

## **THE UNITED KINGDOM DURING WORLD WAR I: BUSINESS AS USUAL?**

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This paper examines the economic aspects of the British mobilisation for World War I and the implications for the state and business. We focus on the following issues: (1) The scale of mobilisation, paying particular attention to the share of GDP devoted to the war effort and the extent of mobilisation in different parts of the economy (2) The way that the mobilisation was financed, examining fiscal and monetary policy (3) The impact of the war on the external account, paying particular attention to the ability of the government to lend abroad to Allies (4) The relative efficacy of government controls and market forces in bringing about the mobilisation of resources (5) The long run impact of the war on wealth, using a national balance sheet approach. In addition to forming a basis for the international comparison of the major combatant countries during World War I, this paper also provides the material for a contrast between the British war efforts during the two World Wars, since the framework draws heavily on our earlier study of World War II.

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## I. INTRODUCTION

Throughout the war there were two phrases which must have been repeated hundreds of times...“Every private interest must be subordinated to the successful prosecution of the war” and “There must be as little interference as possible with the normal channels of trade”...The real problem was to determine the exact degree of interference with normal trade channels that was necessary for the successful prosecution of the war (Lloyd,1924: 259).

World War I transformed the British economy in the short run and had a significant impact on growth and development in the long run. In August 1914 there was little appreciation of the sheer scale of the war effort that would be needed to defeat the Central Powers. Similarly, few could imagine the scale of the sacrifice that the country would be called upon to make, in terms of both the number of men lost on the battlefield and the drain on national finances. Some historians have questioned whether the experience can be called a “Total War”, but from an economic perspective the term is not too misleading, even though the degree of mobilisation in World War II would turn out to be even greater (Chickering and Förster, 2000; Broadberry and Howlett, 2003). As the war lengthened in duration and the war effort expanded, the tension highlighted by Lloyd (1924) between the initial desire to continue with “business as usual” and the need for co-ordinated state intervention came to the fore.

This chapter examines the economic aspects of the wartime mobilisation and the implications for the state and business. We focus on the following issues: (1) The scale of mobilisation, paying particular attention to the share of GDP devoted to the war effort and the extent of mobilisation in different parts of the economy (2) The way that the mobilisation was financed, examining fiscal and monetary policy (3) The impact of the war on the external account, paying particular attention to the

ability of the government to lend abroad to Allies (4) The relative efficacy of government controls and market forces in bringing about the mobilisation of resources (5) The long run impact of the war on wealth, using a national balance sheet approach.

In addition to forming a basis for the international comparison of the major combatant countries during World War I, which is the main aim of this book, this chapter also provides the material for a contrast between the British war efforts during the two World Wars, since the framework draws heavily on our earlier study of World War II (Broadberry and Howlett, 1998; 2003).

## **II. THE SCALE OF MOBILISATION**

### ***1. National income and the scale of war spending***

We begin our analysis of the British economy during World War I by examining the path of real GDP. Feinstein (1972: Table 6) provides separate estimates based on the expenditure and income sides of the national accounts, which he averages to produce a compromise estimate of real GDP.<sup>1</sup> The pattern in Table 1 is similar in the expenditure and income estimates, yielding a compromise estimate of real GDP that rose to a peak in 1918 that was 13.2 per cent above the 1913 level, before dropping back close to the 1913 level when the war ended.

Turning to Table 2, we see that by 1918 population had increased by only 2 per cent above the 1913 level, but that total employment had increased by 5.8 per cent, due to an increase in labour force participation. However, since there was such a

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<sup>1</sup> Feinstein (1972) does not provide an output-based estimate of GDP during the war years.

large increase in the armed forces, the civilian labour force had declined by nearly 15 per cent by the end of the war. This decline in the civilian labour force occurred despite an almost 50 per cent increase in the number of women in civil employment, from 3.3 million in July 1914 (or 23.7 per cent of total civil employment) to 4.9 million in July 1918 (37.7 per cent) (Dewey, 1988: 76; Ministry of Munitions, 1923, Vol. VI, part IV). The rise in the female share of industrial employment mirrored that in total civil employment, increasing from 26.1 per cent to 36.1 per cent, but in some branches of industry, the female penetration of former male preserves was impressive. In the metal trades, for example, the female share of the labour force rose from 9.4 per cent to 24.6 per cent, while in the chemical industry it rose from 20.1 per cent to 39.0 per cent and in the government establishments (which in the war meant the munitions factories) it rose from 2.6 per cent to 46.7 per cent. (Ministry of Munitions, 1923, Vol. VI, part I; Wolfe, 1923: 170).

Despite the increased employment of women during the war, however, there appears to have been no long run effect on the overall level of female participation. The *Census* of 1921 classifies 25.4 per cent of females as occupied in Great Britain, the same proportion as in 1911 (Mitchell, 1988: 13, 104). Although some commentators have noted the increased female employment in the civil service, clerical trades and the engineering industries, these were offset by lower levels of employment in traditionally female industries such as textiles and clothing (Bowley, 1930: 171; Milward, 1984: 35-36).

Combining the compromise estimate of GDP from Table 1 with the population and total employment estimates from Table 2 yields the series for GDP per head and

GDP per employee in Table 3. As was the case with output, GDP per head and GDP per employee increased during the war but then dropped back sharply to the pre-war level in 1919. Nevertheless, since there was a 13 per cent reduction in the length of the working week during 1919, the large drop in output per employee during that year is consistent with a small increase in output per hour worked (Broadberry, 1990; Dowie, 1975).

In evaluating the contribution of the increase in British output to the Allied war effort, we need to take account of the level of development of the British economy on the eve of World War I. This is because a large proportionate increase in output from a low productivity economy may still add up to less than a small proportionate increase from a high productivity economy, even where population is larger in the low productivity economy. However, it should be noted that although the data in Table 4 indicate a substantially higher level of output per employee in the British economy as a whole compared with the German economy, Germany was ahead in industry. Britain's overall advantage arose from higher labour productivity in agriculture and services, combined with a lower share of the labour force in low value added agriculture. Hence we should not expect any great advantage from higher overall labour productivity to have accrued to Britain in terms of the production of munitions. Rather, the greater level of development and, in particular, the absence of a low productivity agricultural sector may be seen as allowing a greater degree of flexibility (Olson, 1963). Note also that the US labour productivity advantage over Britain was substantially larger in industry than in agriculture and services, suggesting a particular US advantage in the production of munitions.

We turn now to an evaluation of the proportion of GDP devoted to war work, since a country with a small GDP may compensate for this by mobilising more intensively than a country with a large GDP. Table 5 presents data on the components of expenditure on GDP at constant market prices.<sup>2</sup> The main change was a dramatic increase in government current spending on goods and services from 8.1 per cent of GDP in 1913 to a peak of 38.7 per cent in 1917 before falling back.<sup>3</sup> The increase in government spending came mainly at the expense of consumers' expenditure, although investment and exports also fell back.<sup>4</sup> Figure 1 demonstrates the unprecedented scale of the surge in government spending during World War I, which was dramatically higher than that seen during the Boer War at the turn of the century, and only slightly lower than during World War II. It is easy to understand why World War I has been seen as the first "total war" (French, 1982).

## ***2. Output of specific goods and services***

Britain was a relatively rich country in 1913, so that devoting nearly 40 per cent of national expenditure to the war resulted in a formidable war effort. To see what this meant in more concrete terms, it is helpful to examine the output of selected items in Table 6, covering agriculture and services as well as industry, since fighting a total war requires more than producing munitions.

Britain was highly dependent on imported food supplies, as a result of the pre-war policy of free trade, which had allowed the "grain invasion" from the New World to shrink the domestic agricultural sector. This was in contrast to the protectionist

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<sup>2</sup> The picture is very similar at current prices.

<sup>3</sup> Note that this definition of government spending excludes debt interest payments and transfers as well as capital expenditure.

<sup>4</sup> Investment includes stockbuilding as well as gross domestic fixed capital formation.

policies adopted in Germany and many other European countries (Olson, 1963). During the five-year period 1909-1913, imports had accounted for 78.7 per cent of wheat and flour consumed in Britain and 56.2 per cent of cereals and pulses overall (Beveridge, 1928: 359). British agriculture had responded by specialising in meat and dairy produce, but even here imports still accounted for 35.7 per cent of meat, 43.4 per cent of butter and 74.2 per cent of cheese consumption (Beveridge, 1928: 359). Although food imports used up scarce shipping space and were vulnerable to U-boat attack, agricultural policy was slow to change, since it was widely expected that the war would be over quickly.

However, a poor American harvest in 1916 combined with mounting shipping losses to bring about a change of policy, and steps were taken to increase the home supply of calories by ploughing up pasture land for grain and potatoes (Beveridge, 1928: 105). The effects of this policy can be seen in Table 6 in the bumper harvest of grains and potatoes in 1918, combined with a drop in home production of meat. The Corn Production Act of 1917 provided the incentives to make the changes, by guaranteeing minimum prices for a five-year period (Whetham, 1978: 94-95). However, in what became known in the farming community as the "Great Betrayal", the price guarantees, which had been confirmed in the Agriculture Act of 1920, were quickly repealed in 1921 when prices started to fall sharply (Whetham, 1978: 139-141). Hence the prewar distribution of the land between pasture and crops was quickly restored.

Turning to industry, Table 6 shows a significant decline of coal output at the beginning of the war from a peak of 287.4 million tons in 1913 to 253.2 million tons

in 1915. One problem was a serious loss of manpower, as miners left to join the armed forces, with employment in mining falling from 1.134 million in 1914 to 0.953 million in 1915 (Mitchell, 1988: 253). However, although the loss of manpower was reversed and employment returned to more than a million in 1917, output continued to decline, falling to just 227.7 million tons in 1918. The declining output and labour productivity occurred in an atmosphere of bitter relations between mine owners and miners (Kirby, 1977: 25-30). This led to increasing government involvement in the industry, starting with price controls and export licensing in 1915 and ending with virtual nationalisation of the mines by 1918 (Redmayne, 1923: 257-269; Supple, 1987: 79-86).

The increased demand for munitions led to an expansion of steel output, which reached 9.7 million tons in 1917, more than 25 per cent above the 1913 level. However, the expansion of capacity to 12 million tons, much of it completed only during 1919-20, saddled the industry with excess capacity during the 1920s (Burnham and Hoskins, 1943: 45). The increment to output was largely of basic steel, making use of phosphoric ores from the East Midlands (Burn, 1940: 350; Hatch, 1919: 120). Nevertheless, a decline in the output of iron ore in the rest of the country more than offset the expansion of east Midlands ores, so that overall output of iron ore declined, as can be seen in Table 6. Since it was not possible to increase imports of iron ore, the increase in steel output was made possible by an increase in the use of scrap iron (Hatch, 1919: 32). The Ministry of Munitions gave a stimulus to collective research in the steel industry, in the search for new high-grade steels and alloys for use in aircraft, tanks and other armaments (Burn, 1940: 369).

The expansion of munitions was at first relatively slow, with the modest increase in shell production leading to the “Great Shell Scandal” of 1915 and the formation of the Ministry of Munitions under Lloyd George (Wrigley, 1982: 32). As the private sector-oriented “business as usual” philosophy gave way to direct government control, the Ministry of Munitions expanded its role to cover a wide range of economic activities reaching a long way back in the supply chain. The range of activities covered by the Ministry of Munitions by the end of the war included: artillery guns, shell manufacture, explosives, anti-aircraft supplies, trench warfare supplies, chemical warfare supplies, optical munitions and glassware, rifles, machine guns, small arms ammunition, aircraft, aerial bombs, tanks, mechanical transport vehicles, railway materials and ropeways and agricultural machinery (Ministry of Munitions, 1923). The gains in output of the key munitions later in the war, shown here in Table 6, were impressive, and it is not difficult to see why contemporaries drew the conclusion that state control was better than private pursuit of profit in securing munitions output. However, this conclusion will be examined more critically in Section IV.

While the output of munitions expanded during the war, the output of civilian goods declined. Although merchant shipbuilding decreased sharply at the beginning of the war as shipyards switched to warship production, concern at shipping losses led the government to bring merchant shipbuilding under state control from the end of 1916 (Fayle, 1927: 209-210). Nevertheless, shortages of skilled labour and steel, together with continuing Admiralty demand for warships, prevented merchant shipbuilding from regaining prewar levels (Fayle, 1927: 239-254). Raw cotton consumption is conventionally used as an indicator of real output for the cotton textile

industry (Robson, 1957: 6). On this measure, shown in Table 6, output in cotton textiles fell relatively gently at the beginning of the war as demand for textiles for military use replaced lost export markets (Singleton, 1994: 606). As government controls over the economy tightened, the cotton industry contracted further. Under the Cotton Control Board, established in June 1917, imports of American cotton were cut back sharply to save valuable shipping space, while the proportion of spindles (in the Egyptian section) and the proportion of looms worked was limited (Henderson, 1922: 14-27). As Singleton (1994) points out, however, a considerably larger reduction in cotton textiles output was achieved during World War II.

Dealing finally with services, Table 6 provides a number of indicators of shipping and financial services, which also made an important contribution to the war effort. Shipping arrivals fell sharply at the beginning of the war due to the massive dislocation of international trade and the requisitioning of merchant ships and port facilities for military use (Fayle, 1927: 33-48). The decline gathered pace from the autumn of 1916 as the intensification of the U-boat campaign drove neutral shipping away (Hardach, 1977: 41-43). Although ships had been requisitioned on an *ad hoc* basis since the beginning of the war, from the beginning of 1917 the whole merchant marine was placed under the authority of a Shipping Controller (Salter, 1921: 38-86). Although precautionary measures such as convoy sailings helped to reduce sinkings, they adversely affected the efficiency of those ships that did continue to arrive at British ports (Fayle, 1927: 274-291).

In financial services, the decline in joint stock bank loans from 1914 to 1916 reflected a decline in demand as special arrangements were made for financing

government contracts (Morgan, 1952: 245). Note that as a result of wartime inflation, the level of advances continued to decline in real terms until the end of the war, despite the increases in nominal terms from 1917 (Feinstein, 1972: Table 61). As a result, an increasing share of clearing bank assets was held in the form of long term government debt (Sheppard, 1971: 29, 118). The decline in the nominal and real value of new capital issues on the London money market reflected tight Treasury control over both home and overseas issues (Morgan, 1952: 261-265). Again, the aim was to ensure that savings were channelled into government loans.

### **III. FISCAL AND FINANCIAL MANAGEMENT**

#### ***1. Government spending and revenue***

War always causes the government to increase its expenditure and thus to seek the extra funding to finance that expenditure. The exceptional nature of the expansion in government expenditure has already been noted (see Figure 1) and it required an exceptional fund raising exercise by the government. A flavour of the situation is illustrated by the response of the usually conservative *Economist* to the September 1915 budget (the third war budget but the first to properly acknowledge the scale of the problem facing the economy): “It was a *plain, unvarnished* statement of *unparalleled* revenues, an *inconceivable* expenditure, and an *unimaginable* deficit, followed by a list of fresh taxation which placed an *unprecedented* burden on the country” (quoted in Bogart 1920: 17).

Table 7 shows that total government expenditure increased by more than thirteen-fold in current prices between 1913/14 and its peak in 1917/18.<sup>5</sup> Initially, the surge in government spending was driven largely by the sharp increase in the number of men in the fighting services, but as the war progressed, there was a big increase in expenditure on munitions, and also on shipping. Although expenditure on munitions was included in the spending on the fighting services until 1915/16, the surge in munitions expenditure during the later years of the war is consistent with the time profile of the munitions production data in Table 6. Clearly, the munitions intensity of the fighting increased markedly in the later stages of the war. Debt interest declined in relative importance initially, but increased in importance again from 1915/16 as the national debt exploded.

Generally the state can raise funds by increasing taxation, increasing borrowing or printing more money and during World War I the British state did all three. In the last fiscal year of peace, revenue funded all of expenditure but the onset of war overwhelmed the pre-war revenue capacity. In the first fiscal year of war, revenue funded only 40 per cent of expenditure and the government had to turn to other sources of finance (considered below) to make up the gap. The budget deficit peaked at 47.9 per cent of GDP in 1916/17.

Tax revenue had been about four times as important as non-tax revenue to total revenue generation before the war but Table 7 shows that its relative importance increased during the war. Furthermore, there was a marked relative shift away from indirect taxation to direct taxation. Together receipts from the two most important

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<sup>5</sup> This definition of government spending includes debt interest payments, transfers and capital

sources of indirect taxation, customs and excise duties, doubled in nominal terms during the war but the expansion in direct tax receipts was even more impressive. Increases in excise duties were targeted on those British staples of alcohol, tobacco and tea and supplemented most notably by the so-called “McKenna Duties”, introduced in 1915, which included a one-third *ad valorem* duty on luxuries such as motor cars and musical instruments (Pollard 1992: 24).

Property and income tax revenues swelled by more than six-fold in nominal terms and their share of total revenue increased from under a quarter in 1913/14 to a third or more during the war. Income tax revenue was boosted by raising the rate of tax and by pulling more people into the tax net, either directly by lowering the exemption limit or indirectly via inflation. The standard income tax rate was doubled to 12 per cent in the first war budget of November 1914, and was then raised progressively throughout the war, finally reaching 30 per cent in 1918/19. The exemption limit was reduced from £160 to £130 in 1915, which combined with wage and price inflation to increase the number of tax-payers from 1.1 million prior to the war to 3.5 million in the final year of the war (Mallet and George, 1929: 322-328, 395-398). Most of these new taxpayers were wage earners who became liable for tax between 1916 and 1918 (Balderston, 1989: 236-237).

The Excess Profits Duty was probably the most significant wartime fiscal innovation. It was the first tax to be levied on companies as opposed to their shareholders. Introduced in the September 1915 budget it taxed profits in excess of a stipulated peacetime standard. The rate was initially 50 per cent but was increased to

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expenditure.

60 per cent in April 1916 and then to 80 per cent in May 1917. There is no doubt that it was subject to much evasion and fraud (Stamp 1932: 216) but even so it was spectacularly successful as a revenue generator. By 1918/19 it was generating £285 million for the exchequer, almost a third of total revenue, making it the single most important tax wielded by the state.

At least until 1917 British fiscal policy was governed by the “McKenna Rule”, although it was fashioned by his predecessor as wartime Chancellor, Lloyd George. This saw the duty of fiscal policy as raising enough revenue to pay for normal peacetime expenditure plus the interest on war loans (French, 1982: 106). This policy has been criticised for being too cautious and for stoking wartime inflation, by not mopping up excess expenditure in the economy. However, it has also been argued that political, social and practical constraints meant that it would have been difficult for the state to pursue a more vigorous policy (Peden, 1985: 40-44; Balderston, 1989: 222-224).

## ***2. Financing the deficit***

Table 8 shows the principal sources of finance of the wartime budget deficit noted above. The most important source was long term domestic debt, particularly the War Loans of 1914, 1915 and 1917. Other important sources of finance were short term or floating debt, in the form of Treasury Bills and Ways and Means Advances, and borrowing from abroad, particularly from the United States (Kirkaldy, 1921: 124-162, 175-183). However, to a limited extent, the government also financed the deficit by allowing an inflationary expansion of the money base (Capie and Wood, 1994: 232-234).

Tables 9 and 10 demonstrate the consequences of these methods of war finance for the national debt and for inflation. In Table 9, we see that during the war, the national debt increased by more than a factor of ten in current prices, from £706 million at the end of March 1914 to £7,481 million at the end of March 1919. This represented an increase in the national debt as a share of GDP from 26.2 per cent in March 1914 to 127.5 per cent in March 1919. The war also saw a significant change in the composition of the national debt, with funded marketable securities accounting for a rapidly declining share. Whereas in March 1914, funded marketable securities accounted for more than four-fifths of the total debt, by the end of the war they accounted for less than 5 per cent. Over the same period, the share of unfunded marketable securities increased from less than 3 per cent to more than 50 per cent (Wormell, 2000: 732).

Goodhart (1986) sees the sharp increase in the money base (M0) during the first few months of the war as necessary to meet a run to cash by UK residents. However, historians generally agree that the injection of liquidity was too large and went on for too long, and was thus a contributing factor to wartime inflation (Capie and Wood, 1994: 233-234). The effect of this is shown in Table 10, with both M0 and broad money (M3) roughly doubling across the war. There has been no formal attempt to measure the success of anti-inflation policy during World War I along the lines of Capie and Wood's (2002) study of World War II. However, it can be seen from Table 10 that the GDP deflator, the retail price index and the money supply all approximately doubled between 1913 and 1918. Between 1939 and 1945, by contrast, although the money supply approximately doubled, the GDP deflator and the

retail price index increased by approximately 50 per cent (Broadberry and Howlett, 1998: 51). This suggests that the state was more successful during World War II in controlling the price level, which Capie and Wood (2002) attribute to taxation policy, bond finance and, in contrast to World War I, the widespread use of ration coupons.

Interest rates were highly volatile in the conditions of uncertainty during the first weeks of the war. The outbreak of war led to an increase in Bank Rate from 3 per cent to 10 per cent over a three day period. However, a series of protective measures by the government meant that by 8 August the rate had fallen to 5 per cent. It rose to 6 per cent in July 1916 as a response to conditions in New York and fell to 5.5 per cent in January 1917 as those conditions eased. Finally, when the United States entered the war on 5 April 1917 Bank Rate fell again to 5 per cent (Kirkaldy, 1921: 53-55).

#### **IV. THE IMPACT OF THE WAR ON THE EXTERNAL ACCOUNT**

The disruption the war caused to international trade and finance may be expected to have had serious consequences for the British war economy. However, for the duration of the war, the external account was not a serious threat to the war effort. Indeed, the current account was in surplus in 1914, 1916 and 1917 and the government felt so confident that it loaned more to foreign economies than it borrowed from them. This reflected, in part, the strong position of the economy in 1914, when central gold reserves were £34 million, other monetary gold stood at £123 million and dollar securities totalled £535 million (Pollard, 1992: 27). However, World War I was a watershed for the international economy and the central role of Britain in the pre-1914 world economy was lost (Wrigley, 2000). The problems for

the British economy were to be long term. The sale of overseas assets, the postwar external changes which exposed the wartime overseas borrowing policy, and the inability to defend the value of sterling, all weakened the external position of the economy in the interwar period so that supremacy in international trade and finance passed to the United States (Burk, 1985).

The evolution of the balance of payments is tracked in Table 11, based on the estimates of Morgan (1952: chapter 9). Looking first at the current account, the war was marked by a dramatic divergence between merchandise imports and exports. Whereas annual exports (including re-exports) never exceeded their 1913 value, despite export prices increasing by 160 per cent between 1913 and 1918, the value of annual imports almost doubled over the course of the war, with import prices rising by 125 per cent between 1913 and 1918 (Kirkaldy, 1921: 36; Feinstein, 1972: Table 61). This divergence between imports and exports led to a merchandise balance of trade deficit of £2.1 billion for the period 1914-18. That this did not lead to a current account deficit in most years was entirely due to the resilience of invisible earnings, which rose from £315 million in 1914 to £580 million in 1918.

Turning to capital account transactions, government lending abroad exceeded government borrowing abroad in all years apart from 1918. Total overseas borrowing by the government during the war amounted to £1,365 million by the end of the financial year 1918/19, with 75 per cent coming from the United States (Morgan, 1952: 320-321). Other significant loans were raised from Canada (9.9 per cent), Japan (2.1 per cent), Argentina (1.4 per cent) and Norway (0.9 per cent). However, more than offsetting these borrowings, by the end of the financial year 1918/19 the

government had also made overseas loans of £1,741 million (Morgan, 1952: 317). About 10 per cent of this was accounted for by Empire countries but the largest share of this loan capital had gone to Russia (32.6 per cent), France (25 per cent) and Italy (23.7 per cent) (Morgan, 1952: 317-326). The £568 million loan outstanding to Russia would, of course, prove especially troublesome.

However, it was the rise in domestic debt, rather than foreign debt, which dominated the dramatic rise in the national debt during the war. Less than one fifth of the national debt of £7,280 million in March 1919 was accounted for by foreign debt. Nevertheless, the weakening of Britain's international situation, which was a direct consequence of the war, did reduce the capacity of the economy to service the debt in the interwar period.

Over the war as a whole, Table 11 shows that on the capital account, the sale of foreign investments more or less balanced net private lending abroad. In the years immediately prior to the war the amount of British capital lent abroad was substantial, equivalent to about ten per cent of national income, but for 1916-18 it amounted to less than £20 million in total. The export of capital was prohibited in 1916, but Table 11 makes clear that the collapse in net private lending had already become an economic reality.

Despite the overall balance of payments situation there was a severe dollar shortage during the war. The balance of trade deficit with the United States had grown from £74 million in 1914 to £227 million by 1916. This was driven entirely by the increase in imports from the United States, which was driven in turn largely by

war purchases (Morgan, 1952: 307-310). In order to ease this situation the state mobilised privately held American securities. The Treasury had been buying dollar securities from British insurance and investment trusts and selling them in New York since mid-1915. From the end of that year, the government started to put increasing pressure on private owners of dollar securities to sell, culminating in the Treasury being given the power to requisition securities in January 1917 (Morgan, 1952: 326-329).

Although Britain was effectively off the gold standard during the war, the authorities did attempt to keep sterling at the pre-war parity of \$4.86. However, the pound depreciated during 1915, reflecting the deterioration in the trade balance, reaching a low of \$4.49 in October. The entry of the United States into the war saw the exchange rate recover to \$4.76, where it more or less remained until Britain formally left the gold standard in April 1919 (Pollard, 1992: 27).

## **V. GOVERNMENT CONTROLS AND MARKET FORCES**

### ***1. The growing role of government controls***

It would be wrong to characterise the economy in the early years of the war as operating as if peacetime conditions still held. It was not “business as usual” because from quite early on the state was intervening in markets and the war was encroaching on normal economic practice. However, state intervention in and management of the economy was relatively *ad hoc* in approach until 1917 and tended to be reactive rather than proactive (Lloyd, 1924: 260). In many areas the state interfered in a way that suggested that they thought market solutions were possible but too often the signals they gave were confusing. The running of the war economy by the government has

been criticised by Trebilcock (1975) for failing to learn the lessons of the Boer War whereas Singleton (1994), in discussing the cotton industry, has effectively criticised the government for failing to learn the lessons of World War II, in that a non-essential industry was contracted more in the latter conflict to release more resources to the war effort. Both historians have criticised the government in World War I for its failure in terms of industrial mobilisation, although the defence of the government would be that it proceeded cautiously because it did not want to stoke domestic political unrest or undermine business confidence or civilian morale.

The spread of government controls was generally slow, although the railways were immediately placed under state control and their profits fixed by the state. This was because the economic and material burden of the war was initially underestimated. Pre-war plans had envisaged a strategy based on naval blockade with an army of about 130,000 troops, plus the financing of European allies (Ministry of Munitions, 1923, Vol. I, part I: 7-45). The rapid expansion of the armed forces therefore initially overwhelmed the capacity of the economy to equip them, although Trebilcock (1975) doubts whether even an army of 130,000 could have been equipped. Until Lloyd George became Prime Minister in December 1916 intervention in the economy was for very specific purposes; there was no attempt before that date for the state to take general control of the economy.

The most significant embodiment of the spread of government influence was the creation of the Ministry of Munitions on 9 June 1915, which played a key role in the co-ordination of war production (Ministry of Munitions, 1923; Wrigley 1982). It had two main functions: to supply munitions and stores, including aircraft and tanks, to

the Army and the Admiralty (and to deal with any related labour questions); and to control the supply of materials that were deemed crucial to war production. The Ministry was given wide powers and was not constrained by financial controls from the Treasury. The government softened the blow to the private sector by recruiting many prominent businessmen to run and advise the Ministry. Indeed, businessmen were co-opted by the state in many other areas, so that although the state was displacing the market, it was not necessarily displacing business. In this sense, there was still “business as usual”.

Even though government intervention in the economy was extensive by the end of the war, it spread at a slow pace until 1917. Although there were internal and external controls on capital, the control of labour was quite limited compared to the experience of World War II. Indeed, even army conscription was not introduced until March 1916. The government did try to placate labour by negotiating a deal on industrial arbitration and dilution in 1915 and by appointing the trade union leader John Hodges as a Minister of Labour in 1916. The state built its own factories, the National Shell factories, and took control of the railways, shipping, collieries (from December 1916), flour mills (April 1917) and the Irish distilleries (May 1918) as well as 125 other privately owned factories. It requisitioned the output of several industries (such as jute, flax and glycerine) or used its powers to restrict output or distribution in many other industries (including building, cotton spinning, beer, sugar, timber, fertiliser, iron and steel, and paper) via licensing or by regulating the amount of materials or labour allocated to the industry. It became the main, or only, purchaser of important raw materials (such as sugar, meat, imported wheat, wool,

jute, indigo, Russian flax and Italian sulphur) whilst price fixing was used to restrict war profiteering (Morgan, 1952: 46-57; Lloyd, 1924).

As with most government intervention, policy in the area of food was reactionary. By the end of 1916 growing shortages and rising prices were causing domestic unrest. This led to the gradual expansion of state control over domestic food production and imports such that by the end of the war the Ministry of Food was responsible for 85 per cent of the food supply (Beveridge, 1928: 57). Rationing was not introduced until 1918, although some localised rationing had begun in November 1917, and eventually covered sugar, meat, butter, margarine, bacon, ham and lard (Beveridge, 1928: 206-207; Barnett, 1985: 146). Differential dietary requirements were met by bread, which had been subsidised since September 1917 and was freely available (Zweiniger-Bargielowska, 2000: 12-13).

## ***2. Markets, distribution and efficiency***

The strategy of the government at the beginning of the war was to rely, as far as possible, on the unfettered workings of the market to deliver war supplies (Lloyd, 1924: 22-23). However, as noted above, ministers have often been criticised for being too slow to realise that the scale of the war they were involved in required massive state intervention and co-ordination. At the same time, it should be noted that this criticism can at times hide the important role that the market played in the successful waging of the war. In particular, Britain's liberal politico-economic inheritance yielded economic advantages that her main rival lacked.

Britain was, along with the United States, the most developed market economy in the world in 1913 and had a political, administrative and financial history that strengthened her ability to wage the war successfully. Olson (1963: 73-116) has made this point strongly in discussing food supply. Prior to the war Britain was far more heavily dependent than Germany on imported food supplies and during the war, Germany waged a (militarily) successful submarine campaign to disrupt and destroy British food imports. But the campaign did not succeed in starving Britain to surrender. Olson argues that this was because Britain's pre-war free trade policy had greatly reduced the size of the agricultural sector, which in turn gave it a capacity for substitution and flexibility that allowed it to respond to the German blockade. Also, unlike Germany, which had boosted its agricultural sector to provide a defence against potential wartime blockade, Britain had not attempted to allow strategic motives to distort its economic advantages in those years. Finally, when the food situation did deteriorate in the war and state intervention became necessary Olson argues that "its relatively unified electorate and generally efficient civil service" allowed Britain to impose controls and execute them effectively.

In a similar vein, Ferguson (2000: 412-418) has argued that good financial management by the state over the long term meant that in 1913 public debt was less than 30 percent of GDP, thus leaving ample scope for new borrowing to finance the war. Furthermore, the development of London as the leading financial centre in the world, and the capacity of the capital market to absorb public debt, especially short term debt, was extremely important. It provided an efficient mechanism for financing the war effort and acted more generally as "a powerful stabilising agent on the short term behaviour of the British economy" (Balderston, 1989: 224).

It should also be remembered that state intervention was not costless, even if the costs partly reflected inexperience in the scale of intervention required. For example, the control of materials had developed in a piecemeal fashion and hence lacked co-ordination, a common problem. Control was not vested in one department but in several, including the Board of Trade, the War Office, the Foreign Office and the Ministry of Munitions, which resulted in chaos and shortages (Hurstfield, 1953: 426-427). Indeed, it could be argued that at times the more cautious approach of the state was appropriate. In the case of food distribution, for example, it allowed existing business networks to be incorporated *gradually* into the centrally administered control system, so ensuring that the system ran relatively smoothly throughout the war (Barnett, 1985: 213-214).

State intervention often occurred too slowly, was executed in a less than desirable manner, or resulted in an inefficient outcome, but it was necessary. However, the inheritance of a strong market economy, allied with the financial clout of the City, a strong public administration and (for the time) a well developed democratic accountability, provided the British state with an economic and political capacity and flexibility that would help to ensure victory. Comparing each of these factors to Germany throws the British advantage into even sharper relief (Olson, 1963; Ferguson, 2000).

## **VI. THE LONG RUN IMPACT ON WEALTH**

### ***1. The accounting framework***

Broadberry and Howlett (1998) provide an accounting framework for evaluating the long run impact of war on wealth, which is then applied to the case of Britain during World War II. Here, we apply the same framework to Britain during World War I. The first important distinction is between stocks and flows in the system of national accounts. Issues concerned with the scale of mobilisation, which have been dealt with in the preceding sections, are best tackled by looking at flows of income, expenditure and output, and asking what proportion of these flows is devoted to the war effort? However, the long run impact of the war can best be assessed by looking at the effects on national wealth, defined here to include human as well as physical capital, intangible as well as tangible capital and net overseas assets (Goldsmith et al., 1963; Revell, 1967; Kendrick, 1976).

Tangible physical capital is the conventional form of capital, consisting of buildings, equipment and inventories. Intangible physical capital is cumulated expenditure on R&D, which is seen as improving the quality of the tangible physical capital. Tangible human capital is the spending required to produce an uneducated, untrained worker, i.e. basic rearing costs. Intangible human capital is mainly spending on education and training to improve the quality of the human capital, although it also includes other items such as spending on health and safety and mobility costs. In an open economy, the impact of the war on net overseas assets must also be taken into account.

We believe that this accounting framework deals with the main objections of writers such as Hardach (1977: 286) and Milward (1984: 9-27) to previous attempts to quantify the impact of war on the economy. In particular, note that: (1) a clear

distinction between stock and flow concepts is maintained throughout (2) all nominal values are converted to a constant price basis so that values for different years can be added together (3) human capital calculations take account of the fact that people consume as well as produce (4) the fact that postwar birth rates rise does not alter the fact that the human capital embodied in those killed by warfare is lost; this has a negative impact on national wealth as much as any destruction of physical capital, which is usually followed by increased investment to make good war losses (5) technological change stimulated by the war can be seen as having a positive impact on intangible physical capital, and can be captured by cumulating any increase in R&D above the prewar level (6) social spending stimulated by the war can be seen as having a positive impact on intangible human capital, and can be captured by cumulating the increase in social spending above the prewar level.

## ***2. Bogart's study of World War I***

It will be useful to review Bogart's (1920) study of the costs of World War I in some detail, since it was carried out as part of the important series of publications on the "Economic and Social History of the Great War" sponsored by the Carnegie Endowment for International Peace and has been the starting point for all subsequent calculations. Bogart's conclusions for Britain and the world as a whole are summarised in Tables 12 and 13. Table 12 provides estimates of what Bogart labels "direct costs" of the war. These costs are calculated as the flow of spending by governments on the prosecution of the war, i.e. spending over and above normal prewar levels. Clearly, this is similar to our attempt to measure the scale of mobilisation, but there are a number of problems with Bogart's presentation of the data. First, it is inappropriate simply to add up nominal sums spent at different times,

given the wartime inflation. Second, this problem, as well as the related problem of the conversion to dollars of all values expressed in national currencies can be avoided if the war expenditures are expressed as a proportion of national income in each year. Third, the presentation of the data on an annual basis is anyway highly informative about the time profile of the war effort.

However, the problems become more serious when we move from Table 12 to Table 13 and Bogart introduces a number of what he calls “indirect costs”. At first sight, it might appear that Bogart has in mind a national balance sheet approach, adding up losses to human and physical capital. Note, however, that there are a number of accounting procedures that give cause for concern. Perhaps the most immediately worrying feature is that Bogart simply adds the direct and indirect costs, a curious combination of flow and stock concepts. To add to the confusion, lost production (a flow concept) is included as an indirect cost ( a stock concept). Although the accounting for losses to physical capital is unremarkable (remembering that cargoes can be seen as inventories), the treatment of human capital deserves some attention, since Bogart’s procedures are not consistent with the national balance sheet approach. The problem is that the capitalised value of human life, based on lifetime earnings, overstates the social loss since people consume as well as produce. In a national balance sheet framework, all that we require is the cost of rearing and training a worker, since this is what is lost to society by premature death. Finally, note that some of the government spending on the war effort, which is included negatively as a direct cost by Bogart, should actually enter positively in the national balance sheet, contributing to intangible physical capital in the form of cumulated

R&D spending and to intangible human capital in the form of spending on health and mobility.

Bogart (1920: 299) makes no attempt to relate his estimates of the direct and indirect costs of World War I to levels of income or wealth, but simply concludes that “the figures presented in this summary are both incomprehensible and appalling”. To put things in perspective, we will conclude this section by relating Bogart’s estimated costs of the war for Britain to conventional estimates of national income and national wealth. Feinstein (1972: Table 4) provides a figure of £2,232 million for UK GDP at factor cost (compromise estimate) in 1913, which is equivalent to \$10,848 million converted at the gold standard exchange rate of £1=\$4.86. That puts the cost of the war for Britain at roughly five times 1913 national income, a huge figure. For the conventional balance sheet estimate of national wealth in 1913, we must combine Feinstein’s (1988: Table 1) figure of £7,502 million for the gross domestic fixed capital stock with Feinstein’s (1972: Table 50) figure of £4,180 million for net overseas assets to yield a total national wealth of £11,682 million, or \$56,775 million. That puts the cost of the war for Britain at roughly her total wealth in 1913. In our view, these figures seriously overstate the cost of the war, at least when viewed in terms of the impact on economic growth and development. To see this, we now turn to an appraisal of the impact of the war on the British economy using a national balance sheet approach.

### ***3. The impact of World War I on Britain’s wealth***

Table 14 presents an assessment of the effects of World War I on Britain’s wealth using a conventional balance sheet approach. For property losses on land, Bogart’s

(1920: 287) figure in dollars is converted to pounds using the gold standard exchange rate, since we do not have any information on the time profile of these losses. For shipping and cargo, the gross tonnage lost is taken from Bogart (1920: 289), but valued at 1913 prices using the average price of a steamship per gross ton from Feinstein (1988: Table 15.12) and using Bogart's ratio of the cargo value to ship value. For external disinvestment, we follow the method of the *Statistical Material presented during the Washington Negotiations* (Cmd. 6707). Annual figures on the sale of overseas investments, government borrowing abroad and net exports of gold and silver are taken from Morgan (1952: 314) and converted to 1913 prices using the GDP deflator from Feinstein (1972: Table 61). Adding together the property losses and external disinvestment yields total losses. The prewar stock of gross domestic fixed capital is taken from Feinstein (1988: Table 1) and the prewar net overseas assets from Feinstein (1972: Table 55). Adding domestic fixed capital and net overseas assets yields national wealth in 1913 of £11,682 million. On this conventional balance sheet basis, therefore, the losses of World War I amount to some 14.9 per cent of prewar national wealth. This compares with a figure of 18.6 per cent of prewar wealth for the losses of World War II on a similar basis (Broadberry and Howlett, 1998: 69). As with the flow data on government spending in Figure 1, World War I appears to have had a dramatic impact, but not quite on the same scale as World War II.

In Table 15, we augment the conventional national balance sheet approach to allow for human capital. In calculating the losses of human capital, we must arrive at an estimate of the value of tangible and intangible human capital embodied in the average British casualty. Tangible human capital is the cost of rearing a child to

working age and our figure for 1913 is based on Rowntree's (1902: 110) estimate of the cost of maintaining a child above the primary poverty line in York in 1900. A weekly cost of 2s 10d translates into an annual cost of £7.37 in 1900 prices. Using Feinstein's (1972: Table 65) retail price index to convert this to 1913 prices yields an annual child rearing cost of £8.28 in 1913. Up to the age of 14, then, rearing costs total approximately £116 per child. Intangible human capital per head is based on education spending to improve the quality of the labour force. Data on education spending by central government and local authorities from Mitchell (1988: 590-644) are combined with data on the number of pupils from Mitchell (1988: 798-810) to obtain a figure for educational spending per pupil. In 1913 prices, annual educational expenditure was £8.50 per pupil. For the cohorts born during the decades centred on 1890 and 1900, which are most relevant for military casualties, the average number of years' schooling was about nine years (Matthews et al., 1982: 573). This means that the intangible human capital embodied in the average casualty was approximately £77. However, for the average adult in 1913, with just 6.65 years' education, the value of intangible human capital was somewhat lower at £57.

Taking the number of casualties from the War Office (1922: 237, 339) at 755,000, losses of tangible and intangible human capital work out at £88 million and £58 million, respectively. Taking the number of adults from Feinstein (1972: Table 56) at approximately 32 million, the prewar stock of tangible and intangible human capital works out at £3,712 million and £1,824 million, respectively. Allowing for human capital, then, yields total war losses of approximately 11 per cent of prewar wealth.

Finally, we consider the extent to which the war induced offsetting investments in intangible human and physical capital. As Milward (1984: 24) notes, many writers have claimed a positive relationship between the extent to which war involved the total population and government spending on social welfare, and this may be expected to increase the stock of intangible human capital. Peacock and Wiseman (1967) stress the importance of sudden shocks such as World War I in displacing norms of acceptable tax levels. However, Peacock and Wiseman were looking at total government spending, including national debt interest and transfers. If attention is confined to government consumption of goods and services, the displacement effect across World War I is barely visible (as in Figure 1). In fact, looking at Peacock and Wiseman's (1967: 188) category of "social services", real government expenditure per head on social welfare appears to have declined during the war years. We have therefore made no allowance for any war-induced increase in intangible human capital. Similarly, we have made no allowance for war-induced government spending on intangible physical capital, since this was not on a large enough scale to affect significantly the figures in Table 15. With total British R&D spending in the mid-1930s still only about £5 million a year in current prices, government financing of this activity during World War I could not have amounted to a sizeable sum, even when capitalised over the duration of the war (Mowery, 1986: 192).

## **VII. CONCLUDING COMMENTS**

Our analysis of the United Kingdom economy during World War I has shown that:

- (1) The scale of mobilisation for war increased steadily to a peak in 1917, when government expenditure reached 38.7 per cent of GDP. This resulted in an impressive

production effort in all parts of the economy, including services and agriculture as well as munitions and other industry. (2) Despite a substantial increase in taxation, the mobilisation was financed largely by borrowing, and this was accompanied by an inflationary increase in the money supply. (3) An external deficit was avoided on current account due to the resilience of invisible earnings, while on capital account the sale of overseas investments and a reduction in private lending overseas allowed the government to lend more to its allies than it borrowed overseas. (4) Although most accounts of World War I have stressed the slowness of the government in moving towards a controlled economy, there is a danger of overlooking the advantages that Britain gained from its position as a highly developed and flexible market economy. This is something which becomes much more apparent when comparing Britain with Germany. (5) A national balance sheet approach suggests that World War I had a significant negative long run impact on Britain's wealth, with war leading to a setback of between 11.0 per cent of prewar wealth (including human capital in the definition of wealth), and 14.9 per cent (excluding human capital). The losses are a lower percentage of wealth if human capital is included because casualties were low relative to the total population.

Finally, since we have used a similar framework to analyse World War II (Broadberry and Howlett, 1998; 2003), it will be instructive to summarise the similarities and differences between the two world wars: (1) The scale of mobilisation was very high during World War I, certainly when compared with previous experience. However, as is apparent from Figure 1, the scale of mobilisation was substantially higher again during World War II. Broadberry and Howlett (1998: 47) note that the peak share of government spending in GDP during World War II

was 49.7 per cent in 1943, more than 10 percentage points higher than the World War I peak of 38.7 per cent in 1917. (2) War finance was less inflationary during World War II. Although the money supply doubled during both wars, price controls and rationing meant less inflation during World War II. (3) Whereas the balance of payments position permitted the British government to act as a net lender to the Allies during World War I, a substantial current account deficit during World War II made the British government a major net borrower on capital account. Perversely, though, loan defaults after World War I put significant pressure on the interwar British economy, whereas the massive British borrowing during World War II had a less severe economic impact in the medium term because of the forgiving of American Lend-Lease aid. (4) The literature on World War I emphasises the slowness of the government in appreciating the need for large scale state intervention and co-ordination when fighting a total war. This view is summed up in the memorable phrase “business as usual”. A similar tendency to idealise the benefits of state control and to denigrate the achievements of the market appears in the literature on World War II (Broadberry and Howlett, 2003). However, there is a danger in such a view of neglecting the benefits that British planners enjoyed from the inheritance of a liberal market economy. These benefits are most obvious when comparing Britain with Germany during both conflicts. (5) The setback to national wealth was greater during World War II than during World War I. However, it makes a significant difference whether or not you include human capital. If attention is limited to physical capital, the scale of the wealth destruction was 18.6 per cent in World War II compared with 14.9 per cent in World War I (Broadberry and Howlett, 1998: 68-71). If human capital is also taken into account, however, the higher level of casualties during World War I (755,000 compared with 360,000 during World War II) means that the scale of

the destruction was more similar, at 12.3 per cent of national wealth in World War II compared to 11.0 per cent in World War I (Broadberry and Howlett, 1998: 68-71).

**TABLE 1: Real GDP of the United Kingdom at constant factor cost, 1913-1919 (1913=100)**

	Expenditure	Income	Compromise
1913	100.0	100.0	100.0
1914	101.0	100.9	101.0
1915	112.1	106.0	109.1
1916	112.8	110.1	111.5
1917	115.0	109.9	112.5
1918	113.1	113.3	113.2
1919	100.6	101.1	100.9

Source: Feinstein (1972: Table 6).

**TABLE 2: UK population and employment, 1913-1919 (1913=100)**

	Population	Total employment	Civilian employment	Armed forces
1913	100.0	100.0	100.0	100.0
1914	100.9	99.7	97.6	202.5
1915	101.5	102.9	92.4	622.5
1916	101.9	104.4	88.9	875.0
1917	102.1	105.1	85.9	1,062.5
1918	102.0	105.8	85.7	1,107.5
1919	101.9	104.2	95.6	532.5

Source: Feinstein (1972: Tables 55, 57).

**TABLE 3: UK GDP per head and per employee, 1913-1919 (1913=100)**

	GDP per head	GDP per employee
1913	100.0	100.0
1914	100.1	101.3
1915	107.5	106.0
1916	109.4	106.8
1917	110.2	107.0
1918	111.0	107.0
1919	99.0	96.8

Source: Tables 1 and 2, using compromise GDP and total employment.

**TABLE 4: Comparative US/UK and Germany/UK output per employee by sector, circa 1911 (UK=100)**

	US/UK	Germany/UK
Agriculture	103.2	67.3
Industry	193.5	122.0
Services	107.3	81.3
Whole economy	117.7	75.5

Source: Derived from Broadberry (1998).

**TABLE 5: Components of UK expenditure on GDP at constant market prices, 1913-1919 (per cent of total)**

	Consumption	Government	Investment	Net exports
1913	77.2	8.1	7.6	7.1
1914	76.9	11.5	7.7	3.9
1915	71.4	31.2	-2.3	-0.3
1916	65.6	35.6	-4.3	3.1
1917	60.2	38.7	0.9	0.2
1918	60.7	37.7	4.4	-2.8
1919	76.1	18.1	5.5	0.3

Source: Feinstein (1972: Table 5).

**TABLE 6: UK output of selected items, 1913-1919**

	1913	1914	1915	1916	1917	1918	1919
<i>Agriculture</i>							
Grains, 000 tons	6,086	6,221	6,308	5,876	5,166	8,574	6,957
Potatoes, 000 tons	7,605	7,476	7,540	5,469	8,604	9,223	6,312
Meat, 000 tons	1,482	1,443	1,487	1,500	1,448	948	
<i>Industry</i>							
Coal, m tons	287.4	265.7	253.2	256.4	248.5	227.7	229.8
Iron ore, m tons	16.0	14.9	14.2	13.5	14.8	14.6	12.3
Steel, m tons	7.7	7.8	8.6	9.0	9.7	9.5	7.9
Aircraft, units		245	1,933	6,149	14,748	32,018	
Aero-engines, units		99	1,721	5,363	11,763	22,088	
Tanks, units				150	1,110	1,359	
Artillery guns, units		91	3,390	4,314	5,137	8,039	
Trench mortars, units		12	945	5,192	5,951	6,473	
Machine guns, 000		0.3	6.1	33.5	79.7	120.9	
Rifles, 000		120	613	953	1,206	1,062	
Shells, millions		0.5	7.4	51.6	87.7	69.8	
Explosives, 000 tons		5.7	29.4	139.2	328.9	280.4	
Merchant ships, 000 gross tons	1,825	1,683	651	608	1,163	1,348	1,620
Cotton consumption, m lb	2,178	2,077	1,931	1,972	1,800	1,499	1,526
<i>Services</i>							
Ship arrivals, million net tons	49.1	43.1	33.7	30.1	23.2	23.2	29.6
Bank loans, £m	430.7	454.1	424.4	413.4	494.6	520.0	855.3
New capital issues, £m	242.1	199.6	82.9	34.7	26.4	65.3	237.5

Sources and notes: Agriculture: grains and potatoes from *Statistical Abstract of the United Kingdom, 1910-1924*, Table 76. Grains are the sum of wheat, barley and oats harvested; meat from Beveridge (1928: 361). Industry: coal, iron ore and steel from Mitchell (1988: 248-249, 279, 288-289); merchant ships from Fayle (1927: 416); munitions from Ministry of Munitions (1923): aircraft (Vol. XII, part I: 173); aero-engines (Vol. XII, part I: 174); tanks (Vol. XII, part III: 93); artillery guns (Vol. X, part I: 96); trench mortars (Vol. XI, part I, 130-131); machine guns (Vol. XI, part V: 27); rifles (Vol. XI, Part IV: 67); shells (Vol. X, part V: 78-79); explosives (Vol. X, part IV: 138); cotton consumption from Mitchell (1988: 332); Services: ship arrivals (foreign trade, with cargoes) from *Statistical Abstract of the United Kingdom, 1910-1924*, Table 47; joint stock bank loans from Sheppard (1971: 118); new capital issues from Morgan (1952: 264).

**TABLE 7: UK government expenditure, revenue and net borrowing, 1913–1918**

	1913/14	1914/15	1915/16	1916/17	1917/18	1918/19
<i>In £m</i>						
Expenditure	197	561	1,559	2,198	2,696	2,579
Revenue	198	227	337	573	707	889
Surplus (+) or Deficit (-)	+1	-334	-1,222	-1,625	-1,989	-1,690
Deficit as % of GDP		14.0	43.1	47.9	46.9	34.6
<i>As % of total expenditure</i>						
Debt interest	17.9	6.3	4.6	6.0	6.7	8.9
Fighting services	41.4	64.5	47.4	37.1	35.3	45.0
Munitions	--	--	15.5	24.3	24.0	17.9
Shipping	--	--	0.5	8.5	9.6	3.3
Other expenditure	40.7	29.2	32.0	24.1	24.4	24.9
<i>As % of total revenue</i>						
Non-tax revenue	17.8	16.5	13.9	10.3	13.3	11.8
Tax revenue	82.2	83.5	86.1	89.7	86.7	88.2
- of which:						
Customs	17.9	17.1	17.7	12.3	10.1	11.6
Excise	20.0	18.7	18.2	9.8	5.5	6.7
Property and income tax	23.8	30.6	38.1	35.8	33.9	32.8
Excess Profits Duty	--	--	0.04	24.4	31.1	32.1
Other taxes	20.5	17.1	12.1	7.4	6.1	5.0

Sources: Kirkaldy (1921: 214-5); Mallet and George (1929: 392-393); Feinstein (1972: Table 4).

Notes: Years are fiscal years (thus 1913/14 is 1 April 1913 to 31 March 1914). Until 1915/16, expenditure on munitions included with the fighting services. Property and income tax includes super tax. GDP at factor cost (compromise estimate) has been recalculated on a financial year basis.

**TABLE 8: Financing the UK central government deficit, 1914/15 to 1918/19 (£m)**

	Budget deficit	Increase in:			
		domestic long debt	domestic short debt	money base	other finance
1914/15	334	391	64	73	-194
1915/16	1,222	458	510	27	227
1916/17	1,625	1,477	95	56	-3
1917/18	1,989	748	484	42	715
1918/19	1,690	1,019	247	123	301

Sources: Morgan (1952: 98, 107); Capie and Webber (1985: Table 1.1).

Notes: Domestic short debt is Treasury Bills and Ways and Means Advances.

**TABLE 9: UK national debt, 1914-1919**

	National debt (£m)	GDP (£m)	Debt/GDP (%)
1913/14	706	2,690	26.2
1914/15	1,162	2,859	40.6
1915/16	2,190	3,400	64.4
1916/17	4,064	4,068	99.9
1917/18	5,921	5,091	116.3
1918/19	7,481	5,866	127.5

Sources: Wormell (2000: 732); Feinstein (1972: Table 4).

Notes: National debt is the value at the end of the financial year. GDP at factor cost (compromise estimate) has been recalculated on a financial year basis.

**TABLE 10: Money and prices in the UK, 1913-1919 (per cent of 1913)**

	M0	M3	GDP deflator	Retail Price Index
1913	100	100	100	100
1914	122	108	101	101
1915	142	125	112	121
1916	162	138	127	143
1917	178	156	161	173
1918	224	190	191	199
1919	266	232	225	211

Sources and notes: M3 and M0 are annual averages from Capie and Weber (1985: Tables 1.1, 1.3); GDP deflator and Retail Price Index are from Feinstein (1972: Tables 61, 65), both with 1913 as the base year.

**TABLE 11: The UK external account, 1914-1918 (£m)**

	1914	1915	1916	1917	1918
<i>Current account</i>					
Merchandise exports	526	484	604	597	532
Merchandise imports	-696	-852	-949	-1,064	-1,316
Merchandise balance	-170	-368	-345	-467	-784
Invisible balance	315	395	520	575	580
Net transfers	-20	-50	-50	-80	-
Current balance	125	-23	125	28	-204
<i>Capital account</i>					
Government lending	-	-298	-530	-563	-297
Government borrowing	-	53	319	532	381
Net government lending	-	-245	-211	-31	84
Net private lending	-144	-60	-6	-3	-10
Sale of investments	-	43	110	60	23
Other transactions	19	285	-18	-54	107

Source: Morgan (1952: 304,341).

Note: A minus sign indicates a debit item. Merchandise exports includes re-exports.

**TABLE 12: Bogart's "direct costs" of World War I (\$m)**

	Gross cost	Advances to allies	Net cost
United States	32,080	9,455	22,625
Great Britain	44,029	8,695	35,334
Rest of British Empire	4,494		4,494
France	25,813	1,547	24,266
Russia	22,594		22,594
Italy	12,314		12,314
Other Entente Allies	3,964		3,964
<i>Total Entente Allies</i>	145,288	19,697	125,591
Germany	40,150	2,375	37,775
Austria-Hungary	20,623		20,623
Turkey and Bulgaria	2,245		2,245
<i>Total Central Powers</i>	63,018	2,375	60,643
<i>Total</i>	208,306	22,072	186,234

Source: Bogart (1920: 267).

**TABLE 13: Bogart's "direct and indirect costs" of World War I (\$m)**

	Great Britain	All countries
Capitalised value of human life:		
soldiers	3,477	33,551
civilians	3,477	33,551
Property losses:		
on land	1,750	29,960
shipping and cargo	4,005	6,800
Loss of production	7,500	45,000
War relief	70	1,000
Loss to neutrals		1,750
<i>Total indirect costs</i>	20,279	151,612
Total direct costs, net	35,334	186,234
Grand total	55,613	337,846

Source: Bogart (1920: 269-299).

Note: Loss of production in Great Britain calculated by applying Bogart's figure of \$500 per year productive capacity to the number of persons in the armed forces from Feinstein (1972: Table 57).

**TABLE 14: Conventional national balance sheet calculation of the effects of World War I on the UK economy (£ million at constant 1913 prices)**

Property losses:	
on land	360
shipping and cargo	384
External disinvestment	998
Total losses	1,742
Prewar stock of fixed capital	7,502
Prewar net overseas assets	4,180
Prewar national wealth	11,682

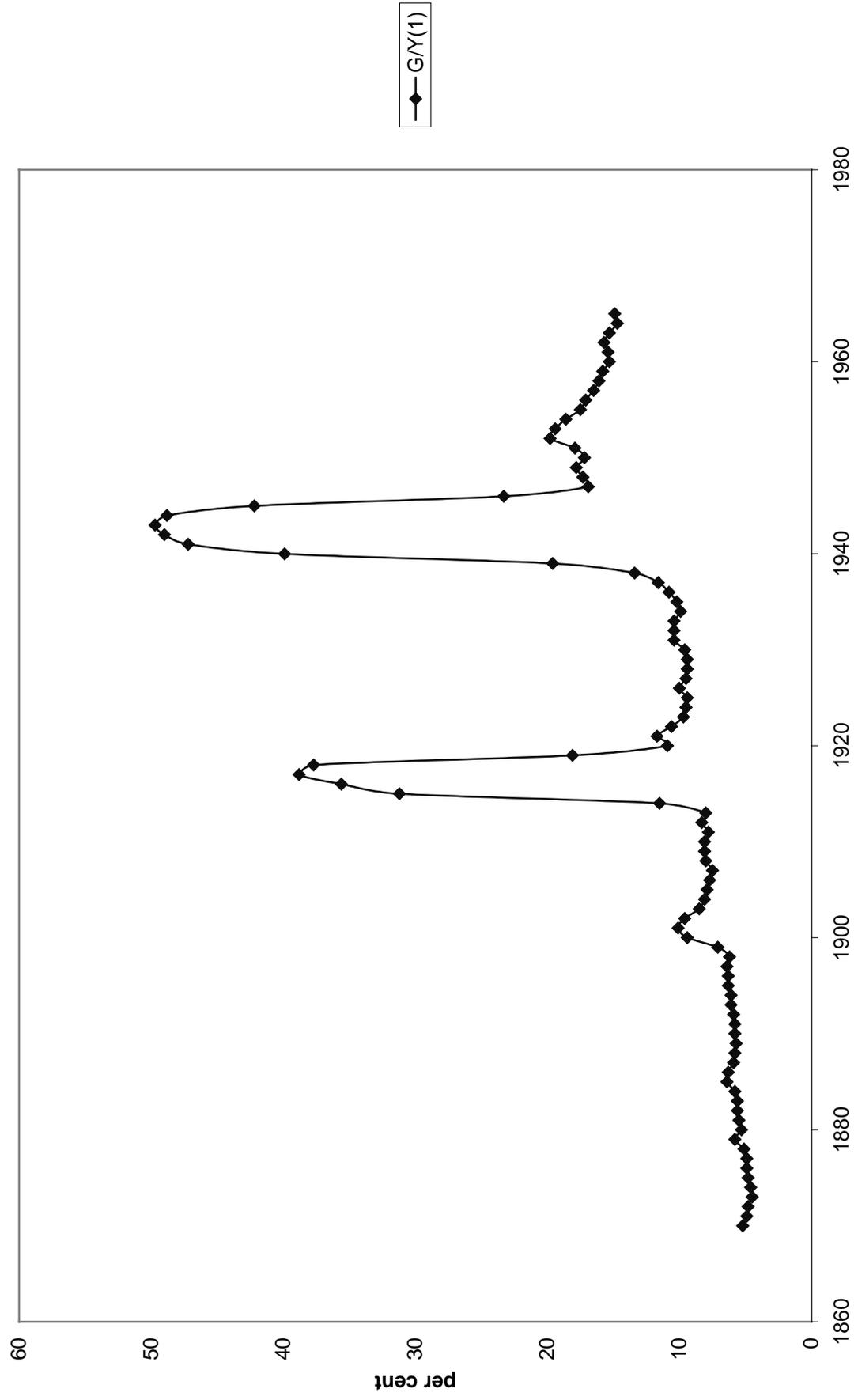
Sources: see text.

**TABLE 15: Modified national balance sheet calculation of the effects of World War I on the UK economy (£ million at constant 1913 prices)**

Property losses:	
on land	360
shipping and cargo	384
External disinvestment	998
Human capital losses:	
tangible	88
intangible	58
Total losses	1,888
Prewar stock of fixed capital	7,502
Prewar net overseas assets	4,180
Prewar tangible human capital	3,712
Prewar intangible human capital	1,824
Prewar national wealth	17,218

Sources: see text.

FIGURE 1: UK government spending as a share of GDP in constant prices



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