

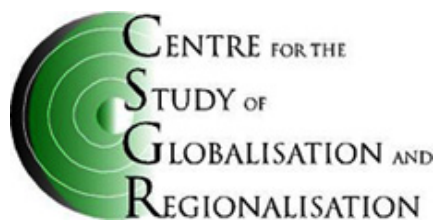
**“Openness And Britain’s Productivity Performance,
1870-1990: A Sectoral Analysis”**

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Abstract**Openness and Britain's Productivity Performance, 1870-1990: A Sectoral Analysis**

This paper uses a new data set of comparative productivity levels on a sectoral basis to shed light on the links between openness and productivity performance in Britain between 1870 and 1990. The key findings are: (1) As a result of the openness of the British economy, agriculture was unusually small in 19th 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.

Keywords: openness; protection; trade blocs; productivity; sectoral; Britain

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I. INTRODUCTION

The historical literature contains two very different views of 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 (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 (Marrison, 1996; Kitson and Solomou, 1990). For this latter group, protectionism has been seen as a way of restructuring the economy onto a more favourable development path. 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 covers the full period from 1870 to 1990, 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 1870-1990. 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 recent estimates of 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 much less clearly the case in Britain, even by the late 1980s.

Sections IV to VI consider shorter periods in the light of the long run evidence, paying particular attention to sectoral issues. In particular, we shall see that: (1) As a result of the openness of the British economy, agriculture was unusually small in 19th 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.

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 1870-1990, derived from Broadberry (1997b; 1997c). 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. 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 1990 had a labour productivity advantage of about 25 per cent.

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. 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 1990 this had fallen to under three-and-a-half 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 1871.²

² 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.

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.³ 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 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

³The 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).

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.

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 clear.

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 the present 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.

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.

1. Industry

The disadvantage faced by British industry in foreign markets on the eve of World War I is easily demonstrated in Table 7. 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.

The link between openness and industrial productivity performance is ambiguous in theory. In a Schumpeterian framework, protection may provide a guarantee of profits which provides the incentive to invest in a risky undertaking, and learning effects may then lead to a shift of comparative advantage (Aghion and Howitt, 1998: chapter 11). On the other hand, however, tariffs may allow firms to reap what Hicks (1935: 8) viewed as the best of all monopoly profits, a quiet life. For Wilhelmine Germany, Webb (1980) argues that the restriction of competition by tariffs and cartels may have contributed to the productivity advance of German heavy industry by reducing the riskiness of capital intensive technologies. Nevertheless, in a wider sample of countries, Capie (1994: 40-42) is unable to find a positive relationship between the growth of industrial production and nominal tariff rates measured as the ratio of total duties to exports.

Perhaps the most telling evidence against arguments that Britain was being disadvantaged industrially by remaining free trade while other countries adopted protective measures from the late nineteenth century is the pattern of comparative productivity levels in manufacturing. As Broadberry (1997a) shows, Britain was not falling behind in terms of manufacturing output per employee. Some countries nevertheless had faster growth of manufacturing output and exports as their population grew faster than in Britain, or as they industrialised. Labour productivity in Britain's manufacturing industry kept pace with the rest of Europe and the transatlantic productivity gap in manufacturing remained stationary between 1870 and 1913.

Furthermore, Britain still had a larger share of the labour force in manufacturing in 1913 than any other country.

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 labour productivity 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.

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. Although the United States also had a large share of the labour force in agriculture this was because of favourable land endowments that enabled farmers to produce at high levels of labour productivity, even without much capital.

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.⁴

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 concentrate here on 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, however, 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).

⁴ Figures from Hoffmann (1965: 817, 825-826)

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.⁵ However, the more 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 8; growth of GDP was faster during the 1920s than during the 1930s.⁶ 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 8 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

⁵ 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 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).

⁶ 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).

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.

Kitson and Solomou (1990) stop their analysis at the end of the 1930s. However, there is a literature which relates the problems of British industrial productivity in the early post-World War II period to the weakening of competitive pressures during the 1930s (Broadberry and Crafts, 1990; 1992; 1996). Since the tariff formed a part of this anti-competitive environment, it may be seen as contributing to Britain's postwar industrial productivity problems. 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.⁷ 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, capital as well as 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.

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.

⁷ In 1948, this was the case for fertilisers, cotton cloth, hosiery, carpets, tobacco and glass.

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, which 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.

One way in which Britain's service sector became less globalised during the inter-war period was through the growing importance of links with the Empire, since the strategy of imperial integration affected services as well as industry. In Table 9, for example, we see that whilst British ships continued to carry almost all seaborne trade on inter-Imperial routes, Britain's share declined substantially on Empire-foreign routes and precipitously on foreign-foreign routes.

VI. BRITAIN IN THE WORLD ECONOMY, 1950-1990

Protection for industry and agriculture continued after World War II, although at a lower level than during the 1930s. 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 negative as the movement of total factor input 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 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). 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, 2000). Table 10 shows the dramatic turn-round of British productivity performance relative to Germany in a number of industries. The productivity figures here, taken from O’Mahony and Wagner (1994) refer to value added per hour worked. In motor vehicles, for example, the German productivity advantage reached nearly two-to-one in 1979, but had fallen back to less than 25 per cent by 1989, while in aerospace, the productivity gap had been all but eliminated by 1989 despite having risen above two-to-one in 1979. In iron and steel the turn-round was even more dramatic, with a German productivity advantage of more than two-and-a-half-to-one in 1979 being turned into a British advantage by 1989.

Kitson and Michie (1996) argue that the de-industrialisation that accompanied this productivity turn-round has had serious consequences, resulting in a balance of payments constraint on growth. But as Crafts (1996: 17) notes, “the idea of a balance of payments constraint on growth is often over-played or deployed to promote damaging supply-side policies.” If we accept that the British industrial sector was over-expanded during World War II and could be maintained at an artificially high level only by limiting the openness of the British economy in some way, then the de-industrialisation of the 1970s and 1980s appears much less damaging.

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.

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 1990 (UK=100)

<i>A. US/UK</i>				
	Agriculture	Industry	Services	Aggregate economy
1869/71	86.9	153.6	85.8	89.8
1889/91	102.1	164.5	84.2	94.1
1909/11	103.2	193.5	107.3	117.7
1919/20	128.0	198.2	119.0	133.3
1929	109.7	222.9	121.2	139.4
1937	103.3	190.6	120.0	132.6
1950	126.0	243.9	140.8	166.9
1973	131.2	215.1	137.3	152.3
1990	151.1	163.0	129.6	133.0

<i>B. Germany/UK</i>				
	Agriculture	Industry	Services	Aggregate economy
1871	55.7	86.2	66.1	59.5
1891	53.7	92.5	71.9	60.5
1911	67.3	122.0	81.3	75.5
1925	53.8	97.4	78.2	69.0
1929	56.9	101.7	84.3	74.1
1935	57.2	99.1	85.7	75.7
1950	41.2	95.8	83.1	74.4
1973	50.8	128.9	111.0	114.0
1990	75.4	116.7	130.3	125.4

Sources: Derived from Broadberry (1997b; 1997c).

TABLE 2: Sectoral shares of employment in the United States, the United Kingdom and Germany, 1870-1990 (%)***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

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

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

Source: Derived from Broadberry (1997b; 1997c; 1998).

TABLE 3: Comparative US/UK and Germany/UK total factor productivity levels by sector, 1869/71 to 1990 (UK=100)***A. US/UK***

	Agriculture	Industry	Services	Aggregate economy
1869/71	98.4	153.8	86.3	95.1
1889/91	122.9	139.7	64.3	83.3
1909/11	117.8	151.1	71.7	90.5
1919/20	132.4	158.4	92.2	108.2
1929	117.6	187.8	92.0	112.7
1937	118.8	161.1	89.1	105.9
1950	132.5	218.0	110.2	138.1
1973	127.2	202.4	120.6	137.5
1990	142.0	157.5	119.9	125.5

B. Germany/UK

	Agriculture	Industry	Services	Aggregate economy
1871	58.3	86.0	69.7	61.6
1891	59.8	86.1	71.9	63.2
1911	71.4	102.6	83.2	75.3
1925	57.1	98.0	85.5	74.3
1929	59.4	100.5	92.2	78.5
1935	59.7	97.1	89.6	78.3
1950	44.6	93.3	89.2	76.2
1973	48.1	112.4	118.0	108.2
1990	65.4	103.5	134.3	116.1

Sources: Derived from Broadberry (1997b; 1997c).

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
1989	22.6	27.7	17.9	23.5

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
1988	9.2	11.3	6.6	9.1

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
1988	21.2	28.6	27.4	35.0

Sources: United Kingdom: Feinstein (1972: Tables 3 and 15); *Economic Trends Annual Supplement, 1994*, Tables 1.3 and 1.17; United States: 1870-1929: Trade data from US

Department of Commerce (1975), *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); 1929-88: Trade and GDP data from US Department of Commerce (1993), *National Income and Product Accounts of the United States, Vol.1, 1929-58, Vol 2. 1959-88*, Tables 1.1 and 4.1; Germany: 1880-1950: Hoffmann (1965), Tables 125, 127, 248.; 1950-1988: Statistisches Bundesamt (1991), *Volkswirtschaftliche Gesamtrechnungen, Revidierte Ergebnisse 1950 bis 1990*, Fachserie 18, Reihe S.15, Tables 2.2.1, 2.2.12 and 2.2.13.

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
1989		1.4	3.4	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 of the United Kingdom, Annual Abstract of Statistics, and National Income and Expenditure*. Imports of tobacco and petrol from Mitchell (1988: 474-480).

United States: US Department of Commerce (1975); *Statistical Abstract of the United States*.

Germany: Customs duties and imports from Mitchell (1980) to 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: HM Customs and Excise (various issues), *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: 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: Board of Trade (1904: 292-315); 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 8: 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 9: Shares of seaborne trade carried in British ships, 1912-1936 (%)

	1912	1931	1936
Inter-Imperial	95.6	94.4	93.2
Empire-Foreign	60.8	52.6	47.2
Foreign-Foreign	22.1	12.8	12.2
Total	47.6	39.3	39.4

Source: Leak (1939: 252).

TABLE 10: 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.

REFERENCES

- Abramovitz, M. and David, P.A. (1973), "Reinterpreting Economic Growth: Parables and Realities." *American Economic Review*, 63, 428-439.
- Abramovitz, M. and David, P.A. (1996), "Convergence and Deferred Catch-up", in Landau, R., Taylor, T. and Wright, G. (eds.), *The Mosaic of Economic Growth*, Stanford, CA: Stanford University Press, 21-62.
- Aghion, P. and Howitt, P. (1998), *Endogenous Growth Theory*, Cambridge, MA: MIT Press.
- Ashworth, W. (1986), *The History of the British Coal Industry, Volume 5, 1946-1982: The Nationalized Industry*, Oxford: Clarendon Press.
- Bairoch, P. (1989), "European Trade Policy, 1815-1914", in Mathias, P. and Pollard, S. (eds.), *The Cambridge Economic History of Europe, Volume VIII, The Industrial Economies: The Development of Economic and Social Policies*, Cambridge: Cambridge University Press, 1-160.
- Balke, N.S. and Gordon, R.J. (1989), "The estimation of prewar Gross National Product: Methodology and New Evidence", *Journal of Political Economy*, 97, 38-92.
- Best, M.H. and Humphries, J. (1986), "The City and Industrial Decline", in Elbaum, B. and Lazonick, W. (eds.), *The Decline of the British Economy*, Oxford: Clarendon Press, 223-239.
- Board of Trade (1904), *British and Foreign Trade and Industrial Conditions*, London: HMSO.
- Broadberry, S.N. (1986), *The British Economy Between the Wars: A Macroeconomic Survey*, Oxford: Blackwell.
- Broadberry, S.N. (1993), "Manufacturing and the Convergence Hypothesis: What the Long Run Data Show", *Journal of Economic History*, 53, 772-795.
- Broadberry, S.N. (1997a), *The Productivity Race: British Manufacturing in International Perspective, 1850-1990*, Cambridge: Cambridge University Press.
- Broadberry, S.N. (1997b), "Forging Ahead, Falling Behind and Catching-Up: A Sectoral Analysis of Anglo-American Productivity Differences, 1870-1990", *Research in Economic History*, 17, 1-37.
- Broadberry, S.N. (1997c), "Anglo-German Productivity Differences 1870-1990: A Sectoral Analysis", *European Review of Economic History*, 1, 247-267.
- Broadberry, S.N. (1998), "How did the United States and Germany Overtake Britain? A Sectoral Analysis of Comparative Productivity Levels, 1870-1990", *Journal of Economic History*, 58: 375-407.

- Broadberry, S.N. (2000), "Manufacturing", in Crafts, N.F.R. and Woodward, N.W.C. (eds.), *The British Economy Since 1945*, (Second Edition), Oxford: Clarendon, (forthcoming).
- Broadberry, S.N. and Crafts, N.F.R. (1990), "The Impact of the Depression of the 1930s on Productive Potential in the United Kingdom", *European Economic Review*, 34, 599-607.
- Broadberry, S.N. and Crafts, N.F.R. (1992), "Britain's Productivity Gap in the 1930s: Some Neglected Factors", *Journal of Economic History*, 52, 531-558.
- Broadberry, S.N. and Crafts, N.F.R. (1996), "British Economic Policy and Industrial Performance in the Early Post-War Period", *Business History*, 38(4), 65-91.
- Brown, J. (1987), *Agriculture in England: A Survey of Farming, 1870-1947*, Manchester: Manchester University Press.
- Buxton, N.K. (1978), *The Economic Development of the British Coal Industry: From the Industrial Revolution to the Present Day*, London: Batsford.
- Cairncross, A. (1992), *The British Economy since 1945: Economic Policy and Performance, 1945-1990*, Oxford: Blackwell.
- Capie, F. (1983), *Depression and Protectionism: Britain Between the Wars*, London: Allen & Unwin.
- Capie, F. (1994), *Tariffs and Growth: Some Insights from the World Economy, 1850-1940*, Manchester: Manchester University Press.
- Collins, M. (1990), *Banks and Industrial Finance in Britain, 1800-1939*, London: Macmillan.
- Collins, M. (1998), "English Bank Development within a European Context, 1870-1939", *Economic History Review*, 51, 1-24.
- Crafts, N.F.R. (1996), "Deindustrialisation and Economic Growth", *Economic Journal*, 106, 172-183.
- Dow, J.C.R. (1965), *The Management of the British Economy, 1945-60*, Cambridge: Cambridge University Press.
- Drummond, I. (1974), *Imperial Economic Policy, 1917-1939: Studies in Expansion and Protection*, London: Allen & Unwin.
- Dunnett, P.J.S. (1980), *The Decline of the British Motor Industry: The Effects of Government Policy, 1945-1979*, London: Croom Helm.
- Edelstein, M. (1982), *Overseas Investment in the Age of High Imperialism: The United Kingdom, 1850-1914*, London: Methuen.

- El-Agraa, A.M. (1994), *The Economics of the European Community*, Fourth Edition, London: Harvester Wheatsheaf.
- Feinstein, C.H. (1972), *National Income, Expenditure and Output of the United Kingdom, 1855-1965*, Cambridge: Cambridge University Press.
- Foreman-Peck, J. (1991), "Trade and the Balance of Payments", in Crafts, N.F.R. and Woodward, N.W.C. (eds.), *The British Economy Since 1945*, Oxford: Clarendon, 141-179.
- Giersch, H., Paqué, K.H. and Schmieding, H. (1992), *The Fading Miracle: Four Decades of Market Economy in Germany*, Cambridge: Cambridge University Press.
- Greasley, D. and Oxley, L. (1996), "Discontinuities in Competitiveness: The Impact of the First World War on British Industry", *Economic History Review*, 49, 82-100.
- Grunzel, J. (1916), *Economic Protection*, Oxford: Carnegie Endowment for International Peace and Clarendon Press.
- Hicks, J.R. (1935), "Annual Survey of Economic Theory: The Theory of Monopoly", *Econometrica*, 3, 1-20.
- Hoffman, R.J.S. (1933), *Great Britain and the German Trade Rivalry*, Philadelphia, PA: University of Pennsylvania Press.
- Hoffmann, W.G. (1965), *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts*, Berlin: Springer-Verlag.
- Holderness, B.A. (1985), *British Agriculture Since 1945*, Manchester: Manchester University Press.
- Imlah, A.H. (1958), *Economic Elements in the Pax Britannica: Studies in British Foreign Trade in the Nineteenth Century*, Cambridge, MA: Harvard University Press.
- Irwin, D.A. (1996), *Against the Tide: An Intellectual History of Free Trade*, Princeton, NJ: Princeton University Press.
- Kendrick, J.W. (1961), *Productivity Trends in the United States*, Princeton, NJ: National Bureau of Economic Research.
- Kennedy, W.P. (1987), *Industrial Structure, Capital Markets and the Origins of British Economic Decline*, Cambridge: Cambridge University Press.
- Kitson, M. and Michie, J. (1996), "Britain's Industrial Performance since 1960: Underinvestment and Relative Decline", *Economic Journal*, 106, 196-212.
- Kitson, M. and Solomou, S. (1990), *Protectionism and Economic Revival: The British Interwar Economy*, Cambridge: Cambridge University Press.

- Leak, H. (1939), "The Carrying Trade of the British Shipping", *Journal of the Royal Statistical Society*, 102, 213-257.
- Liepmann, K. (1938), *Tariff Levels and the Economic Unity of Europe*, London: Allen & Unwin.
- Lindert, P.H. (1991), *International Economics*, Homewood, IL: Irwin.
- McCloskey, D.N. (1970), "Did Victorian Britain Fail?", *Economic History Review*, 23, 446-459.
- Marrison, A. (1996), *British Business and Protection, 1903-1932*, Oxford: Clarendon Press.
- Matthews, R.C.O., Feinstein, C.H. and Odling-Smee, J.C. (1982), *British Economic Growth, 1856-1973*, Oxford: Clarendon.
- Mills, T.C. (1991), "Are Output Fluctuations in the UK Transitory or Permanent?", *Manchester School*, 59, 1-11.
- Millward, R. (1994), "Industrial and Commercial Performance Since 1950", in Floud, R. and McCloskey, D. (eds.), *The Economic History of Britain Since 1700, Second Edition, Volume 3: 1939-1992*, Cambridge: Cambridge University Press, 123-167.
- Mitchell, B.R. (1975), *European Historical Statistics, 1750-1970*, London: Macmillan.
- Mitchell, B.R. (1988), *British Historical Statistics*, (second edition) Cambridge: Cambridge University Press.
- Moggridge, D.E. (1972), *British Monetary Policy, 1924-1931: The Norman Conquest of \$4.86*, Cambridge: Cambridge University Press.
- Ó Gráda, C. (1994), "British Agriculture, 1860-1914", in Floud, D. and McCloskey, D. (eds.), *The Economic History of Britain Since 1700, Second Edition, Volume 2: 1860-1939*, Cambridge: Cambridge University Press, 145-172.
- O'Mahony, M. and Wagner, K. (1994), "Changing Fortunes: An Industry Study of British and German Productivity Growth Over Three Decades", Report Series No.7, National Institute of Economic and Social Research, London.
- Olson, M. (1963), *The Economics of the Wartime Shortage: A History of British Food Supplies in the Napoleonic War and in World Wars I and II*, Durham, NC: Duke University Press.
- Plummer, A. (1951), *International Combines in Modern Industry*, London: Pitman.
- Pollard, S. (1984), *The Wasting of the British Economy: British Economic Policy 1945 to the Present*, Second Edition, London: Croom Helm.

- Reader, W.J. (1970), *Imperial Chemical Industries: A History, Vol.1: The Forerunners, 1870-1926*, Oxford: Oxford University Press.
- Rostas, L. (1948), *Comparative Productivity in British and American Industry*, Cambridge: Cambridge University Press.
- Schlote, W. (1952), *British Overseas Trade: From 1700 to the 1930s*, Oxford: Blackwell.
- Smith, A.D. (1992), *International Financial Markets: The Performance of Britain and its Rivals*, Cambridge: Cambridge University Press.
- Taussig, F.W. (1892), *The Tariff History of the United States*, New York: Putnams.
- Webb, S.B. (1980), "Tariffs, Cartels, Technology, and Growth in the German Steel Industry, 1879 to 1914", *Journal of Economic History*, 1980, 40, 309-329.
- Weiss, F.D. (1988) (ed.), *Trade Policy in West Germany*, Tübingen: Mohr.
- Whetham, E.H. (1978), *The Agrarian History of England and Wales, Volume VIII, 1914-1939*, Cambridge: Cambridge University Press.
- Whisler, T.R. (1994), "The Outstanding Potential Market: The British Motor Industry and Europe, 1945-75", *Journal of Transport History*, 15, 1-19.