1965: 817, 825-826).

The openness and cosmopolitanism of the British service sector has nevertheless been seen traditionally as a problem in much of the literature on British economic growth, which is heavily oriented towards manufacturing. Perhaps the most obvious manifestation of this view is the claim that domestic manufacturing industry was starved of capital as a result of cosmopolitan financiers based in the City of London directing British savings overseas (Kennedy, 1987; Best and Humphries, 1986). Whilst Collins (1990; 1998) provides many reasons to be sceptical of this view, we note here two points which have received insufficient attention in the literature. First, value added per employee was relatively high in financial services, so that Britain's large and specialised financial service sector made a positive direct contribution to Britain's overall productivity position. Second, the marketed services sector including finance was the one in which Britain's productivity relative to Germany and the United States was strongest in the period leading up to World War I (Broadberry, 2006: 37, 48).

4. An aggregate perspective

A number of writers have pointed to a systematic negative relationship between openness and growth in this period (Bairoch, 1989; Jacks, 2006; O'Rourke, 2000) although this remains open to question depending on the methodology and sample used (Schularick and Solomou, 2009; Tena-Junguito, 2009). This might seem to indicate that the UK would have been well-served by discarding free-trade policies in favour of the protection that was the norm in Continental Europe.

There are, however, a number of reasons to be sceptical of making this inference. First, a closer analysis suggests that, at best, it is only tariffs on manufacturing and not on agriculture that are correlated with growth (Lehmann and O'Rourke, 2008) yet the politics of

protectionism in Europe was based on coalitions that protected both sectors. In Germany, agriculture was much more heavily protected than manufacturing with tariff revenue relative to imports at 12% (UK = 1%) compared with 5% (UK = 3%). Second, the case for protecting manufacturing was surely strongest in a context of infant industries and capital market failure. This does not fit well with the UK at this time (Michie, 1988) and, as noted above, Britain was not in fact falling behind in terms of manufacturing labour productivity before World War I. The long-standing transatlantic labour productivity gap in manufacturing was stationary between 1870 and 1913 and no other European country was substantially ahead of Britain by 1913 (Broadberry, 1997a: 52-57). In any event, the tariff proposals that were made by Chamberlain would have tended to divert activity toward traditional sectors such as agriculture and textiles rather than new growth industries (Thomas, 1984) and tariff protection was irrelevant to the services sector which was the locus of American out-performance in productivity growth (Irwin, 2001).

Third, and most important, the long-run effects of free trade on the level of income in the UK are likely to have been substantial and positive. In the recent past the strongest evidence of a positive effect of openness on the level of income was provided by Frankel and Romer (1999) later confirmed by Feyrer (2009) in a paper which deals very well with the identification problem. Jacks (2006) found that similar but rather stronger results are also obtained for the 19th century. Table 9 reports the implications of this analysis for the UK compared with Germany, namely, that the much lower trade exposure of Germany resulting from the protectionist coalition implied a substantial income loss.

These results make sense in the context of Anglo-German productivity comparisons. As noted in Broadberry (1997c), Germany had caught up with Britain in all industrial sectors

before World War I, but German aggregate labour productivity nevertheless remained at about three-quarters of the British level. This can be explained in part by low productivity in German services, but agriculture played a more important part since: (1) the productivity gap was larger in agriculture than in services; (2) agriculture accounted for a larger share of employment than services; (3) value added per employee was lower in agriculture than in services. Openness promoted a shift out of agriculture into higher value-added services in the UK; protection obstructed this in Germany.

V. PROTECTION AND IMPERIAL PREFERENCE, 1914-1950

Once again, the conventional analysis focuses on industry and neglects the implications for agriculture and services. Protectionism was accompanied by a policy of imperial preference, which had a significant impact on the geographical orientation of British business activity, in services as well as in industry. This was to create difficulties of adjustment when the world economy reintegrated after World War II. As for the pre-1914 period, it will be useful to consider industry, agriculture and services in turn.

1. Industry

Kitson and Solomou (1990) accept the conventional view that protectionism was bad for the world economy as a whole between the wars, but make the more limited claim that the British adoption of a general tariff in 1932 was a second best policy given the extent of protectionism abroad. One issue concerns the impact of the tariff on the level of economic activity. A cyclical recovery would be expected to have had beneficial effects on productivity in the short run, since employment lagged behind output in the economic cycle.⁴ However, the more

⁴ Although the direction of the effect is not in dispute, it is likely that Kitson and Solomou (1990) overstate its magnitude. Since the tariff was imposed after Britain left the gold standard, any improvement in the balance of

striking claim made by Kitson and Solomou (1990: 10-16) is that the tariff caused an increase in the trend rate of growth. An obvious difficulty with this argument can be seen in Table 10; growth of GDP was faster during the 1920s than during the 1930s.⁵ Even if attention is confined to industrial production, the acceleration of growth in the 1930s is surely insufficient to warrant claims of a change in trend. However, Kitson and Solomou (1990: 12) argue that the high growth of the 1920s was just a cyclical phenomenon bringing the economy back to the trend for the period 1899-1929. So although actual growth did not increase during the 1930s relative to the 1920s, Kitson and Solomou nevertheless see an increase in trend growth during the 1930s relative to the trend for the longer period 1899-1929. This can be seen in Table 10 for compromise GDP as well as for industrial production. However, the argument is obviously highly dependent on the periodisation imposed on the data. If a break in trend is tested for rather than imposed, the Kitson and Solomou claim is easily rejected. For industrial production over the period 1879-1938, Greasley and Oxley (1996) find a break in trend at 1920 and crashes at 1914 and 1920, but reject a break in trend at 1929. For GDP, Mills (1991) finds a major regime shift only after the deep recession of 1921.

Was the interwar tariff good for productivity performance in British manufacturing?

Kitson and Solomou (1990) suggest that it was, at least, in the short term, and they report that labour productivity growth in industries that were newly-protected in 1932 showed an increase of 2.28 percentage points in 1930-5 relative to 1924-30 compared with 0.03 percentage points in the non-newly protected industries.

trade brought about by the tariff may be expected to have caused exchange rate appreciation, offsetting the competitive gain from the tariff (Broadberry, 1986: 132-138).

⁵ Kitson and Solomou (1990: 11) report figures for 1925-29 rather than the conventional peak-to-peak period 1924-29; this has the effect of showing the growth rate of compromise GDP at 2.0 per cent per annum during both the 1920s and the 1930s. The explanation given for the unconventional choice of dates is that "1924 is far too close to the 1921 depression to be regarded as a peak year in economic activity." (Kitson and Solomou, 1990: 11).

Table 11 revisits this analysis. We look at a 3-way division of industries into those which were protected before 1932 through the McKenna and Key Industry duties, industries which received a new tariff of at least 20 per cent under the 1932 Import Duties Act, and industries which either received no protection or the general ad valorem duty of 10 per cent (and were generally not exposed to import competition) based on the information given in Hutchinson (1965) and Sebag-Montefiore (1943). We also consider longer-run differences in productivity growth by comparing 1935-48 with 1924-35 since this is likely to reveal any adverse effects of reduced competition on managerial incentives to control costs.

The results in Table 11 show that granting additional protection in 1932 had a positive but statistically insignificant effect on productivity growth in the short run and a negligible impact in the longer run. Interestingly, the difference in productivity growth for 1935-48 compared with 1924-35 is significantly negative for industries that had experienced a prolonged period of protection suggesting that they may have been in the comfort zone for too long. Contrary to Kitson and Solomou (1990), there is nothing here to suggest that protection was a policy conducive to improved productivity performance.

2. Agriculture

It is worth noting that the strategic justification for protecting agriculture in peacetime so as to secure food supplies during war did not prove to be of much value during the twentieth century. As Olson (1963: 138-140) notes, it was Germany rather than Britain that succumbed to blockade during World War I. Olson (1963: 138-139) points to the ability of the British agricultural sector to expand output on the stored-up fertility of grasslands brought back into arable use compared with the inability of German agriculture to maintain output at full stretch

in the face of wartime disruption. However, Olson (1963: 146) also stresses the flexibility of the British service sector through administration as well as distribution as the decisive factor.

One factor behind the increase of arable output in Britain during World War I was a system of guaranteed minimum prices set under the Corn Production Act of 1917. If market prices fell below the minimum for the following six years, farmers were to receive deficiency payments equal to the difference between the market and minimum prices on the volume of output that they produced (Whetham, 1978: 94-95). The system was extended for an indefinite term in the Agriculture Act of 1920, but when agricultural prices suddenly collapsed the legislation was hastily repealed in 1921 in what became known in farming circles as the “Great Betrayal” (Whetham, 1978: 139-141). Apart from a system of beet sugar subsidies introduced in 1924, there were few measures to protect agriculture during the 1920s, which continued to be a difficult time for British farmers, particularly arable producers. During the 1930s, however, a wider range of protective measures was introduced as prices collapsed still further. Although tariffs and quotas were used in some cases, support for agriculture generally took the form of subsidies and marketing schemes. This was partly as a result of government desires to keep food prices low, but it also reflected the policy of imperial preference. If Britain was to obtain access to Empire markets for industrial exports, then Empire farmers had to have access to the British market for agricultural produce. Hence Brown (1987: 118) sees protection as a great disappointment to British farmers.

As during World War I, Britain was able to survive blockade by Germany during World War II (Olson, 1963: 140). During the later 1930s, as the prospect of war approached, the government made preparations for the expansion of agricultural output, and this was achieved much more rapidly during World War II than during World War I (Brown, 1987:

125-146). Again, it was the possibility of expansion on the grasslands combined with the flexibility of the British service sector that proved decisive (Olson, 1963: 146).

3. Services

Most accounts of inter-war British economic history emphasise the detrimental effects of the return to the gold standard at the pre-war parity in 1925. The openness and outward orientation of the financial services sector is usually seen as the driving force behind this decision, while industry is seen as bearing the costs of the overvalued exchange rate that resulted. The costs of the overvalued exchange rate have been the subject of much debate, with a number of studies attempting a quantitative evaluation (Moggridge, 1972; Broadberry, 1986). However, the benefits for productivity of an outward oriented service sector are not usually considered in such studies; this gives the literature a bias towards industry. However, as we have seen in Table 1, it is the loss of productivity leadership in services that mirrors most closely Britain's overall loss of productivity leadership.

An important motivating factor behind the return to gold was a widespread belief in the City that Britain's prosperity depended on resurrecting the pre-war liberal international financial and trading systems (Pollard, 1970). The downward spiral following the onset of the Great Depression in 1929 clearly put an end to such hopes, but there were sufficient signs of a revival in the commercial bill acceptance market and new capital issues during the 1920s to suggest that such hopes were not completely without foundation (Ellinger, 1940: 374; Balogh, 1947, 249-250; Broadberry, 2007: 268-272). Furthermore, it is clear that the collapse of the liberal world economic order had a much greater negative impact on the highly globalised British economy than on either the domestically oriented US economy or the more highly protectionist German economy of the pre-1914 period. The response of the British economy

to these events was a growing integration within the British Empire, which although possibly beneficial in the short run, created long run costs of adjustment.

It should be stressed that the above argument is not intended to deny the costs imposed by the exchange rate overvaluation, which arose from a perception that the influence of the City of London would be best maintained by a return to gold at pre-war parity. However, it does suggest that ex-ante there was also a positive side to the balance sheet, which should not be neglected. Had the return to gold been part of a successful re-establishment of a globalised world economy rather than the precursor of a globalisation backlash, Britain would have gained from expansion of its internationally-oriented market services.

4. The legacy of interwar protectionism

It is important to recognise that the protectionist 1930s cast a long shadow over the post-war period in Britain. Oulton (1976: 81) claimed that “the schedule of effective tariffs in the 1960s can therefore be regarded as largely the product of the economic, social and political stresses of World War I and the great depression” given the similarity with the 1930s. This is perhaps an overstatement but there is quite a high correlation, as Table 12 reveals; only in the 1970s does this evaporate completely. Clearly, once put in place, the political economy of protectionism generates persistence.

This had unfortunate implications for productivity performance through the impact that protectionism had in sustaining market power. Price-cost margins were very high in post-war British manufacturing until the trade liberalization of the 1970s (Crafts and Mills, 2009). There is clear evidence that in the early post-war period the weakness of competition

contributed to productivity problems and relative economic decline (Broadberry and Crafts, 1996; Symeonidis, 2008). This is to be expected given that UK firms were exceptionally prone to problems arising from the separation of ownership and control to which greater competition could have been an important antidote. Not surprisingly, Proudman and Redding (1998) found that openness and productivity growth were positively correlated across manufacturing sectors after 1970.

Kitson and Solomou (1990) stop their analysis at the end of the 1930s, but note in the very brief conclusion to their book that the tariff may have prevented the necessary structural change that would have accelerated economic growth after World War II. Quite so. The same may be said of the policy of imperial preference. We have already seen in Table 6 that by the end of World War II more than half of Britain's exports were going to Empire markets, and for some industries the Empire share of Britain's exports was more than three-quarters.⁶ This may be seen as helping to maintain the level of economic activity in the short run, but creating problems of adjustment in the long run.

The trans-World War II period saw an increase in the share of the labour force employed in agriculture and industry, which went against the trend since the mid-nineteenth century. Within the context of a controlled economy, both capital and labour inputs were directed into manufacturing, mining and agriculture on strategic grounds. Yet, as Matthews et al. (1982: 235-236) point out, the increase in total factor input growth was offset by a decrease in TFP growth, suggesting a tendency to diminishing returns.

VI. BRITAIN IN THE WORLD ECONOMY, 1950-2000

Protection for industry and agriculture continued after World War II. The proportion of the labour force in manufacturing continued to rise until 1960, as post-war governments sought to encourage exports and avoid balance of payments problems while maintaining a fixed exchange rate (Matthews et al., 1982: 221). Many restrictions on openness, including quotas, tariffs and exchange controls, were needed to maintain external equilibrium with the over-expanded agricultural and industrial sectors (Foreman-Peck, 1991).

As the world economy reintegrated on a liberal basis, particularly from about 1960, British industry faced major problems of adjustment. As well as an inevitable reduction in the share of the labour force devoted to industry, there were adjustment costs in switching from Commonwealth to European markets. However, the process of adjustment has had benefits as well as costs. As productivity growth in manufacturing accelerated during the 1980s, and as output and employment expanded rapidly in services, the long period of British relative economic decline came to an end. Furthermore, as the European economy became more integrated, economies of scale and standardisation helped to reduce the transatlantic productivity gaps in industry and services. Although agricultural protection has remained high under the Common Agricultural Policy, with adverse consequences for food prices, agriculture is now too small a part of the economy for this to have a major impact on productivity in the economy as a whole.

1. Industry

Matthews et al. (1982: 235-236) point to the slowing down of TFP growth despite the increase in the growth of total factor input during the trans-World War II period as evidence of diminishing returns in manufacturing. Similarly, in mineral extraction, TFP growth became

⁶ In 1948, this was the case for fertilisers, cotton cloth, hosiery, carpets, tobacco and glass.

negative as the movement of inputs out of the sector slowed down. It is perhaps not surprising, then, that during the early post-war period the over-extended manufacturing and mineral extraction sectors required protection. In the coal industry, import licences were granted only to the state-owned National Coal Board for use at times when home production fell short of demand (Ashworth, 1986: 47). In addition, the coal industry received substantial financial support while its major customers, the electricity supply and gas industries, were required to burn more coal than warranted by purely economic considerations (Buxton, 1978: 239). In manufacturing, the early post-war period was characterised by the widespread use of import quotas, while the rationing of key inputs such as steel helped to direct resources towards export industries (Foreman-Peck, 1991: 159-160; Dow, 1965: 153-162). As controls were removed in line with a return to a more liberal world trading environment, the British economy continually ran into balance of payments problems. In 1964 the incoming Labour government imposed a surcharge on manufactured imports in an ultimately unsuccessful attempt to avoid devaluation (Foreman-Peck, 1991: 161). They also imposed a selective employment tax (SET) to encourage labour into industrial rather than service sector employment (Cairncross, 1992: 158-159).

British industry faced additional difficulties during the early post-war period arising from the legacy of imperial preference policies adopted between the wars. Just when investment in marketing and after-sales service was becoming more important, British industry found itself oriented towards distant markets in which Britain had secured a strong position only through preferential treatment. Sometimes, the preferential treatment was rapidly withdrawn after World War II. In the motor vehicle industry, for example, high tariffs in Australia effectively closed off Britain's most important inter-war market, while exchange controls made it difficult to invest in adequate marketing and after-sales service in

Continental Europe (Whisler, 1994: 5). Since spare parts were not included in export quotas, serious damage was done to the reputation of British cars in this important market (Dunnett, 1980: 37). In Table 6 we see that during the 1960s there was a dramatic decline in the share of British exports going to Commonwealth markets, which were overtaken in importance by the EEC during the 1970s.

The decision to join the EEC in 1973 together with the Kennedy Round of the GATT accelerated the process of increasing openness. However, as the process of de-industrialisation also threatened to accelerate during the 1970s, governments continued to protect industry through industrial policies that effectively subsidised “lame ducks” (Millward, 1994: 163-165). The evidence regarding these interventionist policies is that they slowed down much-needed structural adjustment. The picture is that “it was losers like Rolls Royce, British Leyland and Alfred Herbert who picked ministers... What was described as ‘picking winners’ appeared in practice to amount to spending large sums shoring up ailing companies” (Morris and Stout, 1985: 873).

This policy changed under the Conservative governments of the 1980s, with dramatic effects on both the size of the industrial sector and its productivity performance. As employment in manufacturing shrank by about 2 million between 1979 and 1989, labour productivity growth accelerated to 4.2 per cent per annum after stagnating at 0.7 per cent per annum during the previous cycle, 1973-1979 (Broadberry, 2004). Table 13 shows the dramatic turn-round of British productivity performance relative to Germany in a number of industries, notably aerospace, iron and steel, and motor vehicles, the last two of which had seen heavy protection removed during the 1970s. More generally, a difference-in-differences

analysis of productivity growth before and after 1979, reported in Table 14, suggests that the removal of such protection had a favourable impact on productivity performance.

2. Agriculture

Whereas the encouragement of agricultural production during World War I was followed by the virtual elimination of support during the “Great Betrayal” of 1921, World War II was followed by the reinforcement of support in the 1947 Agriculture Act (Holderness, 1985: 12-13). However, the British system of agricultural protection did not involve the sacrifice of low food prices for consumers. Building on the pre-war schemes, farmers received deficiency payments when market prices fell below guaranteed prices. This was less damaging than the variable levy system, which raises the price to consumers as well as producers (El-Agraa, 1994: 212-214). However, Britain adopted the Common Agricultural Policy of the EEC in 1973, based upon the variable levy system. The scale of support for agriculture during the 1970s and 1980s was considerable, and this can be seen in the return of Britain to self-sufficiency in many agricultural products. Even in wheat, where imports accounted for 77 percent of consumption in 1936-39, imports had fallen to 23 per cent of consumption by 1980-81 (Holderness, 1985: 174). Nevertheless, agriculture is now such a small part of the economy that its impact on the overall level of productivity is relatively insignificant.

3. Services

As during the inter-war period, the outward orientation of the financial service sector has often been seen as a disadvantage during the post-war period. Pollard (1984: 85-88) argues that during the Bretton Woods era, the desire to retain an international role for sterling led to an overvalued exchange rate, which undermined the competitiveness of British industry. This echoes his views on the inter-war period, where he emphasises the costs to industry of the

return to gold in 1925 at pre-war parity, but ignores the importance of high productivity in services for Britain's overall productivity performance. In fact, international financial services is one of the few sectors where Britain has retained a strong competitive position (Smith, 1992). In many other parts of the service sector Britain's performance has been undistinguished, and it is the deterioration of comparative productivity performance in services that accounts for much of Britain's relative economic decline overall. Since large parts of the service sector have been relatively closed to international competition, it is likely that contrary to the Pollard view, it is the sheltered nature of much of the service sector rather than the openness of international financial services that has been damaging for overall productivity performance.

4. Reversing relative economic decline

From a low point at the end of the 1970s, relative British economic performance has recovered. By 2007, on the eve of the financial crisis, real GDP per person was about 9 per cent ahead of that in the West German *Länder* and 4 per cent ahead of France compared with 14 per cent and 12 per cent behind, respectively, in 1979. A long period of relative economic decline with continental Europe had come to an end.

The evidence suggests that this has been the outcome of a move towards an economy based less on protection and regulation and more on competition than in the decades from the 1950s through the 1970s. In addition, labour market policies have been conducive to higher levels of employment. In complete contrast to the early post-war period, the UK has become an economy with relatively low levels of regulation and relatively strong competition by OECD standards (Conway and Nicoletti, 2006; Hoj et al., 2007). This has been a favourable

environment in which to exploit the ICT-era opportunities of new technology especially in market services (Nicoletti and Scarpetta, 2005).

VII. CONCLUDING COMMENTS

This paper provides a quantitative economic analysis of the links between openness and productivity performance in Britain between 1870 and 1990, paying particular attention to sectoral issues and focusing on three sub-periods. (1) Before 1914, Britain's continued commitment to openness despite growing restrictions abroad had beneficial effects on aggregate productivity performance through the shift of resources out of low value added agriculture and high productivity in Britain's cosmopolitan commercial and financial service sectors. These factors are rarely given sufficient weight in the literature on British growth, which focuses on the difficulties faced by British industry as a result of tariffs faced in foreign markets and dumping by foreign producers in the British market. (2) Between the wars, given the drift into autarky in much of the world, the policies of protection and imperial preference can be seen as raising the level of domestic activity, with beneficial cyclical effects on industrial productivity in the short run. However, claims of a shift in the trend rate of growth cannot be sustained. As for the pre-World War I period, conventional analysis concentrates on industry and neglects the implications of the trade regime for agriculture and services. (3) Within the controlled wartime British economy, industry and agriculture were expanded on strategic grounds, and the expansion continued during the early post-war period for balance of payments reasons. As the world economy reintegrated on a liberal basis, however, some de-industrialisation was inevitable. The adjustment problems of industry were compounded by a need to switch from Commonwealth to European markets. However, the process of adjustment, which accelerated with the increased openness of the 1980s, has had benefits as well as costs. Dramatic improvements in Britain's industrial productivity performance and

rapid expansion of output as well as employment in services have brought the long period of British relative economic decline to an end.

TABLE 1: Comparative US/UK and Germany/UK labour productivity levels by sector, 1869/71 to 1999 (UK=100)

A. US/UK				
	Agriculture	Industry	Services	Aggregate economy
1869/71	86.9	153.6	85.9	89.8
1889/91	102.1	164.1	84.2	94.1
1909/11	103.2	193.2	107.4	117.7
1919/20	128.0	198.0	118.9	133.3
1929	109.7	222.7	121.2	139.4
1937	103.3	190.6	120.0	132.6
1950	126.0	243.5	140.8	166.9
1973	131.2	214.8	137.4	152.3
1979	156.1	186.0	137.2	145.5
1990	151.1	163.0	129.6	133.0
1999	179.6	141.4	127.9	142.5

B. Germany/UK				
	Agriculture	Industry	Services	Aggregate economy
1871	55.7	91.7	62.8	59.5
1891	53.7	99.3	64.4	60.5
1911	67.3	127.7	73.4	75.5
1925	53.8	92.3	76.5	69.0
1929	56.9	97.1	82.3	74.1
1935	57.2	99.1	85.7	75.7
1950	41.2	91.8	83.2	74.4
1973	50.8	121.1	120.1	114.0
1979	65.5	132.8	131.8	126.5
1990	75.4	111.0	134.9	125.4
1999	48.5	84.7	119.5	110.9

Sources: Derived from Broadberry (1997b; 1997c, 2006); O'Mahony and de Boer (2002).

TABLE 2: Sectoral shares of employment in the United States, the United Kingdom and Germany, 1870-1999 (%)

A. United States			
	Agriculture	Industry	Services
1870	50.0	24.8	25.2
1910	32.0	31.8	36.2
1920	26.2	33.2	40.6
1930	20.9	30.2	48.9
1940	17.9	31.6	50.5
1950	11.0	32.9	56.1
1973	3.7	28.9	67.4
1990	2.5	21.8	75.7
1999	1.2	19.5	79.2

B. United Kingdom			
	Agriculture	Industry	Services
1871	22.2	42.4	35.4
1911	11.8	44.1	44.1
1924	8.6	46.5	44.9
1930	7.6	43.7	48.7
1937	6.2	44.5	49.3
1950	5.1	46.5	48.4
1973	2.9	41.8	55.3
1990	2.0	28.5	69.5
1999	1.9	22.9	75.2

C. Germany			
	Agriculture	Industry	Services
1871	49.5	29.1	21.4
1913	34.5	37.9	27.6
1925	31.5	40.1	28.4
1930	30.5	37.4	32.1
1935	29.9	38.2	31.9
1950	24.3	42.1	33.6
1973	7.2	47.3	45.5
1990	3.4	39.7	56.9
1999	2.6	29.8	67.6

Source: Derived from Broadberry (1997b; 1997c); O'Mahony and de Boer (2002).

TABLE 3: Comparative US/UK and Germany/UK total factor productivity levels by sector, 1869/71 to 1999 (UK=100)

A. US/UK				
	Agriculture	Industry	Services	Aggregate economy
1869/71	99.5	154.2	86.5	95.2
1889/91	123.0	139.6	64.3	83.3
1909/11	118.7	150.9	71.6	90.5
1919/20	133.1	158.3	92.1	108.2
1929	118.0	187.8	92.0	112.7
1937	119.2	161.2	89.1	105.9
1950	132.6	217.6	110.2	138.1
1973	125.9	202.2	120.6	137.4
1990	138.8	157.3	119.8	125.3
1999	129.2	130.5	123.3	125.0

B. Germany/UK				
	Agriculture	Industry	Services	Aggregate economy
1871	58.4	90.5	67.2	61.6
1891	59.8	91.6	65.5	63.2
1911	71.6	106.1	76.4	75.4
1925	57.0	92.9	83.6	74.3
1929	59.3	96.0	90.0	78.5
1935	59.6	97.1	88.8	78.2
1950	44.7	89.4	89.3	76.2
1973	48.1	105.7	127.6	108.6
1990	65.4	98.5	139.0	116.5
1999	47.5	78.8	109.9	95.4

Sources: Derived from Broadberry (1997b; 1997c); O'Mahony and de Boer (2002).

TABLE 4: Trade ratios, 1870-1990 (% of GDP)**A. United Kingdom**

	Imports		Exports	
	Goods	Goods & services	Goods	Goods & services
1870	24.9	27.1	22.0	29.1
1890	26.6	28.8	22.9	29.8
1913	28.6	30.9	25.3	32.4
1925	26.0	29.2	20.3	24.9
1929	23.6	26.8	18.1	23.2
1938	15.2	18.0	10.1	13.6
1950	17.9	23.8	17.5	23.2
1970	15.7	21.4	15.7	22.2
1990	21.9	26.9	18.5	24.2

B. United States

	Imports		Exports	
	Goods	Goods & services	Goods	Goods & services
1870	5.7	6.2	5.6	6.6
1890	6.5	7.2	6.9	7.2
1913	4.6	5.6	6.6	6.8
1925	4.6	5.4	5.4	5.8
1929	4.4	5.4	5.1	5.7
1938	2.6	3.3	3.8	4.5
1950	3.2	4.0	3.6	4.3
1970	4.0	5.5	4.4	5.6
1990	9.0	11.3	7.0	10.0

C. Germany

	Imports		Exports	
	Goods	Goods & services	Goods	Goods & services
1880	16.6		17.3	
1890	17.5		14.1	
1913	20.5		19.3	
1925	18.5		13.8	
1929	16.9		17.0	
1938	5.6		5.4	
1950	11.7	12.7	11.9	15.1
1970	15.0	20.5	18.2	22.6
1990	22.8	26.3	26.6	32.2

Sources: United Kingdom: Feinstein (1972: Tables 3 and 15); *Economic Trends Annual Supplement*; United States: 1870-1929: Trade data from *Historical Statistics of the United States: Colonial Time to 1970*, series U2-U4 and U9-U11; GDP from Kendrick (1961) and Balke and Gordon (1989); 1929-90: Trade and GDP data from *National Income and Product*

Accounts of the United States, Vol.1, 1929-58, Vol 2. 1959-88, Tables 1.1 and 4.1 and Statistical Abstract of the United States; Germany: 1880-1950: Hoffmann (1965), Tables 125, 127, 248.; 1950-1988: Volkswirtschaftliche Gesamtrechnungen, 1950 bis 1990, Fachserie 18, Reihe S.15, Tables 2.2.1, 2.2.12 and 2.2.13, and Statistisches Jahrbuch für die Bundesrepublik Deutschland.

TABLE 5: Customs revenue as a share of import values in the United Kingdom, the United States, and Germany, 1820-1989 (%)

	United Kingdom		United States		Germany
	Total	Excl. tobacco & petrol	Total	Dutiable imports	Total
1820	24.0				
1830	34.3		57.3	61.7	
1840	25.4	21.9	17.6	34.4	
1850	21.7	17.6	24.5	27.1	
1860	11.6	9.1	15.7	19.7	
1870	7.1	5.0	44.9	47.1	
1880	4.7	2.7	29.1	43.5	5.8
1890	4.8	2.7	29.6	44.6	8.8
1900	4.6	2.6	27.6	49.5	8.1
1910	4.5	2.2	21.1	41.6	7.4
1913	4.4	2.1	17.7	40.1	6.3
1920	7.7	4.7	6.4	16.4	
1929	9.7	4.4	13.5	40.1	8.2
1935	24.5	10.2	17.5	42.9	30.1
1938	24.1	10.4	15.5	39.3	33.4
1940	22.7		12.5	35.6	
1945	38.2		9.3	28.2	
1950	31.2	2.9	6.0	13.1	5.4
1960	30.2	3.9	7.4	12.2	6.5
1970		3.1	6.5	10.0	2.6
1980		2.0	3.1	5.7	1.3
1990		1.4	3.3	5.2	1.3

Sources: Britain: Total customs revenue from Mitchell (1988: 581-586); Total import values from Mitchell (1988: 451-454); Customs revenue from tobacco and petrol from *Statistical Abstract for the United Kingdom, Annual Abstract of Statistics, and National Income and Expenditure*. Imports of tobacco and petrol from Mitchell (1988: 474-480) and *Annual Abstract of Statistics*. United States: *Statistical Abstract of the United States*. Germany: Customs duties and imports from Mitchell (1975), updated from *Statistisches Jahrbuch für die Bundesrepublik Deutschland*.

TABLE 6: British export markets, 1830-1990**A. British Empire share of British exports of home products**

	%
1830	26.1
1840	32.3
1850	27.2
1860	32.1
1870	26.0
1880	33.7
1890	33.1
1900	32.4
1913	37.2
1925	39.6
1929	41.5
1931	38.8
1932	41.1
1933	41.2
1934	44.0

B. Shares of British exports to “British Countries” and EEC6 (%)

	British Countries	EEC6
1907	32.2	24.8
1912	36.0	22.7
1924	42.1	18.7
1930	43.5	18.3
1935	48.0	14.7
1948	52.7	9.8
1951	55.0	10.4
1954	53.0	13.0
1958	49.3	13.1
1963	37.5	20.3
1968	31.2	19.3
1970	25.1	21.7
1980	20.1	34.6
1990	16.7	41.3

Sources: Part A: Schlote (1952: Table 22); Part B: *Annual Statement of the Trade of the United Kingdom*, London: HMSO.

Notes: Part A: Old area of trade statistics after 1925 (i.e. United Kingdom of Great Britain and Ireland); Part B: “British Countries” includes the Irish Free State/Republic and the Republic of South Africa, as well as the Commonwealth.

TABLE 7: Indicators of protectionism in post-war United Kingdom**A: Average tariff rates on UK manufactures (%)**

1932	13.2
1935	14.7
1960	14.5
1963	12.8
1968	11.2

B: Tariff rates for UK and West German manufacturing, 1958 (%)

	United Kingdom	West Germany
Chemicals	15	8
Leather	16	12
Rubber	21	10
Wood	15	7
Paper	13	8
Textiles	23	11
Non-Metallic Minerals	17	6
Iron & Steel	14	7
Non-Electrical Machinery	17	5
Electrical Machinery	23	6
Transport Equipment	25	12
Clothing	26	13
Instruments	27	8

C: Trade Costs Index

	UK-France	UK-Germany
1929	100	99
1938	121	122
1950	122	142
1960	122	115
1970	110	105
1980	74	66

Sources:

- a): Kitson and Solomou (1990), Morgan and Martin (1975)
- b): Political and Economic Planning (1962)
- c): data underlying Jacks et al. (2009) kindly provided by Dennis Novy.

Note: trade costs are inferred from estimates of gravity equations and incorporate the impact of all barriers to trade including tariffs, non-tariff barriers, transport costs, communication costs etc.

TABLE 8: Tariff rates on the eve of World War I**A. Ad valorem tariff rates on Britain's exports in 1903 (%)**

	Average of 31 goods	Cotton yarn grey	Cotton fabric un- bleached	Cotton fabric printed	Pig iron	Tin plate	Leather shoes	Caustic soda
Russia	131	70	207	246	91	110	171	101
Spain	76	62	145	124	25	58	119	16
United States	73	48	72	88	26	50	25	36
Austria-Hungary	35	14	54	65	20	59	11	31
France	34	14	49	51	19	35	22	27
Italy	27	14	34	52	13	47	14	8
Germany	25	9	43	49	16	18	11	21
Sweden	23	9	30	50	free	free	38	free
Denmark	18	7	15	60	free	17	25	free
Belgium	13	6	28	27	3	free	10	free
Norway	12	6	12	50	free	free	33	free
Japan	9	7	7	11	4	9	20	11
Switzerland	7	3	4	13	1	9	5	1
Netherlands	3	free	5	5	free	free	5	free

B. Multilateral tariffs in 1913, selected commodities (German marks per hundred kilograms)

	Wheat	Cotton yarn	Cotton fabric un- bleached	Cotton fabric printed	Laces	Bar iron	Sheet iron	Sewing needles
Russia	free	108.13	1,161.00	1,404.0	2,539.0	9.89	13.85	641.20
Spain	6.50	140.00	352.35	299.70	1,093.5	5.18	6.48	243.00
United States	3.95	67.20	51.87	103.74	45%	2.78	5.56	25%
Austria-Hungary	5.35	28.05	--	121.55	561.00	4.25	8.50	144.50
France	5.66	14.99	86.67	152.28	405.00	6.07	10.93	205.50
Italy	6.08	26.73	63.18	129.68	405.00	4.86	9.72	64.80
Germany	5.50	18.00	70.00	120.00	350.00	1.00	4.50	100.00
Sweden	4.16	22.50	56.25	123.75	450.00	free	4.50	45.00
Denmark	free	7.04	56.80	151.68	227.50	1.17	1.17	75.00
Belgium	free	12.15	64.80	81.00	15%	0.81	0.81	13%
Norway	4.86	13.50	28.13	123.75	674.50	free	free	84.38
Japan	2.68	22.28	62.70	87.14	69.60	2.09	2.61	175.89
Switzerland	0.24	16.20	8.10	48.60	81.00	0.24	0.49	40.50
Netherlands	free	free	5%	5%	5%	5%	5%	5%
Great Britain	free	free	free	free	free	free	free	free

Sources: Part A: *British and Foreign Trade and Industrial Conditions*; Part B: Grunzel (1916: 155-158).

Notes: Part A: Average calculated using British export weights; Part B: Percentage values refer to *ad valorem* rates.

TABLE 9: Income gains from greater trade exposure: UK vs. Germany. (%GDP).

1890	+17.0
1913	+10.6

Sources: as for Table 4.

Note: trade exposure is defined as (Exports + Imports)/GDP and the assumed elasticity of GDP to trade exposure is 0.3; this is conservative compared with the estimates in Jacks (2006) but in line with the wider literature.

TABLE 10: UK growth rates, 1899-1937 (% per annum)

	Compromise GDP	Industrial production
1899-1929	1.00	1.54
1924-1929	2.57	2.93
1929-1937	1.96	3.28

Source: Derived from Feinstein (1972, Tables 6 and 8).

TABLE 11: Differences in labour productivity growth, 1924-48**A: Mean (standard deviation) labour productivity growth (% per year)**

	Early Protected (N=15)	Additional Duties (N=42)	Others (N=33)
1924-30	4.247 (2.576)	0.669 (2.030)	1.752 (2.771)
1930-35	4.008 (4.903)	2.722 (2.181)	2.485 (2.821)
1924-35	4.117 (2.614)	1.596 (1.343)	2.066 (1.913)
1935-48	0.891 (1.740)	0.477 (1.419)	0.838 (2.066)

B: Difference-in-differences analysis

$$1930/35 - 1924/30 = 0.733 + 1.321 \text{ Additional} - 0.974 \text{ Early}$$

$$(1.026) \quad (1.384) \quad (-0.762)$$

$$1935/48 - 1924/35 = -1.228 + 0.109 \text{ Additional} - 1.843 \text{ Early}$$

$$(-2.993) \quad (0.200) \quad (-2.510)$$

Note: labour productivity growth calculated from Census of Production and Brown (1964). Early-protected industries were silk & artificial silk, glove, chemicals, petroleum, explosives & fireworks, match, rubber, scientific instruments, musical instruments, incandescent mantles, cinematograph & film products, hardware & holloware, cutlery, motor & cycle, watch & clock.

TABLE 12: Effective protection rates, 1932, 1968, 1979 (%)

	1932	1968	1979
Building Materials	32.0	13.7	0.2
China, Glass	22.5	18.5	0.0
Coke Ovens	-2.5	-7.2	-0.2
Chemicals	41.8	33.3	2.2
Soap & Polishes	26.3	-0.3	-1.8
Oils & Paints	16.5	-10.1/16.6	4.1
Iron & Steel	34.0	32.5	2.7
Non-Ferrous Metals	25.6	-3.5	0.5
Shipbuilding	-14.0	-2.4	-1.3
Mechanical Engineering	14.4	11.6	4.5
Electrical Engineering	18.2	44.3	0.8
Motor & Cycle	41.2	36.3	3.3
Aircraft	-7.4	-3.3	-1.0
Railway Rolling Stock	43.1	7.9/44.5	-0.9
Metal Goods	8.7	4.7	3.0
Cotton & Silk Textiles	10.3	4.3	6.2
Woollen & Worsted	8.8	5.9	3.5
Hosiery & Lace	42.9	14.0	21.4
Other Textiles	9.2	0.3	-0.8
Textile Finishing	-9.6	-7.1	13.0
Leather & Fur	22.1	3.6	51.1
Clothing	21.0	1.1	15.6
Food Processing	26.8	-1.9	3.4
Drink & Tobacco	-11.3	-6.4	6.2
Timber Products	24.4	-4.5	4.4
Paper	20.1	24.0	7.7
Printing & Publishing	-4.3	0.6	4.3
Rubber	13.3	8.0	1.0
Miscellaneous Manufactures	22.8	33.9	12.3
Mean	17.1	8.7/10.8	5.7

Source: based on Kitson et al. (1991), Oulton (1976) and Greenaway (1988)

Note: alternative estimate for oils & paints from Kitchin (1976); alternative estimate for railway rolling stock is for 1963 from Kitchin (1976).

Regression based on Oulton's estimates for 1968 gives $ERP_{1968} = 0.098 + 0.501ERP_{1932}$
(0.028) (3.424)
 $R^2 = 0.28$

TABLE 13: Comparative Germany/UK labour productivity levels in manufacturing (UK=100)

	1973	1979	1989
Chemicals	103.3	127.6	102.5
Mineral oil refining	88.2	122.5	107.7
Plastic products	117.3	126.4	109.7
Rubber products	124.5	140.3	103.5
Mineral products	84.1	106.4	90.9
Ceramic goods	131.5	130.6	125.2
Glass	99.9	129.5	117.7
Iron and steel	124.8	263.4	88.9
Non-ferrous metals	80.5	119.9	112.7
Plant and steelwork	123.7	125.0	124.9
Mechanical engineering	125.9	141.9	123.7
Office machinery	100.7	107.6	86.6
Motor vehicles	148.5	186.0	123.7
Shipbuilding	144.6	143.7	105.3
Aerospace	131.2	200.4	100.9
Electrical engineering	83.5	101.9	97.6
Instrument engineering	180.5	171.6	143.6
Finished metal products	130.0	132.1	127.1
Toys, sport & musical instruments	115.4	131.8	130.4
Timber and board	95.3	110.9	105.1
Wood products	176.4	178.4	150.1
Paper and board	147.9	215.1	160.2
Paper products	164.9	174.4	169.1
Printing and publishing	158.5	189.3	145.3
Leather and footwear	93.3	84.9	104.8
Textiles	88.3	110.8	100.6
Clothing	133.5	123.5	124.2
Food	101.5	125.3	112.9
Drink	59.3	59.3	83.0
Tobacco	42.1	68.7	59.5
Total manufacturing	119.4	140.0	116.5

Source: O'Mahony and Wagner (1994: 7).

Note: Labour productivity measured as value added per hour worked.

TABLE 14: Differences in labour productivity growth, 1968-86**A: Mean (standard deviation) labour productivity growth (% per year)**

	Protection Removed (N= 25)	Others (N=43)
1968-79	2.819 (1.801)	3.569 (1.766)
1979-86	4.908 (3.174)	4.252 (2.325)

B: Difference-in-differences analysis

$$1979/86 - 1968/79 = 0.692 + 1.397 \text{ Protection Removed} \\ (1.381) \quad (1.690)$$

Source: labour productivity growth from Oulton and O'Mahony (1994)

Note: protection removed is a dummy variable based on a decrease of 10 percentage points in the effective rate of protection between 1968 and 1979 in either or both comparisons of estimates for 1968 from Kitchin (1976) and Oulton (1976) with those for 1979 in Greenaway (1988). these sectors are SIC 273, 274, 278, 279, 311, 313, 331, 332, 335, 336/7, 338, 361, 362, 363/4, 368, 369, 381, 390, 395, 411, 461, 462/3, 472/3, 484, 499.

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