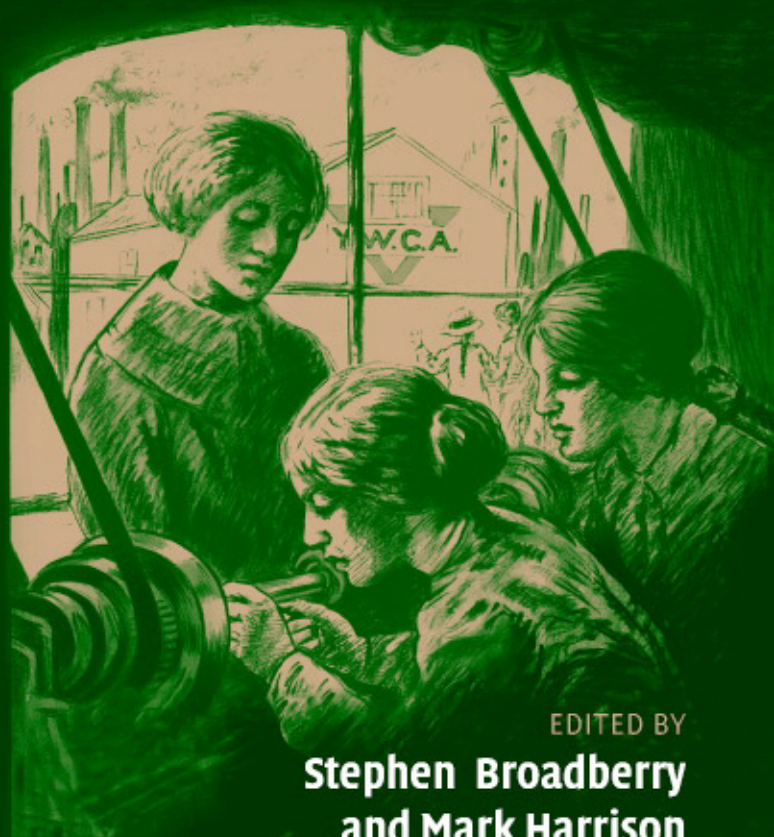


THE ECONOMICS OF
WORLD WAR I



EDITED BY

**Stephen Broadberry
and Mark Harrison**

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The Economics of World War I

This unique volume offers a definitive new history of European economies at war from 1914 to 1918. It studies how European economies mobilised for war, how existing economic institutions stood up under the strain, how economic development influenced outcomes, and how wartime experience influenced postwar economic growth. Leading international experts provide the first systematic comparison of economies at war between 1914 and 1918 based on the best available data for Britain, Germany, France, Russia, the USA, Italy, Turkey, Austria-Hungary, and the Netherlands. The editors' overview draws some stark lessons about the role of economic development, the importance of markets, and the damage done by nationalism and protectionism.

A companion volume to the acclaimed *The Economics of World War II*, this is a major contribution to our understanding of total war.

STEPHEN BROADBERRY is Professor of Economics at the University of Warwick. His previous books include *The Productivity Race: British Manufacturing in International Perspective* (1997).

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Edited by

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and

Mark Harrison



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Introduction

Stephen Broadberry and Mark Harrison

During the twentieth century the world experienced two deadly global wars followed by a ‘cold war’ of unparalleled expense and danger. World War I opened this brutal epoch. To many who took part the experience was little less than apocalyptic; it seemed like an end, not a beginning. They saw it as putting a stop to history, progress, and civilisation. They called it the ‘Great War’. They did not know that it would be followed twenty years later by World War II and that the second war would be greater and more dreadful than the first.

This book brings together nine country studies of the economics of World War I: five Allies, three Central Powers, and a neutral country. Our book is the first, we believe, to offer such a systematic comparison of economies at war between 1914 and 1918, and it is certainly the first to include the Ottoman Empire in such a collection. These investigations suggest two themes that link economics with the study of war.

One theme is the contribution of economic factors to the outcome of the war. Our book suggests that the outcome of global war was primarily a matter of the levels of economic development of each side and the scale of resources that they wielded; in this respect our conclusion is similar to that of our previous study of World War II (Harrison, 1998). How well the resources were organised mattered greatly, but rich countries could usually organise themselves more efficiently than poor ones. The human factor mattered too: how well the people were motivated. Generally we find that, given superior resources, the richer countries could solve the motivation problems that defeated the poorer ones. Thus, organisation and motivation tended to be endogenous; to this extent they did not independently influence the outcome.

Another theme of our book concerns the effects of war on long-run economic development. It is sometimes claimed that war, however dreadful, may have positive ‘spin-offs’ for the nations that take part, whether they win or lose. In practice these are not easy to find. War is, in general, a negative-sum activity. If war was followed by recovery and accelerated

development, this was usually no more than a making good of wartime delays and losses. If wartime activity had promoted new forms of technology or economic organisation that turned out to have peacetime applications too, then there would always have been some cheaper way of achieving the same result. A spin-off of World War I is that it destroyed several monarchies and imperial elites: the *anciens régimes* of Germany, Austria-Hungary, Italy, Russia, and the Ottoman Empire. This sounds as if it might have been for the best, but the destruction of states associated with the war led to the displacement of populations on a colossal scale (Mazower, 1998; Gatrell, 1999). Moreover, the war was followed in Russia by civil war, communism, and dictatorship; in Italy, Austria, and Hungary by fascism and dictatorship; and in Germany by fascism, dictatorship, war, and genocide.

The main lesson that has emerged from our study of the world wars of the twentieth century is that peace is better than war. The best that can be said for World War II is that a positive spin-off was a common understanding of this lesson. Because of this, the main participants in World War II cooperated after the war to promote recovery and trade. As a result, global economic growth in the half-century after World War II was much faster than in the half-century before it. In contrast, only some of the participants in World War I came away with this understanding. Others believed that the lesson of the war was to wage war again, only better. Hence World War II.

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1 The economics of World War I: an overview

Stephen Broadberry and Mark Harrison

Introduction

Globalisation has been under way for centuries. The modern wave of globalisation that dates from the early nineteenth century gave a significant boost to world trade, world capital flows, and worldwide migration, with great powers competing for colonial empires on a global scale. The Great War of 1914 to 1918 then interrupted and, for a time, set into reverse the process of globalisation.

How did globalisation lead to war? At first sight it was the competition for colonies that ran out of control. Britain and France, the established powers of 'old' Europe, had established a condominium over most of Africa and much of Asia; Germany, the rising power of 'new' Europe, had no colonies to speak of, wanted some, and expected to get them at the expense of the French and the British. Behind this lay a perception that world power was a zero-sum game. Since Adam Smith, the Anglo-Saxon liberals had argued that trade was a game from which all could benefit at once. But in the late nineteenth century liberalism was being challenged by a new nationalism that gave more weight to the control of territory and settlement than to trade and competition. When it came to territory, the supply was fixed and there was only so much to go round. Therefore, the new nationalists reasoned, it was worth Germany's while to break up world trade for a while in order to grab territory from the older powers.

In fact, the European powers did not fight World War I over colonies. The war took the form not of a naval struggle to control access to the peripheral territories of Asia or Africa, but of a struggle on land that was fought in the heart of the continental homeland. At first, it is true, Germany's desire for colonies stimulated a naval arms race, but the battle cruisers that were laid down on each side in the process played only a minor role in the war. More important was the fact that the quest for a German empire provoked an anti-German coalition, the Entente Cordiale between Britain and France (1904) to which Russia was also admitted in 1907. Germany was not without friends, having been allied

with Russia since 1872, Austria-Hungary since 1879, and Italy since 1882, but Russia and Germany had drifted apart and Italy would prove an unreliable ally. The increasing polarisation of the continental powers shifted attention away from Germany's original aim, an adjustment of the boundaries of the British and French empires overseas, towards the balance of power in Europe itself. As a result, the war was largely fought on European soil for the control of Europe.

The events that led to the war in 1914 were the assassination of the crown prince of Austria-Hungary by a Serbian nationalist in Sarajevo on 28 June, an Austro-Hungarian ultimatum that Serbia rejected, and Russia's mobilisation in defence of Serbia which, in its turn, triggered a German attack on France and Belgium; this was followed by British entry into the war on the side of France. The German attack on France was motivated by a forward-looking calculation: once the coalitions on each side were fully engaged, Germany risked a war on two fronts, against Russia in the east and France in the west. Having identified the Russians as the less mobile enemy, the German plan was designed to avoid a war on two fronts at once by attacking France with a knock-out blow at the first sign of *Russian* mobilisation; thus, while the Russians completed their mobilisation the Germans would have time to defeat the French before turning their victorious armies to the east to defeat the Russians in their turn. Of course, this is not how things turned out.¹

This book deals with two issues that then arise. First, what did economic factors contribute to victory and defeat in World War I? Second, how did the war affect postwar economic institutions and performance in the economies that took part or were most affected by the war?

As far as the first question is concerned, it is worth recalling that the German war plan for 1914 anticipated victory in the west within six weeks. The war was intended to be won by military, not economic means, and was to be finished off long before economic factors could be brought into play. It was only after this plan had failed, as the leaders on each side contemplated the ensuing stalemate, that belts began to be tightened and sleeves rolled up for the mobilisation of entire economies (Chickering and Förster, 2000).

Once plans were redrawn for a longer haul, a war of attrition developed in the west where the opposing forces of Germany, France, and Britain, each backed by large, rich, and successful economies, ground each other down with rising force levels and rising losses. In battles that were intended to be won by the last man left standing, resources counted for almost everything. The greater Allied capacity for taking risks, absorbing the cost of mistakes, replacing losses, and accumulating overwhelming quantitative superiority eventually turned the balance against Germany.

Eastern Europe, the Balkans, and the Near East formed the theatre of combat for the economically weaker powers: Russia, Italy, and the Austro-Hungarian and Ottoman empires. The British and Germans wished to be more involved there, but neither could withdraw significant forces from the western front. In the east, therefore, the immediate outcomes of battles were less determined by economic factors, at least in the short run. Over a period of years, however, the battles drained the weakest economy first, and this led to Russia's exit from the war in 1917. Then, the Central Powers' chance for victory in the east was destroyed by Germany's defeat in the west. Ultimately, economics determined the outcome.

Population, territory, and GDP

The economic advantage of the Allies over the Central Powers was substantial at the outbreak of war and rose steadily as the composition of the belligerents changed on each side. The most striking change was that during 1917 Russia was defeated and abandoned the Allies, but was replaced by the United States. Thus the richest great power stepped into the gap left by the poorest, and this led to a further increase in the Allied advantage.²

Size and development

What were the resources that were deployed on either side in the war? These are best measured by adding up the populations, territories, and gross domestic products of the territories at war. Populations limited the numbers of men and women available in each country for military service or war work. Territories limited the breadth and variety of natural resources available for agriculture and mining; the wider the territory, the more varied were the soil types and the minerals beneath the soil. GDPs limited the volume of weapons, machinery, fuel, and rations that could be made available to arm and feed the soldiers and sailors on the fighting front. The larger the population, territory, and GDP of a country, the easier it would be for that country to overwhelm the armed forces of an adversary.

In adding up the resources available to each country we also compute the territories and income available per head of the population. Most important was average GDP per head, which reflected the country's development level. A poor country might have a large population, but if most of the adults were engaged in low-productivity subsistence farming then there would be little real possibility of transferring many of them out

of agriculture to the armed forces or war industry, since the remaining farmers would be unable to produce enough food to keep everyone alive. Equally, a poor country might have a large territory but, without a high level of development of roads and railways, would be unable to exploit it economically or defend it militarily. Finally, a poor country typically lacked efficient government and financial services of the kind necessary to account for resources and direct them into national priorities. Thus, a relatively high level of economic development was essential if territory and population were to count in war.

Table 1.1 adds up the resources on the Allied side at the outbreak of war and shows how the volume of resources changed; in this table and the next, countries are listed as far as possible in order of their entry into the war. In reality, of course, populations and outputs changed year by year. To assist with comparability the 1913 figures for each territory are the ones reported in the table. In the first phase of the war Russia, France, and the United Kingdom were joined together as the power of the Triple Entente. They brought with them their dependencies and colonies. Other countries joined in too: Serbia and the other Yugoslav states, the British Dominions, Liberia, and Japan with her colonies. During 1915/16 a second wave of countries joined the Allies: Italy, Portugal, and Romania. In the third wave of 1917/18 Russia dropped out but the United States joined in, bringing its own possessions, most of Central America and Brazil. Greece, Siam, and China also joined. By the end of this process governments representing 70 per cent of the world's prewar population and 64 per cent of its prewar output had declared war on the Allied side.

The bare totals on the Allied side do not give any idea of their heterogeneity. The British Empire will do for illustration since it comprised some of the richest and poorest regions in the world. Britain itself had a prewar population of 46 million with an average income per head of nearly \$5,000 (at 1990 prices). Its colonies, excluding the Dominions, had a prewar population of 380 million, mostly Indians, with an average income of less than \$700. Thus a colonial population eight times that of Britain produced a similar volume of output. Moreover, this output was far less available than Britain's for fighting Germany for three reasons: it was hundreds or thousands of miles away from the theatre of war, the level of development of colonial government administration and financial services rendered it hard to track and control, and most of it was already committed to the subsistence needs of the colonial populations. In short, the mere possession of low-income territories was of little value to a great power in the war. If India helped Britain in the war it was to enable British trade and commerce rather than because Britain could mobilise Indian

Table 1.1. *The world at war: Allied populations, territories, and GDPs in 1913*

	Population millions	Territory		Gross domestic product	
		million sq. km	ha. per head	\$ billion	\$ per head
First wave: Great powers, 1914					
Russian Empire, except Finland	173.2	21.7	12.6	257.7	1,488
France	39.8	0.5	1.3	138.7	3,485
United Kingdom	46.0	0.3	0.7	226.4	4,921
Dependencies and colonies					
Finland	3.2	0.4	11.7	6.6	2,050
French colonies ^a	48.3	10.7	22.1	31.5	652
British colonies ^b	380.2	13.5	3.6	257.0	676
Other powers					
Yugoslav states ^c	7.0	0.2	2.2	7.2	1,029
British Dominions ^d	19.9	19.5	97.8	77.8	3,909
Liberia	1.5	0.1	6.7	0.9	585
Japan	55.1	0.4	0.7	76.5	1,387
Japanese colonies ^e	19.1	0.3	1.6	16.3	857
Second wave: 1915/16					
Italy	35.6	0.3	0.8	91.3	2,564
Italian colonies ^f	2.0	2.0	101.0	1.3	634
Portugal	6.0	0.1	1.5	7.4	1,244
Portuguese colonies ^g	8.7	2.4	27.9	5.2	603
Romania	7.7	0.1	1.8	11.7	1,527
Third wave: 1917/18					
United States	96.5	7.8	8.1	511.6	5,301
US dependencies and colonies ^h	9.8	1.8	18.9	10.6	1,088
Central American states ⁱ	9.0	0.6	6.4	10.6	1,184
Brazil	25.0	8.5	34.0	20.3	811
Greece	4.8	0.1	2.5	7.7	1,592
Siam	8.4	0.5	6.2	7.0	835
China	441.5	11.1	2.5	243.7	552

Table 1.1. (*cont.*)

	Population millions	Territory		Gross domestic product	
		million sq. km	ha. per head	\$ billion	\$ per head
November 1914					
Allies, total	793.3	67.5	8.5	1,096.5	1,382
UK, France, and Russia only	259.0	22.6	8.7	622.8	2,405
November 1916					
Allies, total	853.3	72.5	8.5	1,213.4	1,422
UK, France, and Russia only	259.0	22.6	8.7	622.8	2,405
November 1918					
Allies, total	1,271.7	80.8	6.4	1,760.5	1,384
Percentage of world	70%	61%	—	64%	—
UK, France, and USA only	182.3	8.7	4.8	876.6	4,809
Percentage of world	10%	7%	—	32%	—
World, 1913	1,810.3	133.5	7.4	2,733.9	1,510

Notes: Figures show populations, territories, and incomes for the year 1913. Currency units are international dollars at 1990 prices. Countries and territories are listed in approximate order of their entry into the war.

^a Many countries in Africa, Asia, and Oceania. Algeria, French West Africa, and Indo-China together accounted for more than 70 per cent of the population and GDP but less than half of the territory of the French Empire.

^b Many countries in Africa, Asia, and Oceania, including Anglo-French and Anglo-Egyptian territories. India accounted for more than four-fifths of the population and GDP but only one-third of the territory of the British Empire, not counting the Dominions.

^c Serbia, Bosnia-Herzegovina, and Montenegro.

^d Australia, Canada (including Labrador and Newfoundland), New Zealand, and Union of South Africa.

^e Korea, Formosa, Kwantung, and Sakhalin.

^f Eritrea, Libya, Somalia, the Aegean Islands, and Tientsin.

^g Angola, Cape Verde Islands, Portuguese Guinea, Mozambique, São Tomé and Príncipe Islands, Portuguese India, Macao, and Timor and Camburg.

^h Alaska, American Samoa, Guam, Hawaii, the Panama Canal Zone, and the Philippines.

ⁱ Costa Rica, Cuba, Guatemala, Haiti, Honduras, Nicaragua, and Panama.

Sources: Populations and territories are from League of Nations (1927: 10–16). GDPs per head are from Maddison (2001); where the country or territory is not listed, the appropriate regional average is used.

resources in any meaningful sense. And the trade that really mattered to the British economy in the war was with rich America and Canada, not with poor India.

Table 1.2 adds up the resources of the Central Powers. This is a much shorter story with a smaller bottom line. Austria-Hungary began the war, joined immediately by Germany and soon by the Ottoman Empire. In 1915 the Central Powers were joined by Bulgaria, although not by Italy, which went back on its prewar treaty obligations. At its maximum extent the alliance of the Central Powers comprised little more than 150 million people, but their relative lack of success in accumulating low-income colonies made them relatively well off, with an average income per head of less than \$2,500, roughly comparable to that of Italy on the Allied side.

Allied superiority

Table 1.3 allows us to compare the resources on each side at three benchmark dates: November 1914, 1916, and 1918. This table offers comparisons for each alliance as a whole, and also counts great powers only. The rationale for the latter is very simple: if low-income colonies did not count much, how do the figures look if we do not count them at all? There is some imprecision here, of course. For example, Russia is included as a great power, but much of its territory was little more developed than that of India which is excluded as a colony; also excluded are the British Dominions, which were much richer than Russia. Still, singling out the great powers has the merit of simplicity.

The table shows something very striking: in terms of the resources on either side the Central Powers do not seem to have had much hope. If Germany could not win the war for the Central Powers in the first six weeks, using surprise in the west and an army with superior military qualities, then the chances of victory could only diminish over a longer span of time in which economies would be mobilised on each side and the balance of resources would count for more and more.

Even in the first stage of the war the Allies had access to five times the population, eleven times the territory, and three times the output of the Central Powers. This access was limited by relatively low average incomes across the colonial empires of Britain and France, and low incomes in Russia; we see that the average level of GDP per head on the Allied side in 1914 was not much more than half that of the Central Powers. If we consider great powers only, then the Allied advantages in population and output shrink to twice; the Allied advantage in territory actually increases, reflecting the German and Turkish propensities to colonise sandy deserts in Africa and the Middle East.

Table 1.2. *The Central Powers' populations, territories, and GDPs in 1913*

	Population, millions	Territory		Gross domestic product	
		million sq. km	ha. per head	\$ billion	\$ per head
First wave: Great powers, 1914					
Austria-Hungary	50.6	0.6	1.2	100.5	1,986
Germany	67.0	0.5	0.8	244.3	3,648
German colonies, etc. ^a	10.7	3.0	27.5	6.4	601
Other powers					
Ottoman Empire ^b	23.0	1.8	7.7	25.3	1,100
Second wave: 1915					
Bulgaria	4.8	0.1	2.3	7.4	1,527
November 1914					
Central Powers, total	151.3	5.9	3.9	376.6	2,489
Germany and Austria-Hungary only	117.6	1.2	1.0	344.8	2,933
November 1915					
Central Powers, total	156.1	6.0	3.8	383.9	2,459

Notes: Figures show populations, territories, and incomes for the year 1913. Currency units are international dollars at 1990 prices. Countries and territories are listed in approximate order of their entry into the war.

^aCameroon, Caroline Islands, German East Africa, German South West Africa, Klau-Chau, New Guinea, Samoa, and Togoland.

^bTurkey within its present-day boundaries plus Syria and Palestine, Iraq, and parts of the Arabian peninsula.

Sources: Populations and territories are from League of Nations (1927: 10–16), except Austria-Hungary (taken from chapter 3) and the Ottoman Empire (from chapter 4). GDPs per head, except the Austro-Hungarian and Ottoman Empires, are from Maddison (2001); where the country or territory is not listed, the appropriate regional average is used.

Table 1.3. *Allies versus Central Powers: resource and development ratios*

	Population	Territory	Territory per head	Gross domestic product	GDP per head
November 1914					
Total	5.2	11.5	2.2	2.9	0.6
Great powers only	2.2	19.4	8.8	1.8	0.8
November 1916					
Total	5.5	12.1	2.2	3.2	0.6
Great powers only	2.2	19.4	8.8	1.8	0.8
November 1918					
Total	8.1	13.5	1.7	4.6	0.6
Great powers only	1.6	7.5	4.8	2.5	1.6

Sources: Calculated from tables 1.1 and 1.2. Figures show ratios of Allies (table 1.1) to Central Powers (table 1.2) in populations, territories, and incomes for the year 1913. Currency units are international dollars at 1990 prices.

As the war continued, the Allied powers' advantage in output grew. The decisive year was 1917. When America replaced Russia the Allied population and territory declined but its output multiplied; the average development level of the Allied powers rose above that of the Central Powers for the first time. Although it would take time for America's presence to be felt on the battlefield, it sealed the Central Powers' fate.

The force of these changes is felt even more strongly when it is remembered that the figures in table 1.3 are based on the assumption that in wartime the real output of a given territory did not change. While we cannot track the changes for all countries, the figures available suggest further substantial swings which worked primarily to favour Britain and America. Figure 1.1, based on table 1.4, shows that in wartime the British and American economies expanded by over 10 per cent. The trend in Italy's output is not really known, but the Italian economy certainly kept going and did not collapse (see the appendix to chapter 9). Russia, however, began to collapse in 1916 and France in 1917; this emphasises the importance of the American entry into the war on the Allied side. On the side of the Central Powers the dismal failure of wartime mobilisation was evident from the outset: for much of the war period the German and Austrian economies flatlined at 20 to 25 per cent below their prewar benchmarks for real output. In chapter 4 it is estimated that by 1918 the GDP of the Ottoman Empire had declined by 30 to 40 per cent.

Table 1.4. *The wartime change in real GDP: 1914–1918, by country*

	UK	USA	Germany	Austria	Russia	France
1913	100.0	100.0	100.0	100.0	100.0	100.0
1914	92.3	101.0	85.2	83.5	94.5	92.9
1915	94.9	109.1	80.9	77.4	95.5	91.0
1916	108.0	111.5	81.7	76.5	79.8	95.6
1917	105.3	112.5	81.8	74.8	67.7	81.0
1918	114.8	113.2	81.8	73.3	–	63.9

Source: Maddison (1995: 148–51), except Russia from Gatrell (this volume, table 8.2). Italy is omitted for reasons given in the appendix to chapter 9.

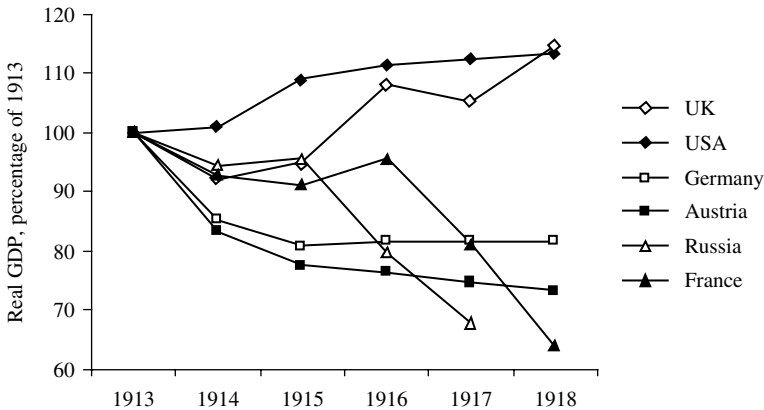


Figure 1.1. The wartime change in GDP: six countries

Source: table 1.4.

The human factor

Where, in all this, is there room for factors other than the economic ones? Reviewing our previous work on World War II (Harrison, 1998) the historian Richard Overy (1998) objected that we left no role to ‘a whole series of contingent factors – moral, political, technical, and organisational – [that] worked to a greater or lesser degree on national war efforts’. Such factors were clearly significant in World War I, and economists have considered why they must matter in principle (Brennan and Tullock, 1982) yet we do not apologise for giving due weight to the quantities of resources.

At first the two sides were unequal in military and civilian organisation, motivation, and morale. Germany entered the war with first-rate military advantages associated with 'the most formidable army in the world' (Kennedy, 1988: 341), past victories, and the exploitation of initial shock and rapid movement. But the effects of looming defeat electrified Britain and France, transformed public opinion, and forced their armies and governments through intensive courses in the new rules of warfare and mobilisation. This proved to be the pattern throughout the war: each temporary setback was followed by strenuous efforts to refine strategy and strengthen morale and organisation, and these efforts generally succeeded within the limits permitted by the resources available to support them. In short, the 'moral, political, technical, and organisational' issues of the war on each side were not independently variable factors but proved to be endogenous to the progress of the war. Other things being held equal, a deficit of organisation or morale on one side tended to be overcome through a self-balancing process. The one thing that could not be overcome was a deficit of resources.

This approach is well illustrated by comparing the two offensives that appeared to give Germany its best chances of winning the war: August 1914 and March 1918. In the first of these Germany planned to exploit mass, movement, and surprise to destroy the French army before the British could intervene in the west and before the Russians could mobilise in the east. In practice the German army succeeded in many of its planned objectives but failed in the ones that were vital. The stalemate of the trenches resulted. Had the German plan succeeded, the economic factors on each side would never have had time to be felt. Given that it did not, the richer Allies won time to put right their military and organisational failings, but they could not have done so without resources on their side.

Its spring offensive in 1918 again seemed to offer Germany the prospect of winning the war on a purely military advantage. For the first time since 1914 its soldiers opened up great gaps in the Allied lines and advanced dozens of kilometres towards the Channel ports. The offensive badly shocked the Allies and forced them into reorganisation; the Americans had to accept a unified command. Resources defeated the advancing Germans: their own lack of supply, for they were badly clothed and undernourished even before they began their advance; the abundance of supplies they found in the Allied trenches that caused many to turn away from the attack to eat and drink their advantages away (Herwig, 1988: 102); and the superabundance of war materials that enabled the Allies to regroup and go on to inflict a far greater defeat on the exhausted enemy.

Mobilisation and the level of development

Fiscal and military mobilisation

The evidence of the chapters that follow suggests that the comparative success of the various economies in mobilising their resources depended on three factors that varied independently: their level of economic development, their proximity to the front line, and the duration of their engagement. A statistical warning may be in order: poorer countries had less good government and national accounts, so we have less confidence in their data, and several are missing from our tables and figures. Britain, France, and Germany were rich and close to the action; figure 1.2, based on table 1.5, shows that, in Britain, government outlay on goods and services had taken up nearly two-fifths of national income by 1917, in France nearly one-half, and in Germany nearly three-fifths. Australia and Canada were rich but distant, so that the burden of government on their national incomes reached less than one-sixth. The USA, richer, distant, entering the war late, also gave 17 per cent of its GDP to its own war effort at the peak of mobilisation and lent another 5 per cent to its Allies. Despite their central involvement and the gambling of their essential state interests, Austria-Hungary and Russia appear to have been relatively unsuccessful; in the case of Austria-Hungary the proportion of national income that the government could command for the war was no more than one-third of national income but this proportion proved to be unsustainable and had declined to one-quarter by 1917/18 when the Habsburg Empire was heading for defeat (see chapter 3). In the Ottoman Empire the proportion of GDP under the control of the state was no more than 16–20 per cent at the peak (chapter 4).

The richer countries maintained their advantage despite the fact that, in peacetime, they tended to spend a lower proportion of their national income on defence (Eloranta, 2003). Thus, their ability to transfer resources rapidly from peacetime to wartime uses was somewhat greater than even these figures imply.

Men and weapons provide more unambiguous measures of mobilisation than money. In the mobilisation of young men we find a pattern that again rises with development and falls with distance. Figure 1.3 plots the wartime mobilisation rates of various countries against their prewar incomes per head in three distance bands. The first band comprises the front-line Eurasian states on whose territory or borders the war was fought. The second band is for the European countries separated from the war by land or sea, with only two members: Britain and Portugal. The third band includes countries that joined the war from continents beyond

Table 1.5. *The share of government spending in national income: 1913–1918, by country (percentage of GDP at current prices)*

	Australia	Canada	France	Germany	UK	USA
1913	5.5	7.0	10.0	9.8	8.1	1.8
1914	5.7	10.0	22.3	23.9	12.7	1.9
1915	9.6	13.1	46.4	43.8	33.3	1.9
1916	14.0	16.5	47.2	50.3	37.1	1.5
1917	17.2	15.7	49.9	59.0	37.1	3.2
1918	17.2	16.9	53.5	50.1	35.1	16.6

Sources: Obstfeld and Taylor (2003); Mitchell (2003a, 2003b); UK from Feinstein (1972: tables 2 and 3); Germany from Sommariva and Tullio (1987); and France from table 3.8. Thanks to Jari Eloranta for help with these figures.

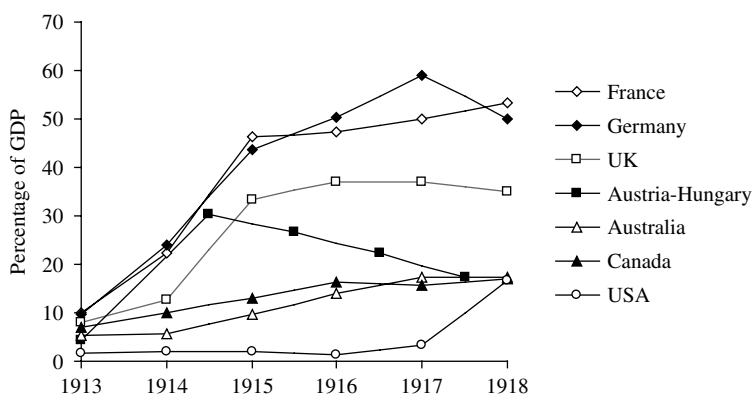


Figure 1.2. The share of government spending in national income: seven countries

Source: table 1.5, except Austria-Hungary (military expenditure only) from chapter 3.

Europe and the Near East. Cumulative numbers mobilised are shown as a proportion of young men in the age group from 15 to 49 years of age. In each distance band, i.e. controlling for distance, the figures show a consistent positive dependence of the proportion mobilised in each country on its prewar income level. However, dropping a band lowered the proportion substantially.³

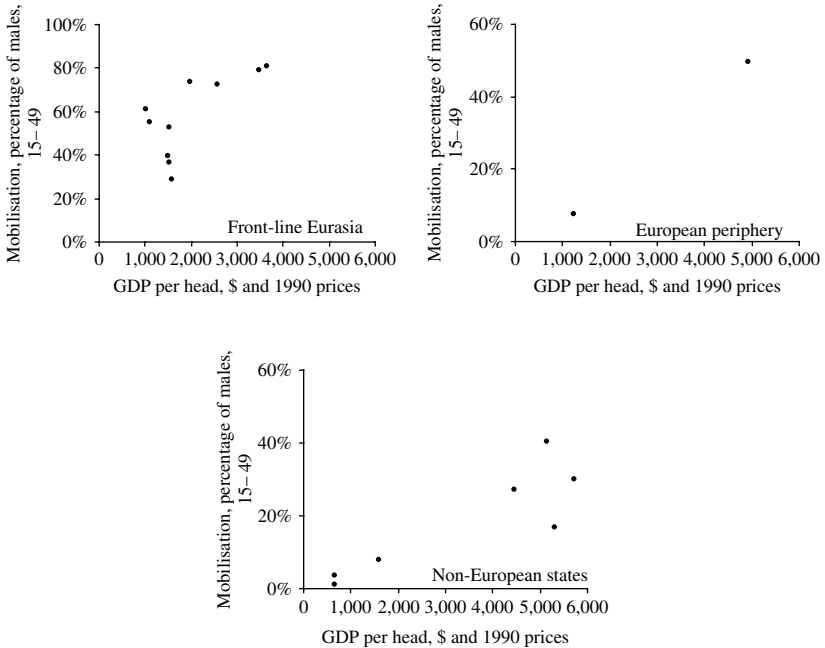


Figure 1.3. Military mobilisation, development level, and distance: eighteen countries and the French colonies

Note: Observations, reading from left to right, in order of increasing GDP per head, are as follows. Front-line Eurasia: Serbia, Turkey, Russia, Bulgaria, Romania, Greece, Austria-Hungary, Italy, France, and Germany. European periphery: Portugal and UK. Non-European states: French colonies, India, South Africa, Canada, New Zealand, USA, Australia.

Sources: GDPs per head in 1913 from tables 1.1 and 1.2 or, if not listed there, from Maddison (2001: 185); cumulative mobilisation rates, 1914–18, from Uralis (1971: 209).

The richer countries were not only able to mobilise more men. Regardless of distance, they also supplied them better. Capital-abundant economies were able to support capital-intensive warfare. Figure 1.4 plots cumulative war production of rifles, machine guns, field guns, tanks, and aircraft in units per thousand men mobilised throughout the war and per year of the war. In each case we see that supply rose strongly with the development level of the country.

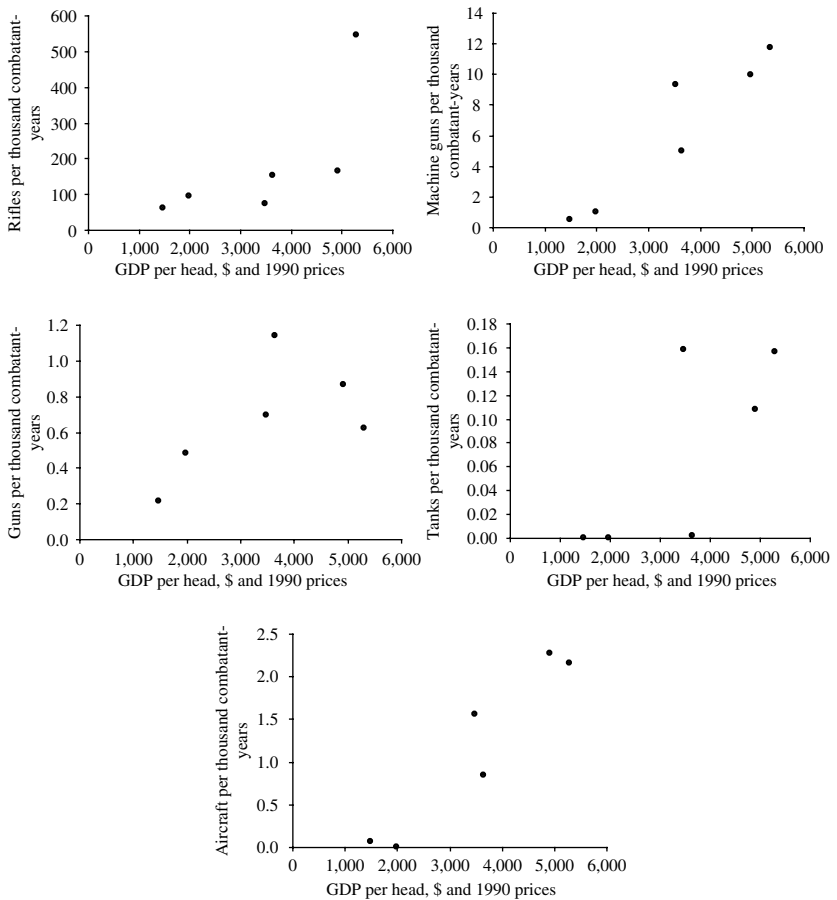


Figure 1.4. War production and development level: six countries

Note: Observations, reading from left to right, in order of increasing GDP per head, are Russia, Austria-Hungary, France, Germany, the United Kingdom, and the United States.

Sources: GDPs per head in 1913 from Tables 1.1 and 1.2; cumulative war production, 1914–18, from Adelman (1988: 45), except UK (from chapter 7) and Austria-Hungary (from chapter 3); cumulative mobilisation as figure 1.3. For each country ‘combatant years’ are numbers mobilised multiplied by years of engagement in the war rounded to 1.5 years for the USA, 3.5 years for Russia, and 4.25 years for the others.

Mobilisation and agriculture

Countries like Russia and Austria-Hungary were large; why did it make such a difference that they were also poor? The reason lay in agriculture: these were countries that ran short of food long before they ran out of guns and shells (Offer, 1989).

One of the most striking attributes of relative poverty was the role of subsistence farming. Contemporary observers were aware of these differences and interpreted them as follows: when war broke out, a country such as Russia would have an immediate advantage in the fact that most of its population could feed itself; moreover, the ability to divert food supplies from export to the home market would actually increase Russia's advantage. In contrast Britain would quickly starve (Gatrell and Harrison, 1993). This diagnosis could not have been more wrong. In practice the presence of a large peasantry proved to be a great disadvantage when it came to the mobilisation of resources for war. Peasant agriculture behaved very much like a neutral trading partner. Why should the Netherlands trade with Germany given the latter's reduced ability to pay, except under threat of invasion and confiscation? Peasant farmers made the same calculation. Thus the Russian economy looked large, but if the observers of the time had first subtracted its peasant population and farming resources they would have seen how small and weak Russia really was. Meyendorff (cited by Gatrell in chapter 8) described what happened in Russia as 'the Russian peasant's secession from the economic fabric of the nation'. And not only from Russia, for Italy, Austria-Hungary, the Ottoman Empire, and Germany all had large peasant populations, which proved extremely difficult to mobilise for much the same reason.

The common process of the peasant's secession is clearly visible from a comparison of the richer and poorer countries' experience. When war broke out British and American farmers boosted production because they were offered higher prices and responded normally to incentives. The fact that British farming had already contracted to a small part of the economy made its expansion easier: there were plentiful reserves of land unused or little exploited, and the high productivity of farm labour meant that substantial increases in farm output could be achieved with relatively little extra in the way of resources.

In the poorer countries, in contrast, wartime mobilisation began by taking resources away from farming, particularly young men and horses for the army. Once in the army these young men and horses still needed to be fed, of course, which implied a diversion of food supplies from rural households to government purchasers. But at the same time the motivation for farmers in the countryside to sell food was greatly reduced. These

were subsistence farmers who grew food partly for their own consumption; what they sold, they took to the market primarily to buy the manufactured commodities, such as textiles and metal goods, that they needed for their families. But war dried up the supply of manufactures to the countryside. The small industrial sectors of the poorer countries were soon wholly concentrated on supplying the army with weapons and equipment, uniforms and rations. There was no capacity left to supply the countryside, which faced a steep decline in supplies. Consequently, peasant farmers retreated into subsistence activities. As the market supply of food dried up, in the towns food prices soared.

The economy began literally to disintegrate: there might still be plenty of food, but it was in the wrong place. The farmers preferred to eat it themselves than sell it for a low return. The government had to feed the army at all costs for a simple reason: hungry soldiers will not fight. Between the army and the peasantry the urban workers were now caught in a double squeeze. There was still enough food for everyone to have enough to eat; the localised shortages that began to spread were famines that arose from the urban society's loss of entitlement (Sen, 1983; Offer, 1989), not from the decline in aggregate availability.

Aware of the unequal distribution of food, public opinion might blame unpatriotic speculators or incompetent officials, but the truth was that a poor country had few real choices. The scope for policy to improve the situation was usually more apparent than real, and government action typically made things worse: for example, the Russian, Austrian, and German governments all began to ration food to the urban population, while attempting to buy up food from the countryside at purchasing prices that were fixed low for budgetary reasons. To repeat: in richer countries the government paid *more* to the food producers, and this worked, but in poorer countries we will see that the government wanted to pay *less* and this had entirely predictable results. The willingness of farmers to participate in the market was still further undermined.

This process may be illustrated in a couple of diagrams. Figure 1.5 shows the prewar food market of two countries, one that we will style as 'Russia' and the other 'Germany'; the difference between the two is that before 1914 Russia was a substantial net exporter of food, Germany a net importer.

Both countries were competitive producers and each faced the same world price; therefore, both produced at the same marginal cost but, given the differences in their national resource endowments and demands, Russia produced at A, consumed at B, and exported AB,

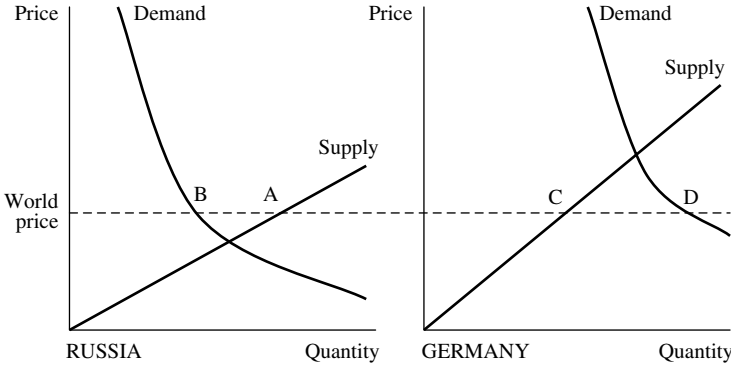


Figure 1.5. The prewar food market: Russia and Germany

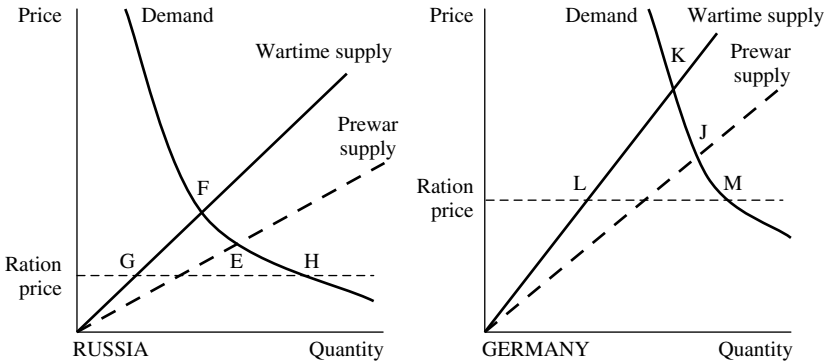


Figure 1.6. The wartime food market: Russia and Germany

much of it to Germany; Germany produced at C, consumed at D, and imported CD, much of it from Russia.

Figure 1.6 shows the effects of war on the market equilibrium. When war broke out, the hostilities on land and sea broke up the world market and isolated each country. Other things being equal, the loss of foreign markets should have reduced food prices in Russia which could now have produced and consumed at E; Germany, deprived of foreign supplies, should have produced and consumed with a higher price at J.

At the same time, however, the military mobilisation of young men, horses, and nitrates raised farm costs. Nitrates proved to be a classic ‘dual use’ commodity of modern warfare. They were an essential ingredient in

both farm fertilisers and high explosives. Their chemical instability made them very hard to synthesise. Before World War I the bulk supply of nitrates to Europe came from natural deposits overseas. The trade disruption associated with the war forced the development of a German industry to manufacture nitrates artificially, but these were costly and war needs took up the supply that was created (Lee, 1975). As a result the availability of nitrates for farming fell sharply in Germany, but the impact was less in Russia where the initial reliance on nitrates was less widespread. The losses of human, animal, and chemical power combined to push the supply curve sharply upwards in both countries in the figure, moving the market equilibrium to a higher price and lower consumption at F in Russia and K in Germany.

Finally, the government stepped in and tried to hold prices down, creating excess demand and scope for a black market in each country. To the extent that such controls were effective, output and consumption tended to fall further in both countries: to G in Russia with unsatisfied demand equal to GH, and to L in Germany with unsatisfied demand equal to LM.

To the extent that they failed, there was scope for black marketeers to step in and capture rents; as long as the rents were competed away production and consumption could both tend back to F and K, but popular respect for law and government would inevitably suffer in the process.

Finally, we see why the outcome was potentially just as bad for German consumers as for Russians. The Russians did indeed have their prewar export surplus to fall back on. Although a much richer nation than Russia, urban famine was as acute in Germany in the closing stages of the war.

Some readers may be surprised to find Germany numbered among the countries that suffered a decline in agricultural output during the war. Although pre-1914 Germany has entered the economic history textbooks as a developed economic power, it should be noted that its modernisation was highly unbalanced. High levels of productivity in heavy industry co-existed with much lower productivity in light industry, and much of the service sector was also characterised by low productivity, despite Gerschenkron's (1962) focus on the modernised railways and the universal banks (Broadberry, 1998). But perhaps the most obvious sign of Germany's relative backwardness was the high share of the labour force engaged in low-productivity agriculture. Germany paid a high price during the two world wars for protecting its agriculture in peacetime (Olson, 1963).

In summary, to be poor when war broke out was to suffer the consequences of a peasant agriculture, which was essentially a dead weight on

the mobilisation efforts of the country concerned. For this purpose we include Germany. The process that resulted had its inexorable conclusion in urban famine, revolutionary insurrection, and the downfall of emperors.

Costs of the war

Bogart's study of direct and indirect costs

At the end of World War I, a number of attempts were made to quantify the costs of the war. As Milward (1984: 9–27) points out, this literature reflected a liberal tradition that saw warfare as having entirely negative effects, and did not perceive any positive changes initiated or accelerated by the war. 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 it has been the starting point for all subsequent calculations.

Table 1.6 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. Inter-Allied transfers are subtracted from gross expenditures to arrive at net costs, which show the heaviest burden to have been borne by Britain and Germany, with France, Russia, and the United States also bearing a substantial net cost on the Allied side and Austria-Hungary amongst the Central Powers. On a per capita basis, Britain, France, and Germany stand out as bearing a much higher net cost than the other countries. Nevertheless there are a number of disadvantages to the way that Bogart presents 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, as in table 1.5 above.

Table 1.7 introduces a number of what Bogart labels 'indirect costs', consisting largely of losses to human and physical capital. The capitalised value of war deaths shows the biggest losses to have been sustained by Russia and Germany, with other substantial losses borne by Britain, France, and Austria-Hungary. Property losses on land were heaviest in France and Belgium, which is included here in other Allies. The heaviest shipping losses were sustained by Britain, the dominant nation in world shipping before 1914.

Table 1.6. *Bogart's 'direct costs' of World War I (\$m)*

	Gross cost (\$m)	Advances to Allies (\$m)	Net cost (\$m)	Net cost per capita (\$)
Great Britain	44,029	8,695	35,334	766
Rest of British Empire	4,494		4,494	13
France	25,813	1,547	24,266	613
Russia	22,594		22,594	135
Italy	12,314		12,314	343
United States	32,080	9,455	22,625	229
Other Allies	3,964		3,964	127
<i>Total Allies</i>	145,288	19,697	125,591	
Germany	40,150	2,375	37,775	557
Austria-Hungary	20,623		20,623	352
Turkey and Bulgaria	2,245		2,245	85
<i>Total Central Powers</i>	63,018	2,375	60,643	
<i>Total</i>	208,306	22,072	186,234	

Sources: Cost data from Bogart (1920: 267); population data from Uralnis (1971: 209).

Table 1.7. *Bogart's 'indirect costs' of World War I (\$m)*

	Capitalised value of war deaths	Property losses on land	Shipping and cargo losses
British Empire	3,477	1,750	3,930
France	4,818	10,000	453
Russia	8,104	1,250	933
Italy	2,385	2,710	431
United States	518		365
Other Allies	3,215	11,500	525
<i>Total Allies</i>	22,517	27,210	6,637
Germany	6,751	1,750	121
Austria-Hungary	3,080	1,000	15
Turkey and Bulgaria	1,203		27
<i>Total Central Powers</i>	11,034	2,750	163
<i>Total</i>	33,551	29,960	6,800

Note: For shipping losses, Other Allies includes neutrals.

Source: Bogart (1920: 269–99).

Table 1.8. *Bogart's 'direct and indirect costs' of World War I (\$m)*

	All countries
Capitalised value of human life:	
soldiers	33,551
civilians	33,551
Property losses:	
on land	29,960
on shipping and cargo	6,800
Loss of production	45,000
War relief	1,000
Loss to neutrals	1,750
<i>Total indirect costs</i>	151,612
Total direct costs, net	186,234
Grand total	337,846

Source: Bogart (1920: 269–99).

A number of accounting procedures here give cause for concern. Although the accounting for losses to physical capital is unremarkable (remembering that cargoes can be seen as inventories), the treatment of human capital requires some attention. The capitalised value of human life, based simply on lifetime earnings, would overstate the social loss since people consume as well as produce. One way of arriving at the social loss is therefore to subtract consumption from lifetime earnings, as in the work of Clark (1931). Obviously this is not an attempt to capture the loss of utility arising from war deaths, but merely treats people as human capital to be replaced like physical capital so as to maintain production. As Edelstein (2000: 349) points out, 'It is absurd to think the methods and perspectives of economic history can come anywhere near to comprehending the meaning of human losses from war. We are far better served by the speeches and letters of Lincoln or the poetry of Sassoon, Brooke, Owen, Graves and Seager.' However, for symmetry with the treatment of physical capital on a replacement cost basis, the simplest procedure is to add up the cost of rearing and training a worker, since this is the net loss to society by premature death.

In table 1.8, Bogart simply adds the direct and indirect costs to arrive at a grand total. The justification for this is unclear, since it combines flows of current spending with changes in the stock of assets needed to generate those flows. To add to the confusion, lost production (a flow concept) is included as an indirect cost (a stock concept). Note also 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 and human capital. To the extent that the war induced additional spending on health and welfare, this contributed to the accumulation of intangible human capital, while research expenditure on the development of weapons may have had spin-off effects on the accumulation of intangible physical capital. Finally, note that 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’. This is an issue which can be addressed in the national balance sheet approach.

Effects on national balance sheets

Broadberry and Howlett (1998) provide an accounting framework for evaluating the long-run impact of war on wealth, which is based on national balance sheets. The first important distinction is between stocks and flows in the system of national accounts. Issues concerned with the scale of mobilisation are best tackled by looking at flows of income, expenditure, and output, and calculating the proportion of these flows that is devoted to the war effort, as in table 1.5. 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 research and development, 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 raised by 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 wartime research and development can be seen as having a positive impact on intangible physical capital; (6) social spending stimulated by the war can be seen as having a positive impact on intangible human capital.

War casualties and human capital losses

One obvious cost of the war was the huge number of deaths resulting from the ‘industrialisation’ of warfare, which led to the growing use of the term ‘total war’ (Chickering and Förster, 2000). There are conceptual difficulties with the types of death to be included in any definition of war deaths, which could be restricted to battle deaths of military personnel or broadened to include non-battle deaths of civilians. We have opted for battle and non-battle deaths of military personnel, following Uralnis (1971) since this offers a high degree of uniformity in data across countries while going beyond those killed in battle or who died from wounds or poison gas. Non-battle deaths include those who died from disease, died in captivity, or died from accidents and other causes. We exclude most deaths in the influenza pandemic of 1918, however.

The data in table 1.9 show how military deaths were spread across the combatant countries. Germany suffered the most casualties in absolute numbers, although a number of countries sustained heavier losses as a percentage of the population, including France, Serbia-Montenegro and Romania amongst the Allies and Turkey amongst the Central Powers. Although Russia sustained the second-highest losses in absolute numbers, this was a lower proportion of the population than the losses in Britain and Italy amongst the Allies and Austria-Hungary amongst the Central Powers. Taking the Central Powers and the Allies together, the battle and non-battle deaths of military personnel represented about 1 per cent of the population of the combatant nations.

Turning these casualties into estimates of human capital losses in the national balance sheet framework requires knowledge of the prewar costs of rearing and educating a child, together with cohort-specific estimates of the education of the labour force. In the absence of sufficient data for many countries, the human capital losses in table 1.10 are calculated as the ratio of war deaths to the prewar population of prime working age, taken from Uralnis (1971). This differs from the proportion of human

Table 1.9. *Battle and non-battle deaths of military personnel in World War I*

	Deaths (1000s)	Population (millions)	Deaths as % of population
Great Britain	715	46.1	1.6
British Empire	198	342.2	0.1
France	1,327	39.6	3.4
French colonies	71	52.7	0.1
Russia	1,811	167.0	1.1
Italy	578	35.9	1.6
USA	114	98.8	0.1
Belgium	38	7.6	0.5
Serbia-Montenegro	278	4.9	5.7
Rumania	250	7.6	3.3
Greece	26	4.9	0.5
Portugal	7	6.1	0.1
<i>Total Allies</i>	5,413	813.4	0.7
Germany	2,037	67.8	3.0
Austria-Hungary	1,100	58.6	1.9
Turkey	804	21.7	3.7
Bulgaria	88	4.7	1.9
<i>Total Central Powers</i>	4,029	152.8	2.6
<i>Total</i>	9,442	966.2	1.0

Note: Battle deaths include those who were killed in battle, died from wounds, and died from poison gas. Non-battle deaths include those who died from disease, died in captivity, and died from accidents and other causes.

Source: Uralnis (1971: 209).

capital destroyed by the war to the extent that younger cohorts had more human capital investment, particularly through education. Also, since the human capital losses are not calculated in monetary units, they cannot be added to physical capital losses to provide an estimate of the proportion of physical and human capital destroyed by the war.

Physical capital losses and changing national wealth

Turning to physical capital losses in table 1.10, we have largely relied for the losses of domestic assets on Bogart's (1920) estimates of property losses on land and shipping and cargo losses from table 1.7. However, whereas Bogart expressed the losses in terms of US dollars, we have expressed them as percentages of prewar capital. France's losses were

Table 1.10. *Destruction of human and physical capital (% of prewar assets)*

	Human capital	Physical capital			
		Domestic assets	Overseas assets	Reparations bill	National wealth
Allies					
Britain	3.6	9.9	23.9	–	14.9
France	7.2	59.6	49.0	–	54.7
Russia	2.3	14.3	–	–	–
Italy	3.8	15.9	–	–	–
United States	0.3	–	–	–	–
Central Powers					
Germany	6.3	3.1	–	51.6	54.7
Austria-Hungary	4.5	6.5	–	–	–
Turkey and Bulgaria	6.8	–	–	–	–

Note: Reparations bill expressed as a percentage of prewar physical capital.

Sources: Human capital: war deaths as a percentage of population aged 15–49 from Uralnis (1971: 209). Physical capital: Britain: Broadberry and Howlett (1998: table 1.13); France: chapter 6, this volume, and Hardach (1977: 289–90); Russia: chapter 8, this volume; Italy: property and shipping losses from Bogart (1920), capital from Ercolani (1969); Germany: property and shipping losses from Bogart (1920), capital from Hoffmann (1965), with reparations bill from Hardach (1977: 248); Austria-Hungary: property losses from Bogart (1920), capital from Fellner (1915).

extremely heavy when expressed as a percentage of prewar capital in table 1.8, as well as in dollar terms in table 1.7. Russia's losses appear rather heavier in proportionate terms than in absolute dollar values, due to the low level of Russia's prewar capital stock. Also in table 1.8, for some countries it has been possible to obtain estimates of the change in overseas assets and national wealth. In the case of Britain, nearly a quarter of overseas investments were liquidated during the war, so that the reduction of national wealth was proportionally much greater than the loss of physical capital. For France, although the loss of overseas assets was proportionally higher due to heavy exposure to Russian loans, the share of physical capital losses was also much higher than in Britain (Hardach, 1977: 289–90). Hence the share of national wealth lost in the war was about the same as the share of physical capital lost.

In principle, some of the government spending on the war effort, which is included negatively as a direct cost by Bogart (1920), should actually be entered positively in the national balance sheet, contributing to intangible physical capital in the form of cumulated research and development

spending and to intangible human capital in the form of spending on health and mobility. However, in practice, Broadberry and Howlett (1998) found that these effects were very small even during World War II. During World War I, these positive effects were difficult to discern at all in the British case. Such effects were unlikely to have been of much more significance for other countries.

Reparations and national wealth

Finally, in table 1.10, we have added in Germany's reparations bill as a proportion of prewar capital, since it represented an increase in overseas liabilities and hence a reduction in national wealth just as much as the liquidation of Britain's overseas assets meant a reduction in national wealth. Of course there is a huge debate over the extent to which Germany actually had to pay these reparations, but that does not alter the effect on the national balance sheet as it stood immediately after the Treaty of Versailles (Ritschl, 2003). These figures include the A + B + C Bonds, which added up to a total of 132 billion gold marks (table 2.17).

The wider impact on growth and development

Milward (1984: 15–16) is critical of studies that focus on the costs of the war, which he sees as neglecting the wider impact of the war on growth and development. This reflects a substantial literature arguing that the two world wars stimulated economic and social changes which had positive as well as negative effects (Andrzejewski, 1954; Titmuss, 1950). However, there are good grounds to be sceptical here. Milward (1984: 17–18) cites Bowley (1930) as a pioneer of this view, but Bowley (1930: 21–3) himself pointed out how difficult it is to show that any of these wider changes were actually the result of the war and would not have occurred anyway in its absence. Classifying developments as (a) mainly unconnected with the war, (b) accelerated or retarded by it, or (c) apparently arising out of it, Bowley was himself reluctant to put anything other than the key elements of the 'cost of war' calculations such as loss of life and destruction of capital into category (c). He did mention the new economic relationship between Europe and the United States in this category, but with hindsight we can see that the process of US overtaking was already underway well before World War I (Abramovitz, 1986; Broadberry 1998).

The postwar role of government

Whilst holding to this generally sceptical view of the wider impact of the war, it is nevertheless possible to draw some valuable lessons from a

consideration of several aspects of government. It is clearly true that the twentieth century has seen a substantial increase in welfare spending. However, it is equally clear that this welfare spending had its roots in the prewar period. Thus, for example, the German historical economist Wagner (1890) had already formulated his eponymous law of a growing share of government expenditure in national income on the basis of pre-World War I trends, and the modern European welfare state was founded before rather than after World War I (Lindert, 1994). Similarly, the growing tendency towards combinations and scale in industry in North America and Europe was already under way well before World War I and can be seen as a result of technological developments associated with mass production rather than the outcome of wartime experience with state regulation and control (Lamoreaux, 1985; Hannah, 1983).

Furthermore, although Peacock and Wiseman (1967: 24–8) formulated their ‘displacement hypothesis’ on the basis of experience during the two world wars, its explanatory power is rather limited upon closer examination. Peacock and Wiseman argued that the war displaced norms concerning acceptable levels of government spending and taxation and appropriate levels of welfare spending and government intervention in the economy. As a result, they argued that there was a ratchet effect, with government spending increasing rapidly during the war through necessity, but falling back by less after the war. Although this appears to fit aggregate spending trends, it does not work once debt service payments are excluded. In other words, the only reason for the ratchet effect was the cost of debt service, with other types of expenditure merely growing in line with national income. This suggests that Andrzejewski’s (1954) military participation hypothesis is much overstated. Although the high military participation ratio may have secured an increase in the absolute level of welfare spending in the short run, it did not secure any increase in the share of national income devoted to such spending in the long run.

Government and markets during the war

The above analysis suggests that the long-run impact of the war on the role of government may not be as great as suggested by some authors. However, it does not challenge the traditional belief in the superiority of government intervention and controls over market forces in the extreme circumstances of war. It is now worth reflecting, therefore, on an alternative classical view of the war economy. Although there is no detailed classical analysis of any particular economy during World War I, there is a study by Ahmed (1986) of the British economy in the twentieth century

as a whole, covering both world wars. From a classical perspective this serves a useful purpose by reminding us that the differences between a war economy and a peacetime economy may not be as stark as suggested in the traditional analysis. After all, it is unlikely that the declaration of war suddenly makes governments all-knowing and all-powerful, or leads to the suspension of all pursuit of selfish interests. There may be some virtue, then, in analysing how we would expect a perfectly competitive market economy to react to war. This can then be used as a benchmark against which to assess the impact of the special measures and controls, rather than simply attributing all change to such measures.

Barro (1974; 1981) has analysed the effects of government spending in a closed economy, and the model has been applied to the United States during the major wars of the nineteenth and twentieth centuries by Evans (1985). Ahmed (1986) adapts Barro's model to the open economy case and provides an econometric application to the United Kingdom in the twentieth century. There are four key aspects to the model. First, there is a temporary increase in government spending to fight a war. Although this displaces some private spending, the 'direct crowding-out' effect is less than proportional, since 'guns' are not a good substitute for 'butter' and people want to go on consuming butter. Hence the level of aggregate demand increases. Second, there is an increase in aggregate supply, as real wages increase to bring forth the required extra labour. In a way, a war acts a bit like a 'gold rush', creating a temporary boom. Third, if the increase in aggregate demand exceeds the increase in aggregate supply, there is excess demand, and this can be met by a deterioration in the balance of trade deficit. Fourth, it makes no difference to the level of economic activity whether the increased government spending is financed by taxation or borrowing. Under this 'Ricardian equivalence' of taxation and bond finance, private spending decisions are unaffected by the form of finance of government spending, since bond finance represents a future tax liability, the present value of which is the same as the taxes which would otherwise have to be raised now.

The model does capture the crude features of the British economy in both world wars, and seems qualitatively applicable to other European countries. Overall activity rose, consumption fell, but by less than the increase in government spending, and excess demand spilled over into an excess of imports over exports. Furthermore, the issue of taxes versus bonds in a Ricardian framework becomes simply one of inter-generational transfers and tax smoothing, with a greater reliance on bond financing spreading the burden onto future generations of taxpayers. Doubtless many of the strong assumptions of the model do not hold, particularly with regard to the ubiquity of perfect competition. Nevertheless, it suggests

that we should not be too quick to attribute all changes during wartime to the efficacy of regulations and controls.

Few historians are likely to be persuaded by Ahmed's (1986) argument that the achievements of the British war economy can be put down to the smooth operation of market forces during the war itself. However, the boom in the US economy before 1917 was a decidedly market-led affair which seems to fit the classical model well, with workers increasing labour supply to take advantage of the high wages on offer in munitions factories. Furthermore, the classical view reminds us that, before the outbreak of war in 1914, Britain had a long history as a market economy. Clearly, this had to be taken into account by those implementing state controls during wartime. Also, it meant that Britain had the benefit of capabilities developed in a market economy context before the war, including high levels of productivity across all sectors and a high degree of flexibility.

However, the relevance of the classical real business cycle model to other countries during World War I looks more questionable, at least without serious modification. For, as noted earlier, in countries at lower levels of development, such as Austria-Hungary, the Ottoman Empire, Russia, and even Germany, the key feature of the war economy was a decline rather than an increase in GDP. This seems to have occurred largely as a result of a retreat into subsistence by peasants working in agriculture, as governments tried to shift the inter-sectoral terms of trade in favour of urban areas so as to keep down the price of food for industrial workers producing vital munitions.

Nationalism and economic disintegration

Finally, we cannot leave an evaluation of the wider impact of World War I on growth and development without considering the effects on national rivalry and the road to World War II. Although World War I may be seen as the culmination of a period of existing national rivalry, there can be little doubt that it served to strengthen the forces of nationalism. This can be seen as having serious economic consequences, giving a boost to protectionism and autarkic policies during the 1920s and 1930s.

The consequences of this economic disintegration for the growth of per capita income in Europe and other parts of the world can be seen in table 1.11. The first point to note is that growth of per capita GDP for a weighted average of fifteen European countries was 1.8 per cent per annum between 1890 and 1994. However, whilst Europe grew at roughly this secular rate before 1914 and after 1973, there was a period of slower growth between 1913 and 1950, followed by a period of more rapid growth between 1950 and 1973. This slower growth during 1913–50 is interpreted

Table 1.11. *Growth of real GDP, 1890–1994: Europe and the United States (per cent per year, average)*

	Europe			USA, GDP per head
	GDP	Population	GDP per head	
1890–1994	2.4	0.6	1.8	1.8
1890–1913	2.2	0.7	1.4	2.0
1913–50	1.4	0.5	0.9	1.4
1950–73	4.8	0.8	4.0	2.9
1973–94	2.1	0.4	1.7	1.4

Source: Feinstein et al. (1997: 7, 9).

Table 1.12. *Growth of real GDP, 1913–1929: selected European countries*

World War I neutrals	% p.a.	World War I combatants	% p.a.
Sweden	1.9	United Kingdom	0.7
Finland	2.4	France	1.9
Denmark	2.7	Italy	1.7
Switzerland	2.8	Belgium	1.4
Norway	2.9	Germany	1.2
Netherlands	3.6	Austria	0.3

Source: Feinstein et al. (1997: 13).

by Feinstein et al. (1997: 8–9) as the destructive impact of World War I, followed by the economic disintegration of the interwar period and the further destruction of World War II. The argument is given added weight by the fact that the impact was much greater in Europe than in the United States, since the war was fought largely on European soil with unprecedented severity, and Europe's economies were more dependent on international economic transactions before 1914. On this interpretation, the period 1950–73 is best seen as catching up in a more integrated world economy.

Turning in table 1.12 to variation between European countries in the growth rate of GDP during the shorter period 1913–29, we see that the most important difference is between neutral and combatant countries. The lowest growth rate amongst the neutrals (Sweden) was equal to the highest growth rate amongst the combatants (France). This again

supports the emphasis on the costs of war in the traditional literature. Important themes stressed in this literature include the protectionist environment and the general lack of international co-operation over the international monetary system, as well as the international trading system (Eichengreen, 1992). One factor which needs to be mentioned here is the proliferation of independent nation states following the break-up of the Austro-Hungarian and Ottoman Empires. This was based on one of the founding principles of the League of Nations, the self-determination of nations. In eastern and central Europe, this led to a proliferation of states with separate currencies and customs jurisdictions. In a less protectionist environment, this may not have been of great significance, but in the context of protectionist interwar Europe, it clearly had serious trade-diverting effects. Nevertheless, although there was clearly a net effect of economic disintegration in central and eastern Europe, we should not forget that there were also areas of increased integration. Probably of most significance here was the increased integration of the reunited parts of Poland that had previously been partitioned between Prussia, Austria, and Russia (Wolf, 2003).

Moving beyond the narrowly economic effects of nationalism, one of the most important developments, which cast a shadow over Europe for the next generation, was the switch in focus of German nationalism away from overseas territories and towards a 'drive to the east', as noted in Ritschl's chapter on Germany. This development pointed the way to the horrors of World War II and the Holocaust, with the wrangling over the punitive reparations imposed by the Allies hastening the journey. World War I also acted as the midwife to the Bolshevik Revolution in 1917, which introduced a new economic and political schism in Europe and cast another shadow over the world until the end of the 1980s.

Total war and economics in the twentieth century

After 1939 it became impossible not to see World War I as a dress rehearsal for World War II. From this viewpoint the first war was rather like the second war, only not as bad. In its own time it was seen as the nadir of civilisation, but this was only because those involved did not realise how much worse it could get. This is immediately obvious from any statistical comparison of the two wars, such as one that was published by a Russian statistician in the last days of the old Soviet Union and is reproduced in table 1.13. The lesson is clear: World War II was just World War I with more countries, more soldiers, more time, more money, more guns, more death, and more destruction.

Table 1.13. *Two world wars in quantitative comparison*

	World War I	World War II
Length of war, days	1,564	2,194
Belligerent nations, number	33	62
Theatres of military action:		
number of nations	14	40
number of continents	1	4
Population of belligerent nations, millions	1,100	1,700
Of which:		
number mobilised	70	110
number wounded	20	35
number disabled	15	25
Excess deaths, millions	20	55
Of which:		
deaths among servicemen	10	32
deaths among civilians	10	23
including:		
in concentration camps	–	11
of partisans	–	2
from hunger and disease	10	10
Munitions produced, units:		
thousand guns	150	1,040
thousand aircraft	–	700
thousand tanks	9	300
Economic losses, \$billion at 1938 prices	692	4,000
Of which, direct losses	416	1,433
including:		
budget outlays	354	1,117
destruction, looting	316	316
indirect losses	258	2,567

Sources: Nesterov (1990: 6). The valuation of economic losses in both wars is evidently based on the Bogart methodology that was critically described, found to be at fault, and revised in tables 1.4 to 1.8 above; Bogart's own figures for World War I have been revalued by the 1938 benchmark used for World War II. With this caveat the comparison is still informative and the estimated sign and slope of the gradients from the first war to the second are plausible.

In reality World War I had some distinct features. One is that economics decided the outcome of the first war in a direct and straightforward sense, even more so than in the second. The military decision of World War I was expected on the western front, where the richest countries engaged most of their forces. Yet the military decision never came. It is true that there were victories and defeats, and that the front became considerably less stable during 1918. But the fact remains that the military struggle ended in ceasefire, not surrender, with the German army still standing on foreign

soil. If Germany's war effort had become unsustainable it was because of the failure of its economy, not its army. In Austria-Hungary, too, it was economic collapse that ended the military ambitions of the Habsburgs, just as urban famine and industrial collapse in Russia signed the death warrant of the Romanovs.

In this limited sense World War II was different: it ended in the crushing military defeat of the Axis Powers. What remained the same is that the Allied victory of 1945, like that of 1918, was enabled by an overwhelming predominance of resources.

We conclude by noting the special features of warfare in the first half of the twentieth century. While there is much debate about the precise definition of 'total war' (Chickering and Förster, 2000), the period between 1914 and 1945 is distinctive from an economic viewpoint. In both world wars the main combatants were able to devote more than half of their national income to the war effort. This did not happen before 1914, or after 1945, and it seems unlikely that it will ever happen again. Before 1914 it was impossible and after 1945 it was no longer necessary. Before the twentieth century, per capita incomes were too low and government services too inefficient for society to devote such a large share of economic activity to warfare; too many people were required to labour in the fields and workshops simply to feed and clothe the population, and government officials were not up to the task of counting and controlling them. After 1945, the destructive power of nuclear weapons meant that any rich or large country could acquire devastating military force for a few billion dollars. Hence the marshalling of economic resources played a much more vital role in the outcome of the two world wars than in any period before or since. This is why we maintain that the history of the world wars cannot be written without the economics.

Notes

- 1 We do not tell the story of the war in this book. Those who would like a more narrative account should note a three-volume history in preparation by Hew Strachan of which the first volume (Strachan, 2003) is newly published. Herwig (1997) gives a compact account of the war from the perspective of the Central Powers.
- 2 Technically speaking, the United States of America never joined Britain and France in a formal alliance; therefore, the United States was not strictly an 'Ally'. This had minor consequences for the co-ordination of military strategy in the west, and major consequences for postwar diplomacy and the negotiation of a peace treaty with defeated Germany. For the present chapter it is not an important distinction.

3 The power of this relationship may be confirmed by multiple regression. We code the three distance bands 0 for front-line Eurasian states, 1 for the European periphery, and 2 for non-European states. We measure the duration of each state's engagement in the war in years rounded to the nearest quarter. Then we regress the mobilisation rate on GDP/head in dollars, distance, and duration. With nineteen observations and *t*-statistics in parentheses we find:

$$\begin{aligned} \text{Mobilisation} = & 0.0685 + 0.0773 \times 10^{-3} \times \text{GDP/head} + 0.0999 \times \text{Duration} \\ & \quad \quad \quad (6.04) \quad \quad \quad (4.58) \\ & - 0.2733 \times \text{Distance} \\ & \quad \quad \quad (-11.62) \end{aligned}$$

In words, each additional thousand dollars of GDP per head raised the mobilisation rate by more than 7 points; each additional year of engagement raised the mobilisation rate by 10 points; dropping one distance band lowered the mobilisation rate by 27 points. All the slope coefficients are significant at the 0.1 per cent level and the R-squared has a value of 0.91. In words, the relationships are very significant; by far the greater part of the variation in mobilisation is explained by them; hardly any room is left for traditional historical accounts based on the peculiarities of national public and private institutions and government policies.

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2 The pity of peace: Germany's economy at war, 1914–1918 and beyond

Albrecht Ritschl

Introduction

The economic history of Germany's Great War appears intellectually unexciting. It is the story of a failed *blitz* campaign and a subsequent war of attrition. It is the chronicle of disappointed expectations, painful adjustment, and of quixotic efforts to ignore reality. It is the account of an insufficient resource base, and probably of misallocation and disingenuous economic planning. And, last, it is the story of a half-constitutional yet undemocratic system in denial of defeat, unable to compromise, unable to make peace, finally drawing the whole of society into the abyss of its own political and military collapse.

A tragedy foretold: in the winter of 1914, the Kaiser's military commander-in-chief, Erich von Falkenhayn, informed his government that Germany's war effort had failed, that its military machinery lay in pieces, and that the only way out of the deadlock would be through diplomatic channels (Mommson 2001: 47). Whatever the changing fate of Germany's armies on the battlefield after that date, events in the end proved Falkenhayn right. Hardach (1973) and Ferguson (1998) have taken this point to the extreme. They argued that, contrary to conventional wisdom and popular myths, the economics of World War I explain little, if anything, that goes beyond the military facts of late 1914.

This survey chapter on the German economy at war is about these seemingly residual economics of World War I on the German side. Analysis of even the most basic facts and figures is considerably more difficult than in the case of Britain or the United States. While contemporary statistics were highly incomplete, statistical compilations by later scholars have mostly evaded World War I. Analysis of the few data that do exist reveals that the German war economy was probably robust but nevertheless suffered severe reductions of output and productivity. Still, the German war economy appears to have been less unstable than previously thought. While previous research has found evidence of

large-scale redistribution of income and of heavily inflationary war finance, closer examination of the data gives a more balanced impression of the German economy – seemingly adding to the lack of excitement.

However, analysis cannot stop there. Scholars and politicians since Rosa Luxemburg (1951[1921]) have argued that imperialist rivalry, driven by the alleged dysfunctions of nineteenth-century capitalism, was at the root of World War I. Whatever the truth of this claim, the apparent military failure of German maritime imperialism deeply affected the political discourse of Germany's political right during the war. While Anglo-Saxon writing about World War I often takes the nineteenth century as its reference point, postwar historians in Germany have interpreted World War I largely by its implications for World War II. In an influential study, Fritz Fischer (1967) noticed an abrupt swing in Germany's imperial ambitions towards eastern Europe during World War I. Although not quite accepted as the official doctrine, internal memoranda at the top level now suggested the formation of a continental empire in the territories conquered from Tsarist Russia. Their analysis consisted in a highly explosive cocktail of Malthusianism, social Darwinism, and ill-conceived implications of Germany's faltering war economy for its future economic policies. All these wartime blueprints for future postwar policy are fatefully reminiscent of the doctrines that came to the fore in Germany after 1933. This chapter will argue that in this policy change lies the true significance of Germany's war economy of World War I. Misapplied economic analysis combined with a surprising overestimation of economic warfare to generate a new blend of German imperialism, which foreshadowed Germany's second war from 1939 on.

The remaining sections of this chapter will be organised as follows. The next section looks into output, capital, and labour during the war. The third section turns to external economic warfare, notably the allied Blockade and Germany's U-boat campaigns. The fourth section analyses the distribution of incomes in the German economy and their potential for social conflict as one possible reason for Germany's collapse. The fifth section looks into the proportions of Germany's food problem. The sixth section reviews war finance as a possible check to German efficiency during the war. The seventh takes the analysis to the political discourse at the time. The redirection of Germany's imperialist thrust towards eastern Europe during World War I foreshadowed the economic aims of Nazi Germany during World War II in a rather direct way. The eighth section turns to the pity of the peace, the ill-fated economic substitute for a missing full military defeat of Germany at the end of World War I. The ninth section concludes.

A real (bad) business cycle

What does a war shock do to economic behaviour? The war-related resource drain on national product operates very much like a major productivity shock, which exogenously reduces incomes and living standards. For consumers, this generates a strong incentive to smooth out the shock over time, be it through the depletion of stocks or through borrowing. In addition, the shock induces a real business cycle: faced with the very low returns from going to work, consumers value their free time more highly and decide to work less to ride out the shock. In a great war, when emotions run high, this effect becomes even more pronounced: volunteers on either side of the front leave their workplaces in droves to enlist in their armies. Volunteers to the combatant armies prefer spending their time in the trenches killing each other to going to the factory in the morning. This generates a bad real business cycle, from which the participating economies take time to recover.

Yet this is not a complete characterisation of the wartime business cycle. As the war goes on, one often sees a remarkable upturn in output, labour input, and investment (Barro, 1981; Ahmed, 1986). If there is some probability of winning the war through economic means, this may be interpreted as a rational investment process. Faced with the choice between large welfare gains in case of victory and large losses in case of defeat, agents accept working overtime shifts, being rationed in their consumption, and investing substantial resources into the war industries.

Evidently, which of the two effects prevails depends on expectations, and on the news coming in from the front once the initial resources have been used up. The better this news, the more it pays to intensify the war effort. If the news is not good, mobilising all the resources is hardly rational, as hardly any peace agreement is going to be so harsh as to reduce living standards below even wartime levels. This, in short, characterises the differences between the war economies of Germany and the western Allies during World War I.

World War I indeed dealt a severe and persistent blow to Germany's output, labour input, and productivity. Mobilisation in the summer of 1914 reduced the workforce, and the sudden shift away from civilian to military uses of national product induced considerable unemployment for a while. In the aggregate, output suffered a persistent decline that was not to be reversed until well into the hyperinflation of 1920–3. Table 2.1 shows estimates of national income between 1913 and 1924 and of war expenditure between 1914 and 1918.

As can be seen from the left-hand panel of table 2.1, results on national income differ widely. Henning's (1974) rather favourable index of

Table 2.1. *Germany: real national income and war expenditure during World War I*

	National income (percentage of 1913)										War expenditure		
	National income (percentage of 1913)				Ritschl and Spoerer			Percentage of 1913			Share of GNP, per cent		
	Henning I	Graham II	Roesler III	Witt IV	Maddison V	VI	VII	VIII	Va	VIIa	VIIIa		
1913	100	100	100	100	100	100	100	100	3.0	3.0	3.0		
1914	96	82	83	90.2	85.2	90	92.3	447.1	15.8	14.9	14.5		
1915	96	74	67	81.4	80.9	81.1	84.8	994.1	36.9	36.8	35.2		
1916	92	69	64	80.2	81.7	75.8	80.9	941.2	34.6	37.3	34.9		
1917	88	67	62	78.5	81.8	73.5	78.9	1,388.2	51.0	56.7	52.8		
1918	88	66	57	74.7	82	71	76.8	917.6	33.6	38.8	35.9		
1919	72	55	-	67.1	72.3	60.8	68.3	-	-	-	-		
1920	74	66	-	74	78.6	70.7	76.5	-	-	-	-		
1921	80	73	-	79.3	87.5	76.3	81.1	-	-	-	-		
1922	83	80	-	82.6	95.2	81.4	85.9	-	-	-	-		
1923	72	61	-	74.4	79.1	68.7	74.7	-	-	-	-		
1924	82	74	-	87.3	92.6	80	83.2	-	-	-	-		

Notes:

- (1) All data are expressed as indices based on 1913 = 100.
- (2) National income in 1913 was 49.5 billion marks, Ritschl and Spoerer (1997, table 1).
- (3) GNP in 1913 was 56.6 billion marks; Ritschl and Spoerer (1997, table 2).
- (4) Total defence expenditure in 1913 was 1.6643 billion marks, Roesler (1967: 195).
- (5) All data refer to changing territory (-10 per cent of output in 1920).
- (6) See text on methods of calculation.

Sources: cols. I-IV: Holtfrerich (1986); col. V: Maddison (1991); cols. VI, VII: Ritschl and Spoerer (1997, table 2); col. VIII: war-related public expenditure in constant prices, Roesler (1967); cols. Va-VIIa: Roesler expenditure series, divided by GNP as columns V-VII.

national income is derived from output estimates, without making its method of calculation explicit. It must be regarded as a mere guess, albeit one that has been highly influential. At the other end of the scale is the rather pessimistic estimate by Roesler (1967), which interpolated GNP using industrial production. The indices of Graham (1930) and of Maddison (1991) include agriculture along with industry, while Witt's index works from deflated income tax data. Maddison's index is spliced to a highly optimistic estimate of output in 1925 by Hoffmann et al. (1965); hence its upward deviation from most of the other estimates after 1918. The last two national income estimates in table 2.1 represent Ritschl and Spoerer's (1997) two estimates of national product, which combine the data employed by Graham and Maddison with information on output in transport and services and two different weighting schemes for sectoral value added in 1913.

It is noteworthy that table 2.1 shows a decline in output and income during the war. Also, the income data produced by Witt appear to fit very well into the general picture drawn by the revised Maddison estimates of Ritschl and Spoerer (1997). Maddison's own series is the apparent exception. Maddison's index is based on the same data on industrial and agricultural output as the estimates of Graham and of Ritschl and Spoerer. As the data employed in these indices show that output in both sectors fell, Maddison's index implicitly assumes that output in transport and services grew fast enough to overcompensate for the decline in the other sectors. Ritschl and Spoerer's series are merely the result of replacing this assumption with more conservative estimates of output in services.

The panel on the right-hand side of table 2.1 provides estimates of the burden of war expenditure on national income. The German economy appears to have mobilised about 40 per cent of its annual output and income into the war effort, with the exception of the year of 1917, where the ratio rises to about 60 per cent. This comes out remarkably lower than in the data for Britain, where 50–60 per cent of output was directed to the war effort. This poor performance of Germany's economic mobilisation for war is consistent with the 'really bad business cycle' interpretation sketched above: given the bad news from the front, extreme economic mobilisation was not easy to sell to the Germans. Seen from a sectoral perspective, Germany's incomplete war effort had its causes in the backwardness of Germany's large agricultural sector.

Indeed, output in industry and agriculture dropped by more than most of the aggregate estimates in table 2.1. Table 2.2 gathers the information from work by Wagenführ (1933) and provides a rough breakdown.

The output of armament-related industries declined until 1915 and then recovered from 1916 onwards, when control over the economy was

Table 2.2. *Germany: agricultural and industrial production during World War I (percentage of 1913)*

	Agriculture I	Industry			
		Total II	War-related III	Intermediate IV	Civilian V
1913	100	100	100	100	100
1914	89	83	88	91	91
1915	85	67	78	77	53
1916	65	64	89	69	46
1917	60	62	103	63	43
1918	60	57	110	63	41

Sources: I: Dessirier (1928); II–V: Wagenführ (1933: 23).

Table 2.3. *Germany: employment in industry (thousands)*

	Total I	By sex		By industry		
		Male II	Female III	War-related IV	Intermediate V	Civilian VI
1913	7,387	5,794	1,593	2,116	2,970	2,301
1918	6,617	4,297	2,320	3,050	2,359	1,380
% change	–10.4	–25.8	45.6	44.1	–20.6	–40.0

Sources: Bry (1960: 193); Kocka (1978: 12 f.).

tightened and new armament programmes were implemented (Roth, 1997). However, this increase came at a cost: output dried up in the other industries. Output also decreased in Germany's labour-intensive, poorly mechanised agriculture where labour shortages soon came to be felt.

Employment appears to have broadly matched the path of output in the various sectors of the German economy. The total workforce in industry fell by roughly 10 per cent (table 2.3).

As would be expected, male labour input dropped sharply, while female labour input increased, though not by the same amount. At the same time, a pronounced sectoral shift into armaments and away from peacetime industries took place. Given that the average workweek was extended, the data in table 2.3 must underestimate employment.

Reliable information on the number of hours worked per week during the war is apparently not to be had. Bry (1960: table A.43) estimates the spread between hourly and weekly wages to have increased by 12 per cent. Thus it is possible that total hours in industry increased slightly, despite the fall in the number of persons employed. Bry's estimate is probably a lower bound for the increase in industrial labour time, as work on Sundays was reintroduced and shift lengths were often extended aggressively. Table 2.4 attempts a rough guess at labour productivity in German industry in 1918, as compared to 1913.

The results of the rough guess in table 2.4 look rather devastating. Productivity per person employed seems to have fallen between 20 and 30 per cent, depending on the various different industry groups. The aggregate industry estimate (column I) even puts the overall decrease at over one-third.

Unfortunately, the industry classifications underlying the data in tables 2.2 and 2.3 do not match exactly (Kocka, 1978: 13). As a result, the estimates of sectoral productivity changes are inconsistent with the calculated industry aggregate. To produce a coherent estimate, column V gives an employment-weighted estimate of aggregate industrial productivity. This measure shows industrial productivity decline to be lower than the aggregate (in column I) would suggest, but still puts the cumulative productivity decrease per person at 22 per cent.

The decline in industrial productivity looks even more pronounced if allowance is made for an overall increase in hours by 20 per cent, as in columns VI–X of table 2.4. The hourly productivity decline measured in this way lies somewhere between one-third and over 40 per cent. An employment-weighted average (column X) suggests that industry-wide productivity per person-hour declined by 35 per cent.

One possible reason why productivity suffered suggests itself from looking deeper into the industry structure of output, as in table 2.5. While output in war-related industries such as non-ferrous metals increased, it decreased sharply in everything not related to the war. We also find a remarkable stagnation and eventual collapse of output in iron and steel, despite its strategic importance. The enormous disproportions in sectoral output imply that capital utilisation rates must have been sub-optimal in most industries, driving down aggregate labour productivity.

Reliable employment data for the aggregate economy seem hard to come by. As a rough consistency check for the above productivity estimates, the national product and income data from table 2.1 are therefore calculated into total population (table 2.6). This measure is biased to the extent that expansion of employment, in particular of female labour

Table 2.4. *Germany: estimates of labour productivity in industry (percentage of 1913)*

	Per employee						Per hour (assuming 20% increase in hours)			
	Total I	War-related II	Intermediate III	Civilian IV	Adjusted total V	Total VI	War-related VII	Intermediate VIII	Civilian IX	Adjusted total X
1913	100	100	100	100	100	100	100	100	100	100
1918	63.6	76.3	79.3	68.4	77.7	53.0	63.6	66.1	57.0	64.8
% Change	-36.4	-23.7	-20.7	-31.6	-22.3	-47.0	-36.4	-33.9	-43.0	-35.2

Notes:

- (1) Industry classifications differ slightly between tables 2.2 and 2.3.
- (2) Industry totals in columns I and VI are not consistent with sectoral totals.
- (3) Corrected totals weighted by employment in same year from table 2.3.

Sources: output: table 2.2; labour: table 2.3.

Table 2.5. *Germany: production of selected goods and industries (percentage of 1913)*

	1913	1914	1915	1916	1917	1918
Mining	100	84	78	86	90	83
Iron and steel	100	78	68	61	83	53
Construction materials	100	88	69	59	58	35
Textiles	100	87	65	27	22	17
Non-ferrous metals	100	89	72	113	155	234
Residential construction	100	68	30	10	4	4
Cereals	100	88	71	72	49	57

Sources: Wagenführ (1933); Holtfrerich (1986: 180).

Table 2.6. *Germany: indices of real per capita income across World War I (thousands and percentage of 1913)*

	Population	National income per capita			
		Witt I	Maddison II	Ritschl and Spoerer III	Spoerer IV
1913	66,978	100.0	100.0	100.0	100.0
1914	67,790	89.1	84.2	88.9	91.2
1915	67,883	80.3	79.8	80.0	83.7
1916	67,715	79.3	80.8	75.0	80.0
1917	67,368	78.0	81.3	73.1	78.4
1918	66,811	74.9	82.2	71.2	77.0

Sources: population: Statistisches Bundesamt (1972); Income: table 2.1.

force participation, failed to compensate for the men drafted into the military.

The aggregate picture looks somewhat more favourable than the industry data suggest. It also adds temporal structure to the productivity decline: except for the estimate in column III, all series would place the largest part of the decrease in income per capita near the beginning of the war. After that, productivity appears to have resisted quite well, until it declined again in the military and political collapse of late 1918. Still, the cumulative decline in output per capita of the German population is around 20 per cent even in Maddison's optimistic estimate. Contrast this with Feinstein's (1972) compromise estimate of British national

Table 2.7. *Germany: the trade balance, 1913–1918*

	Billion marks and current prices			Billion marks and constant prices			Implicit prices		
	Exports	Imports	Balance	Exports	Imports	Balance	Exports	Imports	Terms of trade
1913	10.1	10.8	-0.7	10.1	10.8	-0.7	1.0	1.0	1.0
1914	7.4	8.5	-1.1	7.5	8.5	-1.0	0.99	1.0	0.99
(Aug.–Dec.)	1.4	2.1	-0.7	1.5	2.1	-0.6	0.93	1.0	0.93
1915	3.1	7.1	-4.0	2.5	5.9	-3.4	1.24	1.20	1.03
1916	3.8	8.4	-4.6	2.9	6.4	-3.5	1.31	1.31	1.00
1917	3.5	7.1	-3.6	2.0	4.2	-2.2	1.75	1.69	1.04
1918	4.7	7.1	-2.4	2.8	4.2	-1.4	1.68	1.69	0.99

Source: Hardach (1973, table 6).

product per capita (table 7.3): on the other side of the Channel, per capita product increased throughout the war without interruption, to peak in 1918, with a plus of 11 per cent over 1913. Evidently, the economy was not just a sideshow to World War I.

The not-so-yellow submarines: on economic warfare

German naval strategy in World War I rested largely on not using her navy. Two unintended naval battles had proven the superiority of Britain's fleet and quenched Germany's appetite for more of the same (Hardach, 1973: 21f.). As things stood, the German navy was strong enough to defend its coastline and ports but failed to present the fundamental risk to Britain's war strategy that Germany's strategists had dreamt of before the war (Ferguson, 1998: 83 ff.). Consequently, Germany had no direct military means at her disposal against the Allied blockade, in spite of heavy investment in its fleet before the war. Retaliation thus seemed to be the only way out.

Information on the German balance of payments during World War I is sparse. The only extant series seems to be in one contemporary source cited by Hardach (1973: 42). Table 2.7 reproduces these figures in current and gold values and calculates implicit price deflators and terms of trade indices.

From a real business cycle perspective, the war effort as a rational investment process would imply rising imports and a deficit in the trade balance, as the economy attracts foreign resources and draws on its foreign assets to build up its war machinery (Ahmed, 1986). However, we do not see this in the World War I data, with naval and submarine warfare being the obvious explanation. Even at current prices, Germany's external trade dropped significantly after 1914. Not unlike Germany's autarky policies of the 1930s, war affected exports even more than imports, which implied foreign exchange shortages on top of the trade reduction as such (Ritschl, 2001). In real terms, German imports during the war remained at 40–60 per cent below their peacetime levels, while exports fell even further. A look at the implied import prices and terms of trade in table 2.7 suggests that the gold values might still overstate German imports: import and export prices are shown to have increased by roughly the same percentage, and Germany's terms of trade would even have increased slightly. This seems somewhat unrealistic. Again, the comparison with Britain is revealing: British import prices are reported to have increased by a cumulative 125 per cent over the war years (table 7.11), which would leave a real decline of no more than 16 per cent. If we apply the same 125 per cent increase to German import prices (i.e. a factor of 2.25 instead of 1.69), Germany's imports in 1918 would be an

Table 2.8. *Germany: the propensity to import, 1913–1918*

	Billion marks			Average import–output ratios			
	Imports	GNP I	GNP II	GNP I	GNP II	Nazi Germany	
1913	10.8	56.6	56.6	0.19	0.19	1933	0.20
1914	8.5	51.1	52.3	0.17	0.16	1934	0.18
1915	5.9	46.1	48.0	0.13	0.12	1935	0.15
1916	6.4	45.4	45.8	0.14	0.14	1936	0.14
1917	4.2	44.4	44.7	0.09	0.09	1937	0.15
1918	4.2	42.3	43.5	0.10	0.10	1938	0.16

Sources: GNP 1913 (56.618 billion marks): Ritschl and Spoerer (1997, table 2); output I: table 2.1 (IV); output II: table 2.1 (VII); Nazi Germany: Ritschl (2002, appendix tables B.7, B.9).

estimated 3.16 instead of 4.2 billion marks. This would imply a cumulative decline of 71 per cent instead of the 61 per cent implicit in table 2.7. Whatever the true figure, it seems evident that the blockade managed to inflict far greater damage on the German war economy than the not-so-yellow submarines did to England.

Table 2.8 relates trade to national income. Relative autarky should be reflected in a decline in the ratio of imports to output.

This decline evidently came in two phases. If we can trust the data, really strong cuts in Germany's trade began only in 1917. In fact, the previous decline does not exceed Germany's self-inflicted exclusion from foreign trade during the 1930s. There can be little doubt that Britain's policies of intensified blockade beginning in 1916 must have had an impact on the German economy that was absent in the early years of the war.

Still, the trade balance (at the time calculated only as the flow of goods, not of factor incomes) provides only an incomplete account of Germany's access to and use of foreign resources. Employment of prisoners of war and of foreign contracted workers increased to sizeable proportions during the war (table 2.9).

Even the use of forced labour was attempted: in October, 1916, Germany began deporting Belgian workers at rates of 2,000 per week and more, transferring them in freight trains to camps in Germany (see Hardach, 1973: 76f.). There is even a history of Jewish forced labour during World War I, with Jews deported to Germany from Poland (Elsner and Lehmann, 1988). Under the pressure of international protests, deportations stopped in February 1917 and most (but not all) workers were repatriated.

Table 2.9. *Germany: employment of foreigners, POWs, and forced labour (thousands)*

	Contracted foreign labour			Prisoners of war				Forced labour	Total
	Total	Industry	Agriculture	Total	Industry	Agriculture	Abroad		
1916	589.4	249.5	339.9	1,358.0	331.0	735.0	253.0		1,694.4
1917	351.2	305.8		1,703.5	392.6	837.5	258.8	(60)	1,795.9

Note: Overall total excludes POWs abroad and forced labour.

Sources: Daniel (1989: 57, 59); Elsner and Lehmann (1988: 74).

Too much redistribution? Wages and social conflict

Domestic labour market policy at the beginning of the war was remarkably disoriented, as the main task was seen as fighting unemployment. Job agencies were established in August, 1914. In December, central government asked municipalities to draw up welfare schemes for the unemployed and promised subsidies. Attempts to subject industrial relations to martial law initially failed, except for Prussia's state-owned arms factories. Labour regulation was only tightened in the Patriotic Labour Service Act (*Vaterlaendisches Hilfsdienstgesetz*) of late 1916. Social historians have often interpreted this act as a backlash against the interests of organised labour. Indeed, under the new Act the mobility of labour was restricted, and a compulsory labour service established for all males aged between 17 and 60 years. On the other hand, the implementation of the Act brought increased parliamentary participation in government (not a small gain under Germany's still autocratic system), and a first recognition of workers' representations on the factory floor. Furthermore, even the Patriotic Service Act permitted workers to change employer if the new job offered a higher wage (Hardach, 1973: 195).

To organise war production and labour allocation, a new central planning authority, the *Kriegsamt* (war office), was established. However, its competences remained unclear, and as a result of political horse-trading between the civilian government, the parliamentary opposition, trade unions, and employers' associations, it became subordinate to the War Ministry. This was not what the military had hoped for, and although it may have prevented Germany's political system from sliding into outright military dictatorship, it did less than expected to increase efficiency in production (Feldman, 1966: part VI).

Table 2.10. *Germany: real wages in industry (percentage of 1914)*

	1914		1915		1916		1917		1918	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Daily real earnings in 370 establishments, March 1914 – March 1918										
War-related	100	100	91.8	90.8	88.9	101.5	76.2	83.5	77.8	86.0
Intermediate	100	100	83.4	83.6	79.9	77.6	62.3	65.9	60.4	64.0
Civilian	100	100	82.6	78.0	73.5	72.4	54.3	53.2	52.2	58.9
Unweighted average	100	100	85.9	84.1	80.8	83.8	64.3	67.5	63.4	69.6
Change in implied wage-income ratio/cumulative real wage position										
War-related	100	100	103.6	102.4	87.9	100.4	65.1	71.3	62.2	68.8
Intermediate	100	100	98.6	98.8	105.4	102.3	90.0	95.2	87.2	92.4
Civilian	100	100	141.8	133.9	145.4	143.2	114.9	112.6	115.9	130.7
Unweighted average	100	100	106.4	104.2	104.8	108.7	86.1	90.4	92.3	101.3
Estimates of aggregate real wages in industry and change of implied wage-income ratio										
Aggregate real wage	100	88			79		65		66	
Index of implied wage share/cumulative real wage position	100	109.0			102.5		87.0		96.1	

Sources: earnings by sectors: Bry (1960: 211); aggregate real wages: Mitchell (1981: 181 ff.), Ferguson (1998: 272); wage shares: own calculations, using output from table 2.2.

The net effect of labour regulation and market forces on wages and the distributional position of labour is unclear. In an influential study, Kocka (1978: chapter II) has argued for a shift in income distribution towards organised capital. His evidence is based on data from Bry (1960) on the erosion of real wages in large parts of industry (table 2.10).

The upper part of table 2.10 shows that wages were robust in the armaments industry and declined the most in civilian industries. Bry (1960: 210) also notes the relatively strong position of women's wages in the armaments industry, and women suffered only modest real wage declines even towards the end of the war.

Kocka (1978: 25ff.) interprets German wage policies as evidence of intentional redistribution away from labour and, hence, of increased social polarisation. As an alternative test, table 2.10 calculates the implied sectoral wage shares, obtained from calculating the earnings data into the sectoral output estimates of table 2.2 above. This exercise yields three main results: first, there is indeed evidence of redistribution, although in different directions depending on the industries. Whereas labour clearly lost out in the armaments industries, the converse is true for non-military industries, while evidence on the intermediate sector is mixed. Second, wage differentials between male and female labour appear to have even widened during the first phase of the war. Only after 1916 do we observe a relative improvement of the female wage position. However, this is likely due to female wages hitting subsistence, as the general wage level declined (Daniel 1989: 117). Third, the distributional position of labour clearly worsened only after 1916.

This result is corroborated by a further test, an index of cumulative changes in the wage share relative to 1913. This measure, called the cumulative real wage position, has played a certain role in debates about income redistribution in the Weimar Republic (Broadberry and Ritschl, 1995). We first calculate the unweighted average of the wage shares from the sectoral data above. Results suggest that the distributional position of labour indeed deteriorated sharply after 1916. However, they also imply that it actually increased before that. A second exercise (table 2.10, lower panel) calculates aggregate wage data collected by Ferguson (1998: 272) from various different sources into the aggregate industrial production index of Wagenführ (1933: 23). Although the reliability of the wage series is not beyond doubt, the calculated wage share traces the sectoral evidence quite well.

Table 2.10 tells a clear-cut yet surprising story: aggregating over all sectors of industry, there seems to be no such thing as redistribution towards capital during World War I in Germany. The cumulative wage position of labour worsened in the armaments industry, which is in line with conventional wisdom. However, it stayed neutral in intermediate

Table 2.11. *Germany: wage compression in 479 establishments in Bavaria, change in nominal hourly earnings from June 1914 to October 1918 (per cent)*

	Men		Women	Youths
	Skilled	Unskilled		
Four war industries	+ 234	+ 220	+ 208	+ 240
Six intermediate industries	+ 203	+ 211	+ 216	+ 230
Eleven civilian industries	+ 185	+ 195	+ 206	+ 206
Unweighted average	+ 199	+ 204	+ 209	+ 219
Weighted average	+ 204	+ 220	+ 205	+ 235

Note: Unweighted average calculated from sectoral averages; weighted average from total wage bill and total person-hours.

Source: Bry (1960: 199).

industries and improved strongly in the civilian sectors of industry. The available aggregate data indicate that the net effects essentially cancelled each other out: for industry as a whole, the cumulative real wage position shows no clear tendency throughout World War I. The same result is obtained in recent research by Baten and Schulz (2005) employing microeconomic data from German manufacturing.

Evidently, composition effects in the labour forces also influenced the industrial wage share. The proportion of women and unskilled workers employed increased, which tended to lower the wage bill. However, there also existed a counteracting effect, as the general decline in real wages was accompanied by a compression of the wage scale. Table 2.11 presents evidence of nominal earnings in a sample of 479 firms in Bavaria. As can be seen, unskilled males, women, and young workers generally gained ground in relative terms. The important exception to this rule is the armaments industry, where skill premia still increased.

Nevertheless, the country saw several waves of strikes during the war, beginning in 1915 with protests against shortened rations and with demands for peace, which accelerated from then on. Ferguson (1998: 275) has argued that labour disputes were far less widespread in Germany than in Britain and that their importance has therefore been exaggerated. Table 2.12 summarises the evidence presented by Ferguson, with the German data based on Petzina, Abelshausen, and Faust (1978).

The data in table 2.12 show that, except for 1917, the number of workers on strike in Britain by far exceeded the number in Germany.

Table 2.12. *Germany and Britain: strikes, 1914–1918*

	Workers on strike (000)		Days lost (000)	
	Britain	Germany	Britain	Germany
1914	306	61	10,000	1,715
1915	401	14	3,000	42
1916	235	129	2,500	245
1917	575	667	5,500	1,862
1918	923	391	6,000	1,452

Source: Ferguson (1998, table 30); German data adapted from Petzina et al. (1978).

This becomes even more pronounced when the duration of strikes is accounted for by the number of days lost. Here, Britain's working class outperformed the Germans almost by orders of magnitude, at least in the early phase of the war. Ferguson's point thus seems to be a valid one. He acknowledges that, in either country, strikes were mostly not just industrial disputes but more commonly political in nature. However, strikes in Britain and Germany meant two potentially very different things. The lack of political legitimacy of Germany's government and the beginning of a schism in the Social Democratic Party combined to create a policy of *Burgfrieden*, a labour truce by which organised labour made big concessions in return for very little. The weakness of either side had the strange effect of preventing the government from regulating the labour market as drastically as Britain was doing at the same time (Kocka 1978: chapter 2). Indeed, the repeated attempts of the military to wield control over labour were defeated, when in late 1916 only a very diluted version of the programme was put into law (Feldman 1966, part V). The new upsurge in strikes in 1917 and again after the failed spring offensive of 1918 destabilised this shaky balance of power. The role of income distribution in this process is clearly minor, as table 2.10 shows. However, the fact that output and living standards had declined overall can hardly be ignored.

No milk today: the German food crisis

Conventional wisdom has it that food scarcity caused German morale to wane on the home front, before military resistance collapsed. There are good reasons for this view (e.g. Offer, 1989: chapters 4–5). German food supplies may have resisted the Allied blockade longer and better than expected. But, clearly, they fell throughout the war, and in the end barely

Table 2.13. *Germany: imports of foodstuffs, 1916–1918, metric tons (monthly averages)*

	1916		1917		1918			
					Jan. to June		July to Nov.	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
Grains	20,063	617	3,089	492	989	694	7,333	153
Flour	682	9,018	229	2,069	138	3,090	279	298
Cattle (number)	29,686	48	19,699	79	9,690	35	14,502	43
Pigs (number)	322	114	116	216	33	3.3	549	32
Meat	5,778	853	1848	557	244	450	260	6.0
Butter	7,978	158	3513	118	1,492	45	1,239	38
Vegetable oil and fats	791	23	148	17	19	7.7	37.2	1.7
Margarine	555	22	106	78	2.1	0.1	0.4	0.4
Cheese	6,553	20	3,187	21	1,258	23	1,269	55
Fish	17,573	300	5,416	155	2,278	192	2,229	99

Source: Skalweit (1927, pp. 235–9).

exceeded subsistence. Table 2.13 lists German food imports from 1916 to 1918.

Again, the effects of the intensified blockade after 1916 are visible: imported quantities were reduced sharply and sometimes almost collapsed. For 1918, table 2.13 provides a breakdown between the first and the second half of the year. It shows that, apparently, an attempt was made in the last months of the war to improve the food situation slightly, although to little avail.

Regulation of food production and distribution started quite early on. Price caps were introduced and efforts made to put both production and distribution of agricultural commodities under public control. To increase the amount of grain available for human consumption, the government decreed a much-disputed mass slaughter of hogs, ironically referred to in the debate as *Schweinemord*. Given the wrong price signals set by the price cap system and by quantity regulations, German agriculture arguably produced below capacity: see, e.g., Skalweit (1927), from where the data are taken. However, much of the decline in German food rations is clearly due to faltering imports. Up until 1916, Germany had been moderately successful in evading the Allied blockade by increasing imports of foodstuffs from the neighbouring neutrals, notably from the

Netherlands and Denmark. Increased Allied control over the trade of neutral countries caused this trade partly to dry up (Hardach, 1973: chapter 1). Furthermore, deliveries of foodstuffs from eastern Europe did not come forth at the expected rates. The defeat of Romania led to an upsurge in German grain imports, as expected. In contrast, the hopes for huge war spoils from the occupation of the Ukraine in the spring of 1918 were badly disappointed, as transport facilities and market integration proved insufficient (Offer, 1989).

War finance: Barro versus Ramsey

Conventional wisdom has for a long time accepted almost unconditionally that German war finance was based far less on taxes than Britain's and was, hence, less sound and more prone to inflation. Faced with an adverse productivity shock of major proportions, an individual consumer has a strong incentive to smooth out consumption, be it through the depletion of stocks or through borrowing. This incentive is especially strong in the presence of a distortionary tax system, in which the government's attempt to cover the cost of war through taxation would cause immense deadweight loss. Provided the government's claim to honour its war bonds after a war is credible, agents will prefer smoothing out the tax burden over time to paying the bill instantly. This, in loose and abridged form, is the Barro view of war finance; see Bordo and White (1991) and Bordo and Kydland (1995) for applications of the Barro rule to war finance and the gold standard. Viewed from this perspective, the popular argument that German war finance was necessarily unsound is economic nonsense. To the extent that German war finance was more strongly debt-oriented than in Britain, the Barro view would either conclude that the Germans were more risk-averse than the British (that is to say, their period utility function had a stronger curvature), or it would hold that Germany's tax system was more distortionary than its British counterpart.

Bordo and White (1991) argue that, since the 1720s, Britain under the gold standard had accumulated a sound record of honouring war bonds at par after a war. It seems that Germany, on the contrary, did not have an established reputation in 1913: while Prussia's fiscal policy had been extremely conservative throughout the nineteenth century, the same could not be said of the southern German states. Germany had embarked on the gold standard only in 1875, and the credibility of this commitment had not yet been put to test. The same is not true of France, which had paid for the 1871 war and her reparations to Germany through borrowing, and had honoured the debt in full gold value despite deflationary

Table 2.14. *Germany: war finance, 1914–1918 (million marks)*

	Total outlays			Total revenues, excluding seignorage			Deficit		Share of of war expenditure financed by Reich		
	Reich	States	Public sector	Reich	States	Public sector	Reich	States	Public sector	Share of expenditure financed by deficits	
											Of which war related
1914/15	8,788	3,886	12,644	2,323	3,273	5,596	6,465	613	7,048	56	93
1915/16	25,803	3,494	29,297	1,442	3,237	4,679	24,361	257	24,618	84	102
1916/17	27,839	3,629	31,468	2,040	3,816	5,856	25,799	-187	25,612	81	104
1917/18	49,277	5,880	55,157	4,558	4,327	8,885	44,719	1,553	46,272	84	106
Cumulative	111,707	16,889	128,566	10,363	14,653	25,016	101,344	2,236	103,550	81	104
1918/19	58,694	7,041	65,735	3,663	3,693	7,356	55,031	3,348	58,379	89	162

Note: Data refer to fiscal years, 1 April to 31 March.

Sources: Roesler (1967); Balderston (1989). 1914–1916: Statistisches Reichsamt (1919: 247). 1917–1918: Statistisches Reichsamt (1920: 188).

tendencies in the Great Depression of the 1880s. Yet Germany was remarkably successful in selling war bonds during most of World War I.

Table 2.14 shows the revenues and expenditure of the various levels of government in Germany together with the deficits, excluding seignorage from the calculations. As can be seen, deficits weighed heavily in financing Germany's budget during the war, although clearly less so than the older literature has claimed. This point has been made previously by Balderston (1989), from whose work the figures in table 2.14 are adapted. Table 2.14 arrives at a cumulative total of 81 per cent of expenditure financed by deficits if the last fiscal year, starting in April 1918, is omitted. Including the fiscal year of 1918/19 (which, however, included almost five months of postwar revolution and chaos), the total percentage is 83.3 per cent for the war as a whole (the same as in Balderston, 1989: 228). Neither of the two figures is very far from the British percentage of 78.1 per cent. In terms of borrowing vs. taxation, there was no fundamental difference between the two war economies.

Table 2.14 also provides data on war expenditure and finance by the central government. Viewed that way, it shows that German war finance was strictly of the Barro type: war expenditure and debt financing neatly match each other.

A slightly harder exercise is to calculate the amount of debt monetisation through the central bank. In most accounts of the German hyperinflation of 1920 to 1923, debt finance during the war is still the main culprit. Careful reading of Holtfrerich (1986) already suggests that all is not well with this belief. Table 2.15 calculates the monetisation of central government debt from the debt statistics of the Reich, drawing on Holtfrerich's data.

Given the opaqueness of Germany's public budgeting procedures, borrowing and debt statistics from various different sources are seldom compatible. Columns I and II give the deficits in the two main components of the budget, the ordinary and extraordinary account. Column III provides independent figures on the increase in central government debt from the public debt statistics. As can be seen, the data are roughly consistent in their cumulative sum to 1917/18 but not afterwards (see Balderston, 1989, for the details). Adding seignorage, I arrive at a broad definition of central government deficit in column V. To obtain an estimate of funded debt (column VII), data on the increase in floating debt in column VI are subtracted from central government debt in column III. From the Reichsbank's statistics, the percentage of floating debt held by the central bank is known. This permits calculation of the amount of borrowing absorbed by the central bank each year (column VIII). This, together with seignorage, yields an estimate of total war

Table 2.15. *Germany: the monetisation of central government debt (million marks)*

	Borrowing on:		Increase in debt III	Seignorage IV	Total increase in debt V
	Ordinary account I	Extraordinary account II			
1914/15	- 698	7,004	11,513	103.6	11,616.6
1915/16	51	23,927	22,781	259.7	23,040.7
1916/17	945	24,772	29,381	465.3	29,846.3
1917/18	- 937	42,204	36,067	701.9	36,768.9
Cumulative	- 639	97,907	99,742	15,30.5	101,272.5
1918/19	150.6	34,901	51,148	390.5	51,539

	Increase in:		Total financed by Reichsbank IX	Monetisation, % of debt increase X
	Floating debt VI	Funded debt VII		
1914/15	1,800	9,713	1,700.2	14.6
1915/16	4,600	18,181	3,599.9	15.6
1916/17	4,100	25,281	3,268.1	10.9
1917/18	14,400	21,667	5,512.3	15.0
Cumulative	24,900	74,842	14,080.5	13.9
1918/19	23,800	27,348	9,089.5	17.6

Notes:

- (1) Separation between ordinary and extraordinary account according to German budgeting law.
- (2) Borrowing figures in (I) and (II) from budget data, roughly consistent with table 2.14.
- (3) Debt figures from debt statistics.
- (4) (V) = (III) + (IV)
- (5) (VII) = (III) - (VI)
- (6) (IX) = (IV) + (VIII)
- (7) (X) = 100 × (IX) ÷ (V)
- (8) Cumulative debt monetisation including 1918/19 is 15.2 per cent.

Sources: Roesler (1967); Holtfrerich (1986); Balderston (1989).

finance by the printing press (column IX). Calculating this into the conservative estimate of the debt increase in column III, I obtain a ratio of debt monetisation of about 15 per cent up until 1917/18. In the last year of the war (which also includes the take-off into postwar inflation after November 1918), the rate of debt monetisation stood at 18 per cent. These results on the monetisation of debt look surprisingly conservative. With no more than 15 per cent debt monetisation during World War I, it appears that there can be no talk of war debt having been financed largely through the printing press. Other mechanisms driving suppressed inflation must have been at work.

This is where an alternative interpretation comes in. The Ramsey view of war finance holds that distortions are minimised when it is mainly the fixed factors in the economy that are taxed away during the war. To provide proper dynamic incentives, these factors would have to remain tax-free in peacetime. This is consistent with the standard result of the Ramsey theory of taxation, which holds that capital gains taxes are sub-optimal (Ramsey, 1927). Ramsey taxation is one interpretation of the attempts after World War I to impose capital levies, as reviewed by Eichengreen (1990) in comparative perspective. It may be an interpretation of Germany's inflation after World War I. However, the willingness of the public to accept German war bonds evidently persisted throughout the war. Had German war finance consisted in expropriating holders of public debt and fiat money, some version of the Ramsey view of war finance would probably apply. Given the rather conservative figures on debt monetisation, there seems to be little justification for that.

No doubt, prices already increased substantially during the war, as did the monetary base. Table 2.16 summarises the evidence. Up to 1918, wholesale prices (column I) had increased by 43 per cent, while prices of a constant food basket (of a sailor in the navy in 1914, column II) had more than doubled. During the same period, the monetary base grew by a factor of six, which testifies to the relative severity of price controls in the German war economy. As the data in table 2.16 bear out, hyperinflation was not a wartime phenomenon. Compared to the postwar years, prices were kept fairly well under control until 1918. The years of 1919 and 1920 witnessed the transition to open inflation, which had got entirely out of hand by 1922. However, a view at the monetary base shows a much steadier inflation process. Except for 1918, annual growth of the monetary base oscillated around 50 per cent per year, and shot up to generate astronomical price levels only in 1923. What made a difference for inflation after 1918 was apparently the ineffectiveness and disappearance of wartime price controls, not money growth itself.

Table 2.16. *Germany: money and prices (percentage of 1913 and of previous year)*

	I. Wholesale prices		II. Food prices		III. Consumer prices		IV. Monetary base	
	Level	Annual change	Level	Annual change	Level	Annual change	Level	Annual change
1913	100	—	100	—	100	—	100	—
1914	102	2	101	1			141	41
1915	116	14	143	42			165	17
1916	132	14	198	38			220	34
1917	157	19	213	8			343	56
1918	143	-9	229	8			604	76
1919	470	229	326	42			881	46
1920	1,501	219	953	192	1,044		1,374	56
1921	2,491	66	1,529	60	1,337	28	2,061	50
1922	44,921	1,703	17,056	1,016	15,036	1025	23,242	1,028
1923	2.35×10^{13}	5.23×10^{10}	—	—	3.81×10^{13}	2.53×10^{11}	—	—

Notes:

- (1) Wholesale prices in domestic paper currency.
- (2) Basic food prices refer to weekly food ration of naval serviceman in 1914.
- (3) Official CPI available only from 1920 on.
- (4) Monetary base excludes debt monetisation.

Drang nach Osten: rehearsal for World War II

German war planners preparing for World War II constantly looked back and tried to infer what they considered to be the lessons from World War I. This started with war tactics, where the Germans tried to perfect the use of the one weapon that had contributed most to their own military defeat in 1918: the tank. But lessons did not stop there. Whether real or imagined, German planners interpreted the war as an inherently economic problem, and designed the aims for a war of revenge accordingly. Starting in 1915, public and internal debates on Germany's war goals began to shift away from the classical ambitions of German overseas imperialism and towards building up a continental empire in eastern Europe. Internal memoranda in the army's supreme command proposed the gradual Germanisation of Poland and the creation of a tight belt of German farm settlements in western Ukraine. In a classic treatment of German wartime imperialism, Fischer (1967) has claimed that these ambitions were indeed official policy. Nowadays, a consensus has emerged that this is probably exaggerated (e.g. Mommsen, 2001). However, there is no doubt that such ideas were seriously discussed in Germany's military and political leadership. One such memorandum, elaborated by the *Alldeutscher Verband* (Pan-German Union), even proposed the ethnic cleansing of all annexed territories. Under the third military supreme command (*Dritte Oberste Heeresleitung*) of Hindenburg and Ludendorff, Germany indeed came close to putting such war aims into practice. The armistice concluded with Soviet Russia in Brest-Litovsk in December 1917 and a peace treaty imposed on Russia in March 1918 gave Germany almost unlimited freedom to pursue its territorial aspirations, both in the Baltic and in former Russian Poland. Germany occupied the Ukraine down to the Caucasus and even reached the oil fields of Baku on the Caspian Sea, something that Hitler failed to achieve in the Second World War.

The similarities are not coincidental. A contemporary observer, writing after the war, argued that Germany's trade rivalry with Britain had unnecessarily provoked the war, and that Germany should have concentrated on establishing a continental empire instead. Given Britain's unquestionable maritime superiority, the argument went, Germany's attempts to break its food blockade had necessarily been futile. Given Germany's food dilemma, a future war against Britain would only be feasible with the backing of Russia, just as war against Russia was only feasible with British neutrality. That writer was none other than Hitler himself (for details see Ritschl, 1990).

Malthusian interpretations of Germany's food problem probably went back to the 1890s. Then a controversy between defenders of unlimited industrialisation and proponents of a balance between industry and agriculture had emerged, in which *Blockadefestigkeit* (national self-sufficiency) and *Kriegsernährung* (wartime food supplies) took centre stage. Malthusians argued that German population growth could not be stopped, as Darwinists would later add that it should not. In the negotiations of the Treaty of Versailles, the German representatives used Malthusian reasoning to argue that without sufficient *Lebensraum*, or living space, the German population would be doomed to immiseration and starvation. This may not be surprising in itself. What does surprise in retrospect is the deep impression that this appears to have made on Keynes (1919). In the 1920s, the German economist Werner Sombart, then a grand old man in his field, chaired a prize committee for a competition. Participants were asked to submit essays on how to feed a growing population on the reduced territory of the Weimar Republic. Birth control and foreign trade had been excluded from the list of admissible answers as being trivial and unfeasible solutions to the problem (Ritschl, 1990). This was the mindset that increasingly framed perceptions and expectations among the political right in Germany. Mommsen (2001: 153) has referred to the First World War as 'the incubation phase of a new, aggressively *völkisch* nationalism and of radical anti-semitism, which spread at a rapid speed and gradually cast its spell over larger and larger parts of the population'. Such was the mindset of large parts of Germany's political class and its military towards the end of World War I.

The pity of the peace: Versailles, reparations, and the Allies' incomplete campaign

Given the state of mind of Germany's public, it can be argued that President Wilson's Fourteen Points and the Treaty of Versailles offered a peace arrangement that was too lax and too strict at the same time. It was too lax because it left the task of uprooting the elites supporting the Kaiser and his armies undone. It was too harsh because it attempted an economic *ersatz* warfare against Germany instead. The underlying problem of the peace arrangement was that the outcome of the war in 1918 was not as clear as it should have been. Germany's economy was exhausted but not in ruins. Wartime food rations had been minimal but not obviously below subsistence. The army was technically defeated, but Germany had not yet been invaded. Strikes in the metal industry and mutinies in the navy – which was about to be sent off on a final suicide

mission – accelerated the political implosion of Germany. But still, whatever the moves on the military chessboard of Germany's western front, the defeat was not visible to the man in the streets of Germany. Soon, 'stab-in-the-back' myths spread, and asserted that the army had been knocked out, not by enemy action in the battlefield but by faltering morale on the home front. Such urban legends may have helped the uninformed average German to overcome the cognitive dissonance between propaganda and reality. However, they undermined the legitimacy of the new republic from the first day, and laid the ground for future revenge. True, in the fall of 1918 the German side had sought an armistice and had reluctantly begun to cope with Wilson's Fourteen Points. But neither the army under Hindenburg (later the fateful last president of the Weimar Republic who handed power to Hitler in 1933) and Ludendorff (later Hitler's ally in the beerhall *putsch* of 1923) nor the Kaiser himself accepted political liability for what followed. The army's high command was replaced, Wilhelm II went into exile, and the onus for the armistice and the terms of the peace treaty fell on the new republic that was hastily formed in November 1918. The man who signed the armistice for Germany, Matthias Erzberger, did not survive for long: a death squad on the German navy's unofficial payroll assassinated him in 1921 (Sabrow 1994).

France in 1870/1 had no doubt suffered greater and more obvious humiliation on the battlefield than Germany did in World War I. After only six weeks of war, the French emperor fell into Prussian hands. Fanaticised troops and irregular units, the *franc-tireurs*, continued the struggle. Prussian troops encircled Paris and opened a corridor for the *franc-tireurs* to go in and quell a communist uprising. The victors even went so far as to proclaim Prussia's king as Kaiser of a new German empire, right there in the palace of Versailles. Hardly anything could have made the military results of this war more manifest than this highly symbolic act of doubtful taste. At the same time, however, Germany's demonstration of power had the unintended consequence of stabilising the new French republic.

To understand the implications of the incomplete end of World War I in 1918, assume a counterfactual which projects the end of the Franco-Prussian war of 1871 onto World War I with signs reversed. Imagine that Allied troops had stormed the Kaiser's headquarters in Spa in late 1918, rather than allowing him to slip away into exile in the Netherlands. Suppose, furthermore, that war had continued, with irregular units forming on the German side, as actually happened after 1918. The spring of 1919 would doubtlessly have seen the invasion of Germany by Allied troops. In a further analogy to 1871, one might imagine the Allies

encircling the cities of Berlin in the east and Munich in the south, while communist insurgents and the right-wing irredenta kept fighting each other in the besieged city centres. To complete the counterfactual, imagine the proclamation of a new French monarchy in the hall of mirrors in Potsdam's Sans Souci castle in 1919. Evidently, the analogy is not complete: Berlin does not easily compare with Paris, and Sans Souci can by no means rival Versailles. However, what matters is the significance of these places in the political symbolism of either country, not the size of their respective halls of mirrors. It took another war and the rise of the Soviet Union for the Allies to finally make it to Potsdam and sign an agreement there in 1945. America's insistence on an early armistice and its swift withdrawal from the European war theatre had to a certain extent spoiled the military victory over the armies of the Kaiser. The harsh clauses of the Treaty of Versailles can be interpreted as a desperate attempt to achieve an *ersatz* victory by economic means.

The Treaty itself did not fix the total amount of reparations, except for considerable down payments that were never made in the planned manner. Drawing up a final reparations bill was left for a reparations commission, which came up with an ultimatum to Germany in May 1921.

Evaluation of the 1921 reparations bill is an ambiguous issue. By that year, nowhere in Europe had GNP recovered to its peacetime level. Hence, calculations of debt burdens that compare reparations to output levels far below capacity are of only limited value. In addition, price levels in the early 1920s were markedly higher than in 1913; and the deflation phase by which Britain would return to the gold parity in 1925 lay still ahead. What a given sum of reparations really meant therefore depended strongly on expectations about future price levels. Already in the Treaty of Versailles, and again in the London ultimatum, the Allies employed the concept of the 'gold mark'. This implied German currency units evaluated at the prewar dollar parity, although without any attempt at deflation. As US price levels had increased by a factor of 2.6 between 1913 and 1920, this reduced the real value of any claim expressed in gold marks drastically. Accordingly, Holtfrerich (1986) deflated the reparations bill of 1921 by 1920 US prices to arrive at far lower real burdens. However, during the international deflation after 1921, price levels quickly fell again. This subsequent deflation (to about 130 per cent of the 1913 price level in the US in 1922 (e.g. Dornbusch, 1987) thus operated as a debt deflation on German reparations, raising their real value again.

Table 2.17 provides summary evidence on the debt burden of reparations. Throughout, it employs the concept of gold marks, that is, current dollars multiplied by the prewar mark/dollar exchange rate of 4.2. For comparison, data are also presented using price deflators from 1920 on a

Table 2.17. *Germany: reparations and their burden*

	At gold parity	At 1913 prices
I. Reparations bill (London ultimatum), billion gold marks		
A bonds	12	9
B bonds	38	27
C bonds	82	59
II. Burden of the national debt, excluding reparations (percentage of 1913 GNP)		
Germany 1920 (deflated)	48	
Britain 1920	144	
France 1920	135	
III. Burden of the reparations bill (percentage of German 1913 GNP)		
A bonds	24	17
A + B bonds	99	54
A + B + C bonds	261	117
IV. Combined burden of reparations and debt (percentage of German 1913 GNP)		
Debt plus A bonds	72	65
Debt plus A + B bonds	147	102
Debt plus A + B + C bonds	309	165
V. Payments to 1922, billion gold marks, according to:		
Reparations Commission	8.1	
Germany (Brentano)	51.7	
Keynes	26	
Moulton/McGuire	25.8	

Sources: Ritschl (1996); Holtfrerich (1986).

1913 basis. Which is the better estimate depends entirely on whether the wartime shock to international prices was expected to be permanent or transitory.

Whatever the best estimate of expected price levels, reparations themselves – the so-called *indemnité nette* or A bonds of that scheme (panel I of table 2.17) – were no larger than France's reparations to Germany in 1871. Evaluated at gold parity, they amounted to roughly 20 per cent of the national product of the last peacetime year (panel II of table 2.17). That was hardly a problem. France had comfortably managed to pay off its reparations by floating an international loan, thereby separating its payments on the loan from its political payments to the victor. A similar separation was expected from the planned 'commercialisation' of Germany's reparations through loan flotation.

What did cause a problem, though, were the intended additions to the net indemnity. A first item was the so-called B bonds, considered by some

to be an indirect compensation for the future inter-Allied debt owed by the European Allies to the US (panel I of table 2.17). At gold parity, these amounted to another 80 per cent of Germany's GNP of 1913 (panel III of table 2.17). Taking these two parts of Germany's reparations debt together, Germany thus owed almost her entire peacetime GNP abroad in reparations. To this was added what could be termed the unrealistic part of Germany's reparations, another 160 per cent of her GNP of 1913. This sum was added to the reparations bill mainly to pacify right-wing backbenchers in the parliaments of London and Paris. Payment on this item was arguably never seriously expected (panel III, table 2.17).

Germany's debt burden under the London ultimatum can be compared to the debt burden borne by Britain and France (see Ritschl, 2002: chapter 5). Compared to the GNP levels of 1913, the gold value of Britain's debt burden of 1920 stood at 144 per cent, while that of France amounted to 135 per cent (panel II of table 2.17). In comparison, Germany's situation is peculiar, as in those pre-hyperinflation days, the domestic price level had already increased tenfold with respect to 1913. Consequently, Germany had devalued considerable portions of its war-time debt, and return to the gold parity without default on the war debt was out of the question. Indeed, not counting reparations, the burden of German public debt stood at only 48 per cent of its 1913 GNP (panel II of table 2.17). If we add the A and B bonds respectively, a debt/income ratio is achieved which is roughly equivalent to the gold values of Britain's and France's debt levels at the same time.

Indeed such reasoning seems to have been on the minds of Allied policy makers at the time. The peace treaty itself had already included the principle of comparable burdens (in Article XXX). Indeed, in purely fiscal terms, Germany's debt burden was clearly less outrageous than it would appear. As long as a full return to the gold parity was expected for Britain and France, it seemed reasonable to burden Germany with a debt total not far below those borne by the victorious powers. Britain did indeed go back to the old parity in 1925, while France's decision to stabilise its currency at a far lower exchange rate has led to an extended debate about undervaluation; see Eichengreen and Wyplosz (1988), Prati (1991), and Sicsic (1993) for modern contributions to this debate.

However, an additional constraint was the fact that, for the most part, German debt was foreign-owned rather than domestic. Under the influence of Keynes' (1919) polemic against the peace treaty, contemporaries were worried about Germany's 'capacity to pay', envisaging macroeconomic transfer problems should reparations really be paid. However, as a sovereign debtor, Germany was evidently not easy to force into payment,

and default would seem like an obvious prediction. The modern theory of sovereign debt since Eaton, Gersovitz, and Stiglitz (1986) and Bulow and Rogoff (1989) has emphasised the dominance of willingness-to-pay constraints over capacity-to-pay constraints in sovereign country debt.

Germany after World War I provides an early case in point. It was declared in default merely eighteen months after the London ultimatum of 1921. The ensuing occupation of the Ruhr in 1923 was an only partly successful attempt to enforce payments by sanctions (Schuker, 1976). Reparations were rescheduled and downsized in the Dawes Plan of 1924, again in the Young Plan of 1929, once again in a moratorium in 1931, and finally forgiven in 1932. The amount of total reparations paid has remained controversial. Estimates for the period until 1922 range from 8 to 52 billion gold marks (table 2.17, panel V), with 26 billion gold marks as the most plausible estimate. Reparations after that date were mostly forthcoming on paper only. During the Dawes Plan the bill was actually paid on US credit, loans that Germany defaulted on in 1933. This has led historians to point out sarcastically that, in terms of real resource transfers, the US in fact paid reparations to Germany between 1924 and 1933 (Schuker, 1988). During the Young Plan after 1929, Germany was effectively barred from paying more reparations on credit. For a brief period, reparations now were indeed paid out of trade surpluses, but the sudden stop in Germany's balance of payments during 1929 culminated in a foreign debt moratorium in 1931 and the cancellation of reparations in 1932 (Ritschl, 2002).

Given the political predicament of the Weimar Republic, the reasons are not too difficult to understand. From the first day of its existence, the new democracy was caught in a double principal–agent problem. On the one hand, it was the agent of its voters at home who demanded prosperity, an extension of the welfare state, and a more or less revisionist foreign policy. On the other hand, it was the agent of the Allies who demanded payment of reparations and compensation of inter-Allied war credits, precisely to keep Germany from attaining its revisionist foreign policy goals.

It is the pity of the peace of 1919 that the Allies lacked the necessary resolve to turn military advantage into political victory. There is no way of knowing how the Weimar Republic would have fared had the war ended with results as obvious and indisputable as those of 1871. Germany's war on France was clearly orchestrated by the Prussian hegemon, and Prussia's determination to carry it to the extreme indirectly helped to stabilise France's new republic. World War I against Germany was much more of a classical coalition war. Its premature end both revealed the fissures within that coalition and foreshadowed its later break-up. And it offered little help for political transition in central

Europe. Germany escaped from the horrors of World War I with its economy weakened but its determination to pursue its nationalist goals largely unscathed. The premature end of the war and America's sudden withdrawal from the scene, so bitterly criticised by Keynes (1919), opened a security void in Europe that America's weakened allies could not easily fill. In this situation, the Treaty of Versailles was at best a poor substitute. It sought economic safeguards in the absence of a credible security arrangement. It prolonged the agony of Germany's economy for several more years. It strengthened the elements aimed at revenge instead of promoting change and modernisation. And when its feeble controls ultimately collapsed, nothing was left to prevent Germany from rearming for World War II.

Conclusion

The seemingly unexciting economics of World War I on the German side has a number of surprises in store. Research over the past decades has pictured Germany's war economy as an increasingly repressive apparatus that combined massive redistribution towards capital with inflationary war finance and catastrophic food supplies. After military operations on the western front became entrenched in late 1914, hardly anything happened that added explanatory power to the history of the war. According to this literature, the pity of this war lay in the tragic circumstances that provoked it. By comparison, what happened to the war economy after the first stalemate of late 1914 is considered hardly more than in the small print. Two exceptions to this rule are the alleged redistribution of income towards capital and the supposedly highly inflationary methods of war finance. Both would afford easy explanations for social unrest in Germany at the end of World War I and for the hyperinflation of 1920 to 1923.

This survey of the German economy at war has taken issue with both the small print and the wider theme. It has argued that conventional wisdom on the redistribution of income during the war may need to be revised. Social history has pictured Germany during World War I as an increasingly oppressive regime that cut back on workers' rights and altered the distribution of income in favour of capital. This chapter shows that these results appear to suffer from sample selection bias. While profit margins indeed increased very strongly in the armaments industry, the picture in other industries is very different. In the aggregate, the distributional position of labour appears to have remained more or less unchanged; a redistribution of incomes took place, not so much between labour and capital but rather between capital across different industries. Consequently, historical accounts of the early interwar period

in Germany and its social conflicts that rest on a worsened relative position of labour will likely need revision.

This chapter has also taken a fresh look at the issue of German war finance and its inflationary character. Building on the earlier research of Balderston (1989), we find that the ratio of public borrowing to tax revenues in Germany during the war was hardly higher than in Britain. The same turns out to be true of the rate at which these debts were monetised. Thus, the fiscal histories of Britain and Germany during World War I look rather similar, while their inflation histories after the end of the war could hardly be more different. There appears to be little, if any, role for public borrowing in Germany in explaining the later hyperinflation.

Still, the most important perspective on the German war economy is perhaps not its immediate effects on the war or its immediate aftermath – the results in the present chapter would tend to de-emphasise these even further. Crucial for the further evolution of German imperialism was the experience of the failed western *blitz* campaign of 1914. Given this failure, the thrust of Germany's imperialist drive turned away from maritime rivalry with Britain and towards territorial expansion in eastern Europe, with many of the Malthusian and Darwinist forebodings of what was to come in World War II. It was only a small step for Germany's extreme right to interpret the British naval blockade as a new turn in a Malthusian struggle for survival to seeking new arable *Lebensraum* in the east. This step was first taken, not by the Nazis after 1933, but by the advisers to Germany's supreme command in the middle of the First World War. Whatever the importance of the German war economy to the outcome of World War I, it was clearly crucial for Germany's agenda in World War II.

The pity of war lay in providing German imperialism with a new geographical aim, and the pity of peace lay in providing it with the necessary breathing space to get there. This chapter has sketched a counterfactual borrowed from the Franco-Prussian war of 1871 to examine the possible effects of a more clear-cut end to World War I. Failure to fight the war to the end in 1919 and the hasty withdrawal of American troops generated a security void in Europe that the economic clauses of the Treaty of Versailles could not fill. Had a clear regime change in Germany been sought and supported by a credible security arrangement, the modernisation of Germany and its economic recovery would have been secured against a fallback into its old vices. Lacking that, the peace treaty substituted military credibility with economic pressure, and the nascent Weimar Republic bore the double burden of unreasonable economic demands from without and unreasonable charges of collaboration with the enemy from within.

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3 Austria-Hungary's economy in World War I

Max-Stephan Schulze

Introduction

When World War I had ended, more than 1 million of the 8 million men mobilised in the Austro-Hungarian armed forces had died in action or as prisoners of war. More than 1.8 million had been wounded, 3.5 million had become ill and hospitalised, while between 1.5 and 1.7 million soldiers of the Habsburg armies were taken prisoner (Gratz and Schüller, 1930: 161–4; Rothenberg, 1976: 218; Winkler, 1930: 23–4). The Monarchy's defeat after more than four years of fighting was followed by its dismemberment: confirmed in the Treaties of St Germain (1919) and Trianon (1920), the lands that for centuries had been in a multinational empire under Habsburg rule were divided into new nation states or ceded to neighbouring countries. Austria and Hungary were reduced to small rumps, while Czechoslovakia, Yugoslavia, and Poland emerged as independent states.

That was the horrendous price Austria-Hungary paid for her folly of going to war as a means of solving the Serbian crisis once and for all, even if that meant risking military conflict with Russia.¹ While the Habsburg authorities may have gambled on a short military conflict that could be fought on the basis of material stocks, from an economic perspective the empire was ill prepared for the long, resource-intensive industrial war that was to start in August 1914. Some basic observations underline the point. Judged by its commitment to spending on armaments, Austria-Hungary was, perhaps ironically, the least militaristic of the six major European combatant nations. While participating in the prewar European armaments race (Stevenson, 1996), it did so with less vigour than any of the other major belligerents. A measure available to contemporaries such as per capita defence expenditure would suggest that there was only a very small difference in defence commitment between Austria-Hungary, Italy, and Russia (table 3.1), all of whom spent far less on defence per inhabitant than the richer economies of Britain, France, and Germany.

Table 3.1. *Austria-Hungary in comparison: defence expenditure per head (annual averages in current prices, sterling equivalents)*

	Austria-Hungary	United Kingdom	France	Germany	Italy	Russia
1900/4	£0.41	£2.33	£0.91	£0.96	£0.44	£0.45
1905/9	0.49	1.38	1.15	1.15	0.48	0.66
1910/13	0.66	1.59	1.63	1.43	0.80	0.49
1900/13	0.51	1.78	1.20	1.16	0.56	0.54

Sources: Stevenson (1996: tables 1, 5). Austria-Hungary re-calculated.

Table 3.2. *Austria-Hungary in comparison: defence burden (defence expenditure at current prices, annual averages, percentage of net national product)*

	Austria-Hungary	United Kingdom	France	Germany	Italy	Russia
1900/4	2.6	5.6	4.3	3.8	3.1	5.0
1905/9	2.5	3.2	4.0	3.9	2.8	7.4
1910/13	2.8	3.4	4.1	4.2	3.9	4.5
1900/13	2.6	4.1	4.1	4.0	3.2	5.7

Sources: Stevenson (1996: tables 1, 4). For Austria-Hungary NDP: GDP from Schulze (2000: tables A1, A2); price index from Mühlpeck et al. (1979: 678–9); GDP rescaled by 5 per cent to allow for GDP/NDP differential.

However, the actual political priority accorded to the armed forces is captured more accurately in the defence burden, which expresses total defence expenditure as a proportion of total output (table 3.2). According to this measure, the Habsburg Empire fell progressively behind during the decade or so before the outbreak of World War I. This holds even if allowance is made for the temporary expenditure increases in the UK, Russia, and Italy that were associated with the Boer War, the Russo-Japanese War and the Libyan War (Stevenson, 1996: 2–8).²

Table 3.3 below reports on domestic product and population levels in 1913. These data suggest that the balance of available resources immediately prior to the war was unfavourable to the Central Powers by a large margin. The balance tilted further to the Allies' advantage with Italy entering the war in 1915. Was, then, Jaszi (1961: 212) right when he argued that 'by 1913, the Austro-Hungarian Monarchy was already a defeated Empire from the economic point of view, and as such it went into the World War in 1914'? The answer seems far less clear-cut than the

Table 3.3. *Austria-Hungary in comparison: real domestic product and population, 1913*

	International dollars and 1990 prices		
	GDP (\$ million)	GDP per head (\$)	Population (millions)
Austria-Hungary	100,515	1,986	50.6
France	144,489	3,485	41.5
Germany	237,332	3,648	65.0
Italy	95,487	2,564	37.2
Russia	254,448	1,488	171.0
United Kingdom	224,618	4,921	45.6

Sources: Maddison (2001: tables A1-a, A1-b, A1-c). For Austria-Hungary: Schulze (2000: tables A1, A2). For Russia: GDP approximated using Maddison's figure for USSR territory GDP per capita and Gregory's population estimate cited in Gatrell (1986: 32).

simple fact of the empire losing the war on Germany's side would suggest. After all, the Habsburg economy, despite its apparent inadequacies, proved broadly capable of sustaining the war effort until late 1917.

This chapter examines the course of Austria-Hungary's war economy.³ The next section presents new output, population, and employment estimates in an effort to trace the extent of wartime economic mobilisation. This is followed by a discussion of the rapidly deteriorating food supply situation in the empire – a key factor in its economic, political and military defeat. The fourth section deals with the problems of war finance and inflation, while the fifth section seeks to gauge the costs of the war and its impact on wealth.

Economic mobilisation

Population and labour force

Over the course of the war, the total population of the Habsburg Empire fell by nearly 2 per cent (table 3.4). This was an outcome, first, of high military casualties especially in the initial stages of the war and during 1915 (cf. Herwig, 1997: 135–49); second, a sharp decline in live births after 1914, and, third, an increase in civilian mortality. As early as 1915, the natural increase turned negative in both halves of the empire (table 3.5). Here, a rapidly shrinking supply of foodstuffs is likely to have been a major factor (see pp. 91–7).

Table 3.4. *Habsburg Empire: population and armed forces*

	Habsburg Empire ^a		Austria		Hungary	
	Population	Armed forces	Population	Armed forces	Population	Armed forces
<i>Millions:</i>						
1913	50.60	0.39	29.19	0.25	21.41	0.14
1914 ^b	50.79	0.45	29.29	0.28	21.50	0.17
<i>Percentage of 1913:</i>						
1914, second half ^c	100.3	982.5	100.2	827.5	100.4	1,252.1
1915	99.6	1,048.8	99.6	916.7	99.6	1,278.9
1916	99.6	1,254.5	99.7	1,096.4	99.5	1,529.6
1917	99.1	1,311.1	99.1	1,146.2	99.1	1,597.9
1918	98.2	1,195.4	98.2	1,045.0	98.2	1,450.7

^a Excluding Bosnia-Herzegovina.

^b Mid-year population and pre-mobilisation-strength armed forces.

^c Armed forces after full mobilisation.

Note: Population refers to total population net of war dead and missing in action at the end of the year. Wartime population for Austria reconstructed using indices of live births and civilian dead in Alpine Lands and Czech Lands (1914–18); for Hungarian Kingdom: official figures for 1914–15, extrapolated using index for population movement in Hungary proper (1916–18); 1913 and 1914 include small official adjustments for migration effects. Armed forces: 1914 number of mobilised men; 1915–18 ration strength (annual average).

Sources: Austria – *Österreichisches Statistisches Handbuch 1916/17*; Austria – *Statistisches Handbuch Republik 1920*; Gratz and Schüller (1930: 151, 161–4); Grebler and Winkler (1940: 145–6); Hungary – *Magyar Statisztikai Évkönyv–1916/18*; Winkler (1930: 18–9).

From the perspective of resource mobilisation for war, changes in the level of employment are of particular significance. Despite a marked increase in female participation in Austria, the more populous and more industrialised part of the empire, both total and civilian employment fell dramatically during the war. This was bound to act as a severe constraint on wartime output. Table 3.6 shows that, by 1918, the civilian labour force in the empire as a whole was about 24 per cent below the 1913 level. Even with the number of prisoners of war working in industry and agriculture accounted for in the labour force estimate, the 1918 level of employment (excluding the armed forces) was still one-fifth short of the prewar level. Total employment, including military personnel (cf. table 3.4), fell by 3 to 8 per cent between 1913 and 1918, depending on whether or not prisoners of war are included in the labour force.

Two factors, in particular, mitigated against higher levels of overall employment throughout the war. First, the scope for expanding the

Table 3.5. *Habsburg Empire: births, civilian deaths, and war casualties (thousands)*

	1913	1914	1915	1916	1917	1918	1914–18, total
Habsburg Empire ^a							
Natural increase ^b	512.6	511.6	-42.4	-185.4	-257.6	-512.7	-486.5
Casualties ^c	-	220.9	529.5	330.5	330.5	274.7	1,686.2 ^d
Austria							
Births	864.8	850.7	632.1	500.7	466.1	465.2	2,914.8
Deaths	589.9	579.9	634.2	598.2	624.7	761.0	3,198.0
Natural increase ^b	274.9	270.8	-2.1	-97.5	-158.6	-295.8	-283.2
Casualties ^c	-	124.9	299.3	186.8	186.8	155.3	953.2
Hungary							
Births	735.6	746.9	512.3	-	-	-	-
Deaths	500.9	506.1	522.6	-	-	-	-
Natural increase ^b	234.7	240.8	-40.3	-87.9	-99.0	-216.9	-203.3
Casualties ^c	-	96.0	230.2	143.7	143.7	119.4	733.0

^a Excluding Bosnia-Herzegovina.

^b Births, less deaths.

^c Number of men killed in action, died in captivity and missing.

^d 1,742.7 including Bosnian casualties.

Note: Casualties per year estimated using total of war dead and missing in action for 1914–18 and average monthly casualty rates for 1914/15 and 1917/18. Allocation of casualties between Austria and Hungary according to their shares in the total for 1914–18.

Source: See table 3.4.

female labour force was severely limited by the extent to which, prior to the war, women were engaged in low-productivity agriculture. According to the 1910 census, nearly 45 per cent of Austria's female population participated in the labour force and most of those (67 per cent) were in agriculture, largely as so-called 'family helpers'.⁴ The female participation rate in agriculture stood at 58 per cent and Winkler (1930: 31–2) argues that there was little room for going much, if at all, beyond that level. Any significant increase in the size of the female labour force was, therefore, largely confined to the urban, non-agricultural population.⁵ There, initial prewar female participation was about half of that within the agricultural population, permitting a pronounced increase during 1914–18.

Second, high rates of war casualties led to almost continuous calling-up of large numbers of prime working age males for military service well into 1918 – all in all, 8 million men were mobilised over the period 1914–18. Neither the rise in female participation nor the increased use of prisoners

Table 3.6. *Habsburg Empire: civilian labour force*

	Habsburg Empire				Austria		Hungary	
	Male	Female	Total A	Total B	Male	Female	Male	Female
<i>Thousands:</i>								
1913	15,166	11,399	26,565	26,565	8,568	6,469	6,598	4,929
<i>Percentage of 1913:</i>								
1914	73.7	101.6	85.7	85.7	75.4	101.8	71.5	101.3
1915	60.7	106.4	80.3	81.0	62.9	108.0	57.9	104.2
1916	55.1	107.5	77.6	81.1	57.2	109.7	52.3	104.7
1917	50.9	110.4	76.4	80.3	52.9	113.4	48.3	106.4
1918	48.6	112.6	76.0	81.0	50.7	116.7	45.8	107.4

Total A: Male and female labour force.

Total B: Total A plus prisoners of war working in agriculture and industry, assuming two-thirds of prisoners of war working from 1915.

Note: With few permanent moves out of the armed forces and back into the civilian labour force (as distinct from exemptions from military service, i.e. ‘Enthebungen’), the civilian male labour force has been approximated as the potential male labour force (based on actual population movement and prewar participation rates) minus all males drafted into the armed forces over 1914–18. Female labour force: agriculture – using Austrian 1910 agricultural participation rates (reflecting likely maximum female participation) also for Hungary (where census undercounts prewar female participation in agriculture); other sectors – estimates based on wartime increase in female industrial labour recorded in workers’ accident and health insurance statistics for Lower Austria.

Sources: table 3.4; Austria – Census 1910; Hungary – Census 1910; Winkler (1930: 30–5).

of war as industrial and agricultural workers was anywhere near sufficient to compensate for the cumulative labour shortfall that emerged.

Aggregate output

Tables 3.7 and 3.8 present new estimates of wartime GDP in the Habsburg Empire, based on the output or value-added approach to national income.⁶ They suggest that the Habsburg economy was subject to an almost uninterrupted contraction throughout World War I. While there was some difference in the timing and extent of this contraction between the Austrian and Hungarian halves of the empire, which had to do with both structural characteristics of the ‘two economies’⁷ and allocative decisions made during the war, the overall picture is fairly clear: by 1918, aggregate output had fallen to between 59 and 65 per cent of its 1913 level.

Table 3.7. *Habsburg Empire: gross domestic product (1913 prices)*

	GDP, million crowns	GDP per head, crowns	GDP per employee, crowns	
			A	B
1913	27,326.2	540.0	1,013.8	1,013.8
<i>Percentage of 1913:</i>				
1914	89.8	89.5	91.0	91.0
1915	89.2	89.6	94.5	93.9
1916	80.2	80.5	84.8	81.8
1917	69.6	70.2	73.9	70.9
1918	61.5	62.6	66.8	63.4

A: Based on total civilian labour force plus armed forces.

B: Based on total civilian labour force, armed forces, plus prisoners of war working in agriculture and industry.

Source: tables 3.4, 3.6, and 3.8.

Table 3.8. *Austria and Hungary: gross domestic product (1913 prices)*

	Austria			Hungary		
	GDP, million crowns	GDP per head, crowns	GDP per employee, crowns	GDP, million crowns	GDP per head, crowns	GDP per employee, crowns
1913	17,373.9	595.1	1,136.7	9,952.3	464.9	852.84
<i>Percentage of 1913:</i>						
1914	88.5	88.3	89.9	92.2	91.8	93.6
1915	85.0	85.3	88.7	96.4	96.8	104.4
1916	77.7	77.9	81.0	84.6	85.0	91.5
1917	66.9	67.5	69.6	74.2	74.9	81.0
1918	59.4	60.5	62.8	65.1	66.3	73.2

Note: The estimates of GDP in constant 1913 prices are each based on seven sectoral series (agriculture; mining; manufacturing; handicrafts; construction; trade, finance and communications; government and private services (excl. housing)). These sectoral output series and their constituent sub-series are combined using constant 1913 value-added shares as weights. Bosnia-Herzegovina is not included. The estimates for 1918 are conjectural and based on only a small number of output indices.

Sources: (1) output: Austria – *Österreichisches Statistisches Handbuch 1913–1916/17*; Austria-Hungary – *Statistik des auswärtigen Handels 1917 (I)*, Gratz and Schüller (1930: 133, 139–42), Grebler and Winkler (1940: tables 18, 23); Hungary – *Magyar Statisztikai Évkönyv 1913–1916/18*, Riedl (1932: 275–6), Komlos (1983: tables E.3, E.5, E.6), Sandgruber (1978: tables 4, 139, 154), Schulze (1996: tables A.6–A.10, A.13–A.17; 2000: tables 2, A1, A2), Wegs (1979: table 7), Winkler (1930: 47–53, 60, 234, 240). (2) population and employment: tables 3.4 and 3.6.

Table 3.9. *Habsburg Empire: military/war expenditure, 1913 prices*

	Million crowns	Percentage of GDP
1913	1,172.2	4.3
1914/15	7,382.1	30.2
1915/16	6,191.2	26.8
1916/17	4,535.7	22.2
1917/18 ^a	4,038.5	17.2

^aTo October 1918.

Note: Wartime GDP recalculated to correspond with financial year (July to June).

Sources: Austria – *Österreichisches Statistisches Handbuch 1915*, Grebler and Winkler (1940: 135; tables 2, 6, 7, 8); Hungary – *Magyar Statisztikai Évkönyv 1914*, Mühlpeck et al. (1979: 678–9), table 3.7.

The fall in output per head of population and output per employee was slightly less dramatic, yet nevertheless substantial. The decline of the latter, as a proxy measure for labour productivity, may serve as a first pointer to *material* input supply (and possibly infrastructure) constraints as a key factor in the contraction of Austria-Hungary's war economy – in other words, it was not just a case of an insufficient labour supply that curtailed GDP growth. While there were some signs of a stabilisation or even increase (Hungary) in GDP and GDP per worker in 1915, all this amounted to little more than a temporary and partial reprieve. The key message here is that Austria-Hungary had to fight the war from a progressively shrinking material resource base. The question that now arises is how successful business and government were in making those overall diminishing resources available to the war effort.

In the last year before World War I, about 21 per cent of the combined central government expenditure of the two states making up the Habsburg Empire were spent on the armed forces, i.e. the joint army and navy, the Austrian *Landwehr* and the Hungarian *Honvéd*. All this added up to about 4 per cent of the empire's total GDP. As Table 3.9 shows, the war first brought about a dramatic increase in real military expenditure during 1914/15 and then a fast decline. Likewise, the proportion of GDP devoted to the war effort so measured first shot up to 30 percent in 1914/15 and then declined as real war expenditure contracted even more sharply than real GDP.⁸ However, in wartime government expenditure continued to include 'regular' expenditure items that cannot be classified as 'war expenditure'. The figures reported in table 3.9 are thus indicative of the *minimum* of actual claims by the Habsburg state(s) on

domestic product. With real GDP falling, this led to a fast and serious compression of private consumption over the course of the war.⁹

Changes in the structure of output

The composition of aggregate and industrial output changed over the course of the war. This process was conditioned by three major factors, in particular, that partially reinforced and partially negated each other: first, the emergence of absolute sector-specific material and labour shortages; second, a shift in economic priorities that led to the redirection of resources into essential war industries at the expense of other, non-essential industries; and, finally, the outcome of continuous intra-empire conflicts between the Austrian and Hungarian governments over the placement of war orders and use of material stocks.

The agricultural sector provides a poignant illustration of the first problem. In both halves of the empire, its absolute and relative size in terms of output shrank dramatically during the war as labour, seeds, fertilisers and transportation were lacking, leading to widespread and progressively more serious food shortages (see pp. 91–7). Austria-Hungary's experience thus offers a stark reminder that a country's peacetime (near) self-sufficiency in foodstuffs may well be irrelevant to its war economy (Hardach, 1987: 111–12, 121–3). Before the war, male agricultural workers accounted for half the total male labour force in Austria; in Hungary the

Table 3.10. *Austria: gross domestic product by sector of origin (million crowns and 1913 prices)*

	1913	1914	1915	1916	1917
Agriculture	4,255.6	3,686.7	3,220.8	2,910.0	2,210.7
Mining	360.5	321.6	321.6	350.8	326.3
Manufacturing	4,829.7	3,765.5	3,573.5	3,318.0	2,938.8
Construction	451.7	416.7	238.5	269.2	264.7
Handicrafts	1,522.4	1,207.3	1,097.7	1,032.2	922.6
Distribution, finance, and transport	3,278.0	2,851.9	2,688.0	2,491.3	2,294.6
Government, professions, and personal services	2,676.0	3,125.6	3,631.3	3,133.6	2,673.3
GDP, total ^a	17,373.9	15,375.3	14,771.4	13,505.1	11,631.0
Annual change	–	–11.5%	–3.9%	–8.6%	–13.9%

^a Excluding housing.

Source: See table 3.8.

Table 3.11. *Hungary: gross domestic product by sector of origins (million crowns and 1913 prices)*

	1913	1914	1915	1916	1917
Agriculture	5,174.4	4,564.9	4,789.0	3,942.6	3,428.0
Mining	122.9	114.5	106.9	112.5	113.2
Manufacturing	1,543.2	1,345.3	1,423.8	1,420.1	1,272.3
Construction	220.0	202.0	116.2	131.1	128.9
Handicrafts	512.6	449.6	447.5	450.6	407.0
Distribution, finance, and transport	930.0	809.1	762.6	706.8	651.0
Government, professions, and personal services	1,449.2	1,688.3	1,944.8	1,655.0	1,386.9
GDP, total ^a	9,952.3	9,173.7	9,590.8	8,418.6	7,387.3
Annual change		-7.8%	4.5%	-12.2%	-12.2%

^a Excluding housing.

Source: See table 3.8.

proportion was even higher at 67 per cent (Austria – census 1910; Hungary – census 1910). Drafting these men (or a significant proportion of them) from low-productivity agriculture into the armed forces was bound to have a large adverse effect on the total output of foodstuffs. Yet the blockade against the Central Powers succeeded in making compensating imports of foodstuffs unavailable. The blockade also curtailed the supply of industrial inputs, and here the cotton textile industry is a case in point. The rapid fall in cotton imports and the exhaustion of stocks meant that essential raw material inputs were quickly running out. By 1917, Austria's textile industry produced less than a fifth of its 1913 level of output (table 3.12) and was not any longer in a position to satisfy the clothing requirements of the armed forces.

In contrast, the development of the engineering and metallurgy sectors reflect the prioritisation of essential war industries. Before the war, Austria-Hungary's engineering industry was amongst the world's leading producers (Schulze, 1996). In addition, the empire had a sizeable iron and steel industry to draw on. Overall, these sectors responded reasonably elastically up to mid-1917 to the war-induced increase in demand for military hardware and the associated rise in steel requirements. As a result, their share in total manufacturing output rose from about 25 per cent in 1913 to nearly 50 per cent in 1917. Riedl (1932: 278) estimates that, in 1917, 85 per cent of total steel output was claimed by the army administration to cover direct military demands such as armaments, ammunition, railway equipment, and fortifications. In peacetime, military requirements had probably added up to less than 5 per cent of a

Table 3.12. *Austria: value added in manufacturing (million crowns and 1913 prices)*

	1913	Percentage of 1913			
		1914	1915	1916	1917
Brewing, distilling	263.3	75.2	51.9	13.9	9.2
Sugar refining	74.2	98.7	98.7	64.2	61.2
Flour milling	112.9	61.0	58.0	44.0	57.0
Food processing	707.8	76.0	61.3	29.7	29.9
Textiles, clothing	1,045.3	76.3	57.0	38.0	19.0
Iron, steel	258.9	85.0	105.3	142.7	124.7
Engineering	528.5				
Metal-working	406.6	78.0	96.0	126.0	123.0
Electricity generation	60.3	118.1	138.0	143.9	142.9
Total ^a	4,829.7	78.0	74.0	68.7	60.8

^aIncludes residual estimate for other manufacturing branches.

Source: See table 3.8.

smaller volume of steel output. There was an initial decline in engineering and steel production in 1914 and this was largely (though not solely) an outcome of labour shortages as workers joined the armed forces. In the mining sector, this continued to be a problem well into 1915. Policy was subsequently reversed in order to exempt a larger proportion of workers from front-line service and raise manpower levels again in the steel mills and iron ore mines (Gratz and Schüller, 1930: 99).

The steel industry, drawing primarily on domestic sources of iron ore, relied on both domestically produced anthracite and imported coking coal from Germany and was broadly capable of keeping pace with the rising demands of the armaments and munitions industries during 1915–16. In 1917, though, substantial steel imports were needed to augment domestic output and meet army requirements (Wegs, 1979: 51–62). From 1915, the lack of essential raw materials became a key constraint on Austria-Hungary's war industries. Non-ferrous metals essential for steel and armaments production were particularly hard to get, and previously abandoned zinc, tin, lead, and copper mines were reopened, reducing but not solving the problem of shortages. With vital inputs such as copper, nickel, manganese, and lead in short supply, the response was widespread confiscation of goods containing scarce metals and re-smelting as well as the use of 'ersatz' wherever possible in both civilian and military applications (Herwig, 1997: 240–1; Wegs, 1979: 56–80).

Table 3.13. *Austria-Hungary: heavy industry and armaments output, physical units*

	1913	1914	1915	1916	1917	1918
Mining						
Million tons:						
Coal ^a	54.1	48.4	47.3	49.9	47.3	(43.3)
Coal consumption ^a	60.1	52.4	50.5	56.2	53.6	–
Thousand tons:						
Coke ^b	2,598.8	2,202.0	1,907.6	2,584.7	2,618.5	–
Iron ore	5,098.1	4,009.6	3,785.5	4,600.1	4,075.5	–
Manufacturing						
Thousand tons:						
Cast iron	287.4	215.7	302.9	206.2	515.9	172.8
Steel	2,649.0	2,162.0	2,667.0	3,563.0	3,116.0	1,887.0
Cast iron and steel consumption	3,058.3	2,381.9	2,933.1	3,851.2	3,757.9	–
Units:						
Machine guns	–	1,187	3,730	6,335	15,436	12,201
Field guns	–	–	1,730	6,948	7,700	2,064
Rifles, thousands	–	149.2	905.8	1,197.1	1,091.1	237.1
Shells, thousands per month	–	300	1,300	2,000	1,400	750
Cartridges, thousands per day	–	2,500	3,750	4,000	3,000	1,750
Locomotives	–	273	273	395	398	463
Tenders	–	146	157	211	226	113
Railway cars	–	3,500	12,000	18,000	14,000	–

^a Anthracite and lignite.

^b Austria only.

Sources: Austria – *Österreichisches Statistisches Handbuch 1913–1916/17*; Austria-Hungary – *Statistik des auswärtigen Handels 1917 (I)*, Grebler and Winkler (1940: tables 22, 23); Hungary – *Magyar Statisztikai Évkönyv 1913–1916/18*, Riedl (1932: 275–6), Schulze (1996: tables A.6, A.13), Wegs (1977: 124–5, 127; 1979: tables 7, 10, 15, 16), Winkler (1930: 50–1).

However, it is telling that of the fifteen output and consumption series listed in table 3.13, nine peaked as early as 1916 (ignoring 1913). To the extent that these series represent essential war industries that, under the auspices of the joint War Ministry, were given priority in terms of resource allocation, the numbers point to a limited capacity to translate these priorities into sustained output increases.

The evidence would suggest that this had much to do with the disintegration of the railway system. Wegs (1977: 121–34) described transportation as

the 'Achilles heel of the Habsburg war effort' and argues that after mid- to late 1916 the carrying capacity of the transportation system declined sharply. By the end of 1917, the railways could only meet half the demands made upon them for want of rolling stock. The significant rise in wartime output of rolling stock between 1914 and 1916 (table 3.13) was insufficient to accommodate the army's needs without adversely affecting service provision to industry. In addition, it failed to compensate for the heavy losses of rolling stock in the Galician theatre (1914–15) and the rapid fall in reliability owing to poor maintenance. The ability to repair railway cars and engines was reduced as both spare parts and trained personnel were lacking. At the start of the war, around 12,000 locomotives were available for military and civilian purposes, yet about 5,000 of these were continuously in repair. Although the production of locomotives was stable in 1916–17 and even increased in 1918 (table 3.13), output remained far too low to avoid the stock of engines at the railways' disposal falling over the course of the war and insufficient to meet essential military and civilian transport requirements.¹⁰ By 1918, the total number of railway engines had fallen to less than 7,000, many of which were either of reduced load capacity or completely unserviceable because of the use of inferior repair materials (Wegs, 1977: 124–7).

During the winter of 1917 most Austrian cities suffered from severe coal shortages as a result of the railway system's inability to deliver. Likewise, industrial plants were shut down or had to operate at much reduced capacity because of a lack of coal in early 1918 – not because coal was not mined, but because it was not taken from the pit heads to the manufacturing establishments. This was having a detrimental effect on the railway system itself: the lack of fuel meant that the shortage of rolling stock would be aggravated further, since railway car producers were among the many no longer able to obtain essential inputs. The adverse effects on some core transport and coal users in 1917/18, such as the steel, armaments, and munitions industries, are reflected in table 3.13 (cf. Gratz and Schüller, 1930: 96–7).

In contrast, the wartime development of the brewing and distilling industries provides a case of intentional down-scaling of productive effort. Here the key issues considered by contemporary planners were that these industries' inputs were essential for either safeguarding wartime human food consumption and livestock feeding, or for war-related industrial applications.

The third major factor that influenced the structure of aggregate and industrial output was the internal political conflict between the Austrian and Hungarian authorities. This issue is addressed below and within the context of state intervention in the Habsburg economy.

State intervention and economic policy co-ordination

Constitutionally, the Habsburg Empire was made up of two major sub-units, Austria (Cisleithania) and Hungary (Transleithania), each with its own government, parliament, and bureaucracy. This did not pose a constraint in peacetime when resource allocation was left to markets. In wartime, however, the dualist structure of the Habsburg governmental and administrative machinery did indeed cause serious co-ordination problems. In effect, 'dualism' meant duplication of effort in the sense that a multitude of agencies were set up separately in each half of the empire. They were charged with organising the domestic and foreign procurement of raw materials, facilitating their distribution among producers, and setting prices and, in some industries, production quotas. Organised along product or industry lines, these agencies (or *Zentralen*) were mostly privately financed and run. With the first agencies for metals and cotton set up in Austria in autumn 1914, their numbers rose with increasing product coverage, and their interventionist remits widened as the war dragged on (Wegs, 1979: 29; Winkler, 1930: 107–22). Hungary followed with its own agencies in 1915. Heavy industry (steel, mining, armaments) and the activities of the relevant metal agencies came progressively under the direct control of the *joint* War Ministry with authority across the empire and the occupied territories (Wegs, 1979: 27–40; for a fuller discussion see Mejzlik, 1977). This was an exception to general practice in other sectors of the economy where the Austrian and Hungarian bodies operated more or less independently. In the absence of functioning goods and factor markets, and the presence of pervasive price controls, there were no systematic empire-wide allocative decision-making mechanisms.

'Dualism' also meant that decisions at government level on resource allocation were frequently the outcome of politically negotiated formulae that reflected the political and constitutional balance between the two halves of the empire, but ignored capacity constraints in, and productivity differentials between, the industrial and agricultural sectors of Austria and Hungary. In other words, the political structure of the Habsburg Empire increased wartime allocative inefficiency (and, in light of rising intra-empire trade barriers, inequity in consumption, too). At the extreme end of the spectrum, the 'dualist' state allowed its dominant constituent parts to work towards different aims. Perhaps more so than in any other area, this is demonstrated by the manner in which the severe and persistent food shortages were approached within the 'dualist' framework of the Austro-Hungarian monarchy (see pp. 91–7).

However, Gratz and Schüller (1930: 139–42) use the case of the woollen and cotton textiles industries to illustrate the point raised earlier, i.e. the allocation of scarce raw materials between the two states but within the same industry was frequently determined by political rather than economic considerations. The general rule tended to be to use the ratio of quota contributions to the common affairs budget (63.6 to 36.4 per cent) as the guideline for sharing input materials between the two parts of the empire. This holds, in particular, for those industries that did not fall under the control of the joint War Ministry, but were instead regulated by the agencies run under the auspices of the individual Austrian and Hungarian Ministries of Trade and Agriculture. According to Gratz and Schüller's evidence, the prewar capacity in textiles was about 10 to 15 times larger in Austria than in Hungary, depending on branch-specific activity. Yet Austrian manufacturers, who were generally producing at higher productivity levels, were allocated only about three times as much raw material as their Hungarian counterparts. As a result, much of Austria's capacity lay idle, implying, *ceteris paribus*, a loss in combined output because of the prevailing productivity differentials. Depending on the extent to which similar arrangements applied also to other manufacturing branches, this practice was bound to have an effect on both the relative performance of the industrial sectors in Austria and Hungary (see tables 3.10 and 3.11) and on the overall wartime performance and structure of manufacturing output in the empire. In terms of economics, then, there is perhaps more to be said in favour of the 'Zweistaaten-Theorie' than Wegs (1979: 129) is prepared to concede.

On the verge of starvation

One of the most outstanding and critical features of the Habsburg Empire's war economy was the rapid fall in foodstuffs supplied to both its civilian population and, somewhat later, also its armed forces. Before the war, Hungarian agriculture readily satisfied domestic demand for grain and, at the same time, covered all or most of the grain deficit in the more populous Austrian half of the empire. In some years, this left enough to make the Habsburg Monarchy a net exporter of grain. Yet already in late autumn 1914 food shortages began to arise in the larger cities and Austria's population, in particular, was suffering rapidly deteriorating nutrition levels throughout the war (Herwig, 1997: 274–6; Gratz and Schüller, 1930: 42–91; Löwenfeld-Russ, 1926, treats wartime food policy in Austria in depth).

Table 3.14. *Austrian agriculture: acreage, output, and yields*

	1913	Percentage of 1913			
		1914	1915	1916	1917
Acreage, thousand hectares					
Wheat	1,213	55	61	67	51
Rye	1,964	65	76	80	59
Barley	1,092	64	69	73	54
Oats	1,905	60	70	77	49
Maize	284	65	71	51	–
Potatoes	1,276	56	71	78	69
Output, thousand tons					
Wheat	1,623	64	54	47	42
Rye	2,704	70	57	47	44
Barley	1,750	73	43	49	29
Oats	2,677	72	40	52	35
Maize	338	81	85	43	39
Potatoes	11,552	67	75	54	50
Yields, 100 kg per hectare					
Wheat	13.4	115	88	69	62
Rye	13.8	108	75	59	56
Barley	16.0	114	63	66	41
Oats	14.1	118	57	67	71
Maize	11.9	122	120	83	–
Potatoes	90.6	119	106	69	73

Note: no data available for 1918.

Source: Sandgruber (1978: tables 134, 135).

Tables 3.14 and 3.15 document the rapid contraction in domestic output of fieldcrops, especially in the Austrian half of the empire. Several factors account for the food shortages that emerged almost as soon as armed conflict had started. First, in the early stages of the war the Russian occupation of Galicia – which accounted for about a third of Austria's cereal harvest and arable land – and of the Bukovina closed off an important source of domestic supply. Widespread devastation meant that during the war this part of the country was never brought back into full agricultural production. Second, the Hungarian harvest of 1914 was well below the 1913 level, largely as a result of adverse climatic conditions rather than the direct impact of the war. However, it failed to recover to prewar levels thereafter. Though the overall loss of output was markedly less pronounced than in Austria, persistent labour shortages, a fall in the

Table 3.15. *Hungarian agriculture: acreage, output, and yields*

	1913	Percentage of 1913				
		1914	1915	1916	1917	1918
Acreage, thousand hectares						
Wheat	3,453	104	104	95	98	98
Rye	1,102	105	103	96	97	95
Barley	1,232	94	97	89	83	80
Oats	1,277	91	92	91	86	83
Maize	2,916	98	99	92	89	91
Potatoes	565	101	104	97	99	79
Output, thousand tons						
Wheat	4,554	70	94	72	79	61
Rye	1,387	86	91	74	79	64
Barley	1,806	82	72	64	46	50
Oats	1,544	87	81	85	54	46
Maize	5,360	94	83	50	56	51
Potatoes	4,451	107	113	85	58	61
Yields, 100 kg per hectare						
Wheat	13.2	68	91	76	80	62
Rye	12.2	82	89	77	81	68
Barley	14.7	84	75	72	55	63
Oats	12.1	96	88	94	63	56
Maize	18.4	96	84	55	62	56
Potatoes	78.7	107	109	88	59	77

Source: Hungary – *Magyar Statisztikai Évkönyv 1913–1916/18*.

number of available draught animals, and deteriorating soil productivity (as fertilisers became scarce) took their toll in the Hungarian lands as well. By 1917, yields in the Habsburg Empire had declined to between 40 and 80 per cent of prewar levels and, in Austria, acreage cultivated had fallen to as little as 50–70 per cent. Third, the attempts to maintain a modicum of social coherence and equity by setting fixed and/or maximum prices, at which government agencies would purchase foodstuffs and pass them on to consumers, had a distinctly negative impact on the volume of production and availability of bread grains, in particular. An ill-considered official price policy induced changes in price differentials to which many farmers responded by moving out of grain and into the production of animal feed or even using arable land for grazing and hay making, especially where there were severe shortages of labour. Moreover, the wartime shifts in relative prices made it frequently worthwhile for farmers to use cereal grains and potatoes as livestock feed rather

Table 3.16. *Habsburg Empire: average consumption of bread grains (wheat and rye) (1,000 tons)*

	1909/13	1914	1915	1916	1917	1918
Output, net of seeds:						
Austria	3,868	2,542	2,103	1,765	1,703	1,649
Hungary	5,078	3,737	4,707	3,642	3,728	3,134
Net imports ^a	234	522	68	541	1,164	(190)
Consumption, total	9,180	6,801	6,878	5,948	6,596	(4,973)
Consumption per head, kg	184	134	136	118	132	(101)

^aIncludes wheat and rye flour imports, converted into grain equivalents.

Sources: Austria – *Österreichisches Statistisches Handbuch 1916/17*; Austria-Hungary – *Statistik des auswärtigen Handels 1917 (I)*, Gratz and Schüller (1930: 40–50); Hungary – *Magyar Statisztikai Közlemények 1916/18*, Löwenfeld-Russ (1926: 61, 133), Sandgruber (1978: table 135).

than delivering them for human consumption via the food agencies (Löwenfeld-Russ, 1926: 77–9, 84–107).

In the face of rapidly emerging absolute food shortages and soaring prices in unofficial markets, and of produce not subject to direct price controls,¹¹ the governments' room for manoeuvre to encourage production whilst maintaining a reasonably fair provision of basic foodstuffs became progressively smaller. The first food riots in Vienna broke out as early as spring 1915, and more were to follow there and in other urban centres over the next years (Herwig, 1997: 274–7). According to Jindra, (1996: 17–50), the manifest failure to secure the feeding of the population played a pivotal role in the dwindling of government authority as the war continued, in the growing antagonism between the Habsburg nationalities, in the empire's progressive loss of internal political and social cohesion and, ultimately, in its economic and military collapse in 1918.

Table 3.16 offers a broad-brush attempt at gauging the extent to which the provision of bread grains – the key component of the staple diet – evolved over the course of the war. The data show that imports, even at their maxima in 1916 and 1917, when substantial amounts were brought in from the Habsburg occupied territories of Romania and the Ukraine, were insufficient to compensate for the fall in output and make up the difference to peacetime levels of provision. Food imports from other parts of the world were effectively prevented by the Allied blockade of the Central Powers. While in the very short run stock releases may have partially softened the impact of falling output and imports, in the medium term there were no stocks left, nor was there any scope for replenishing

them out of current production. As a result per capita 'consumption' across the Habsburg Empire, or, more accurately, the average amount of bread grains available per head of population, was approximately 30–45 per cent below the prewar level.

Taken on their own, though, these averages would underestimate the actual extent of the deterioration of food supplies in the empire. Moreover, they mask the extremely high degree of inequity in the distribution of foodstuffs. First, the effects of the pronounced and lasting fall in available bread grains was aggravated by the sharp decline in the output of other crops (Tables 3.14 and 3.15). Similarly, by spring 1918, Austria's stocks of cattle and pigs had fallen by about 20 and 60 per cent, respectively, from their prewar levels (Löwenfeld-Russ, 1926: 198–9). The decline in Hungarian livestock numbers further reduced an already diminished capacity to provide meat and milk to both the army and the empire's civilian population (Gratz and Schüller, 1930: 90). Second, in response to price controls and emerging shortages in the countryside, farmers withheld grain stocks from delivery to the food agencies, under-reported actual harvests to the authorities and sought to sell larger proportions of their output at the far higher prices that could be obtained on black markets. Ultimately, this led to highly localised grain provision that made for extreme differences in food availability across regions, between town and country and between different income groups (Gratz and Schüller, 1930: 51–4). Third, the armed forces in general, and front-line troops in particular, drew for most of the war on higher (though also declining) per capita allocations of foodstuffs than the non-farming civilian population. Fourth, wartime food policy was characterised by virtually complete co-ordination failure between the separate Austrian and Hungarian authorities. With a dramatic fall in domestic output of bread grains, Austria became even more dependent on Hungarian deliveries. Yet total grain imports from Hungary declined from a prewar average of 1.4 million tons to less than 28,000 tons in 1917 (with wheat and rye imports falling from 682,000 tons to about 8,600 tons). Similar steep declines were recorded for flour, while imports of vegetables, fruit, and meat also contracted (Löwenfeld-Russ, 1926: 61). As a result, the provision of Austria's civilian populace rapidly deteriorated and became the centre of an increasingly bitter political dispute between the Austrian and Hungarian governments that was never resolved (Gratz and Schüller, 1930: 223–307).

In essence, the roots of this problem reach back into the prewar period when no arrangements had been made between the two governments about how to meet the food requirements of either the armed forces or the civilian population in case of war. The initial wartime agreement of 1915

stipulated that the joint army's needs were to be met by the two parties in proportion to their respective grain output, though neither side actually delivered the planned quantities. This 'deal' effectively ignored the import dependence of the larger Austrian population. Meeting Austria's share in deliveries to the joint army at a time of falling imports from Hungary thus already led to a heavy toll on civilian consumption in the early stages of the war. Herwig (1997: 277) argues that both political and economic considerations lay behind Hungarian restrictions of exports to Austria. The government saw food shortages and the risk of urban riots as a potential threat to the Magyars' political domination of a country where they were outnumbered by Slavs. Moreover, the question of food supplies offered a means of registering a protest in Vienna against the disproportionate conscription of Hungarian peasants into the joint army, reflecting concern over the adverse effects this was having on agricultural output. In early 1915, rather than increasing deliveries to Austria, surpluses were sold to Germany in exchange for hard currency and essential war materials. In food supply matters the Habsburg economy had thus begun to disintegrate long before its political dissolution in 1918.

In light of the worsening situation in the western half of the empire, the two governments eventually agreed that from 1916 Hungary would take over all of the bread grain deliveries to the army. However, neither this measure nor the formation of an Austro-Hungarian Joint Food Committee in early 1917 was to address effectively the two core problems of continuously diminishing food supplies and widening differentials in provision across the regions of the empire. The new committee was largely a window-dressing exercise and had no power over the 'national' food administrations in the two halves of the empire. These continued to implement their own policies in terms of determining the extent of requisitions, setting the grain allowances farmers could legally withhold from official markets, and fixing the grain rations for the non-farming population. Even allowing for large deliveries to the army, and assuming that all the empire's net imports of grain went to Austria, there was far more room for manoeuvre in Hungary. However, the more generous allowances for a relatively larger rural population and higher rations for the urban populace there, came at the expense of exports to Austria. In 1917, average consumption of bread grains by Austrian civilians was probably about 30 per cent below that of their counterparts in the lands of the Hungarian crown and about 40 per cent below its prewar level.¹² The official rations for 1917/18 reflect this intra-empire gap in provision, though from early 1918 the Austrian authorities were no longer able to supply the urban population with as meagre a daily ration as 165 grams of poor-quality flour, which was less than half the prewar daily consumption; in Vienna even this was halved in June 1918.

On 30 April 1918, with no flour left in Vienna's storerooms, the head of the Joint Food Committee authorised the seizure of barges on the Danube carrying Romanian grain to Germany, triggering a crisis between the allies but averting the imminent threat of starvation. By mid-1918, army rations, too, had declined by 40 to 50 per cent from the level of a year before, and this was beginning to have serious effects on morale (Gratz and Schüller, 1930: 77–83). The armistice (December 1917) and shortly thereafter the Treaty of Brest-Litovsk (March 1918) between Russia and the Central Powers had raised great hopes for deliveries of foodstuffs from the Ukraine. Yet these proved delusive – fuelled by ever more severe food shortages – and strikes, which had already occurred in previous years, became more frequent, widespread, violent, and politically articulated, as did mutinies in the armed forces (Rauchensteiner, 1993: 533–52; Herwig, 1997: 361–5). By October 1918 the game was up. Food stocks had run out completely in some Austrian provinces or would last only for another week or two in others. Lands such as Bohemia, Moravia, Silesia, and Galicia effectively isolated themselves from the rest of the country by not allowing any outward movement of local produce in a desperate effort to feed their own populace. Austria and the empire had, finally, lost the capacity to wage war.

War finance and inflation

A key aspect of fighting a war is a government's ability (or otherwise) to lay claim to a larger share of total output than in peacetime. This involves an increase in government expenditure and requires raising additional funds. The data on war expenditure as a proportion of real GDP (see table 3.9) reflect the extent to which the Habsburg state was able to mobilise material resources and to sustain the war effort over time. An initial sharp increase from 4 per cent to 30 per cent was followed by decline to 17 per cent over the last year of the conflict. This decline is indicative of both the state's weakening capacity to generate revenue with which to command real resources, and the severe problem of sustaining state claims on *falling* output. The latter point was of particular significance in the Habsburg case where real GDP contracted continuously throughout the war. Under such conditions, maintaining a *constant* proportion of national income devoted to the war would suffice to further compress real private consumption.

Table 3.17 reports on the rise in Austrian government expenditure (measured in current prices) between 1913 and its 1917/18 maximum. Virtually all of this fivefold nominal increase was due to war expenditure: in 1913, Austria spent 740 million crowns on the military,¹³ equal to about 21 per cent of overall government expenditure; for the fiscal year 1917/18,

Table 3.17. *Austrian government expenditure and revenue (million crowns and current prices)*

	1913	1917/18
Expenditure	3,469	22,169
Revenue	3,123	4,194
Deficit	338	17,975
Deficit, percentage of GDP	1.9%	16.3%
Percentage of revenues (%):		
Taxes, of which	42.1	45.0
Property and income taxes	13.8	16.1
War profits tax	–	7.2
Customs	6.4	2.4
Excise	13.4	8.4
Fees	8.5	10.9
Non-tax revenues, of which:	57.9	55.0
Monopolies	13.9	15.5
Commercial income	38.7	37.2
Other revenues	5.3	2.3

Note: 1917/18 GDP recalculated to correspond with financial year and reflatd using Winkler's price index for Austria.

Source: Winkler (1930: 69–73).

Austrian war expenditure had risen to more than 18,500 million crowns, or 84 per cent of the total. Similar changes characterised Hungary's public finances.¹⁴ Bogart (1920: 237) emphasises that 'the finances of the Dual Empire were probably in worse condition at the outbreak of the war than any of the other belligerents, with the possible exception of Turkey'. In fact, the deficit in Austria's last prewar budget amounted to almost one-tenth of government expenditure (or 2 per cent of GDP), while the national debt/GDP ratio had reached 73 per cent by 1913 (table 3.20) – these levels are indeed high by the standards of the time. However, by 1917/18, the last complete fiscal year during the war, the deficit had grown to more than 80 per cent of expenditure and 16 per cent of GDP. Here, the comparison with Britain in particular is instructive, throwing the Habsburg experience into sharper relief (see table 7.7). First, as a richer and more developed economy with a more advanced fiscal system at its disposal, the British government managed to cover a larger proportion of its wartime expenditure through tax and non-tax revenue. Second, and perhaps more importantly, it could draw on a sophisticated, flexible capital market of international scope that was able to absorb far larger amounts of government debt – both in absolute terms and relative to GDP. Third, the state of

Britain's prewar public finances, with a stock of debt amounting to less than a third of GDP (table 7.9), left far more room for increased borrowing to finance the war than in the Habsburg case (table 3.20).

Revenue, then, played only a modest role in financing Austria-Hungary's war effort, rising by about one-third between 1913 and 1917/18. By the latter date, tax and non-tax receipts covered less than a fifth of expenditure. Yet there were some changes in the composition of revenue. The overall tax contribution increased slightly relative to non-tax revenue, as income flows from property and income taxes, and, in particular, the war profits tax, became more important over the course of the war. However, in international comparison the Habsburg Empire was among the group of belligerents, like France, Germany, and Russia, where increases in tax revenue as a means of covering wartime expenditure were of limited significance and below the cross-country average for 1914–19 (Mendershausen, 1941: appendix, table III). In addition, the evidence shows that the wartime budget deficits exceeded the war expenditure of the two Habsburg states from as early as 1914/15 (see tables 3.9 and 3.18 for sources). By 1917/18, for instance, Austria's revenue was insufficient to cover both the level of prewar spending and the service of her war debt, which then stood at about 1,700 million crowns (table 3.17; Winkler, 1930: 69–75). Thus borrowing was used by the authorities not only to fund war expenditure, but it was also resorted to as a means of meeting the interest charges on the growing war debt and even significant parts of the civil expenditure burden (cf. Bogart, 1920: 255).

Table 3.18 documents the rise in the total Austro-Hungarian budget deficit in current prices and shows the extent to which this was covered through the proceeds of war loans and advances from the central bank. Since the agreements between Austria and Hungary did not allow for contracting *joint* loans, the most important sources of finance were the eight war loans that the Austrian and Hungarian governments each placed on the domestic market, with some limited take-up in Germany and neutral countries. These were issued at the rate of four loans in each fiscal year (offering 5.5 or 6 per cent return), though no new issues (either in the form of treasury notes or bonds) came onto the market after June 1918. In this way, the empire raised about 51 billion crowns. The remainder of the cumulative total budget deficit was largely covered by advances from the Austro-Hungarian Bank totalling nearly 36 billion crowns. These amounts translated into a dramatic, inflationary increase in the money supply: M1 rose from 2.19 billion crowns in July 1914 to 34.85 billion in late October 1918 (Popovics, 1925: table II). Table 3.19 indicates the effects this had on price movements and the exchange rate. Note, though, that the reported fall in the crown/Swiss franc exchange rates, as an

Table 3.18. *Austria-Hungary: finance of combined budget deficits (billion crowns and current prices)*

	Total deficit	New loan issues, nominal proceeds	Increase in central bank advances ^b	Other finance (residual)
1914/15	11.05	7.25	5.52	-1.72
1915/16	18.07	12.93	3.58	1.56
1916/17	23.64	14.57	3.67	5.40
1917/18	27.41	18.97	12.65	-4.21
1918, July to October	10.70	—	10.31	0.39
Total	90.87	53.72 (51.48) ^a	35.73	1.42 (3.66)

^a Estimated actual proceeds: assuming same ratio of subscribed over paid-up loans in Austria as in Hungary (0.958) on average over 1914–18.

^b Includes syndicate loans, loans against collateral, promissory notes, deposit certificates and, as by far the largest component, certificates of indebtedness.

Note: Gratz and Schüller (1930: 176–7) report slightly higher nominal and lower actual proceeds (53.98 and 50.92 billion crowns).

Sources: Grebler and Winkler (1940: tables 11, 12; 140–1); Popovics (1925: table II); Winkler (1930: 271).

Table 3.19. *Austria-Hungary: money, inflation, reserves, and exchange rates (percentage of July 1914)*

	Currency in circulation	M1	Cost of living ^a	Metallic reserves at central bank		Exchange rate, K/SFr
				Gold	Total	
1914, Dec.	168	191	129	96	84	86
1915, Dec.	234	217	261	63	57	67
1916, Dec.	356	330	615	26	25	49
1917, Dec.	602	596	829	24	27	44
1918, Oct.	1,167	1,016	1,589	24	24	42

^a Cost of living index excluding rent (Austria).

Note: All measures refer to end of month except exchange rate Austro-Hungarian crown/Swiss franc (K/SFr) which is based on monthly averages.

Sources: Popovics (1925: tables I, II, IV); Winkler (1930: 40–1).

example, far underestimates the actual decline in external purchasing power of the crown. The authorities used extensive exchange controls and exchange rate manipulation in an effort to maintain credit domestically and abroad (Grebler and Winkler, 1940: 119). The fast rise in the

money supply met with widespread supply shortages and high levels of government demand: the result was a steep increase in the price level, and by the end of hostilities Austrian consumer prices were about sixteen times higher than they were in July 1914. Note, though, that inflation in Hungary took a somewhat different course. Up to late 1915, prices in the Hungarian part of the empire rose at similar or slightly higher rates than in the western half. Thereafter, however, Austrian inflation outstripped the rate of price rises in Hungary,¹⁵ reflecting the far better food supply situation in the Hungarian lands, the progressive disintegration of goods markets within the empire, and more expansive financial policies pursued by the Austrian government. While the two Habsburg states' total proceeds from war loans corresponded fairly closely to their agreed quota contributions to the joint affairs (0.636 vs. 0.364), Austria drew far more heavily on cash advances from the Austro-Hungarian Bank. By the end of the war about 72 per cent of the fast-growing governments' liabilities at the bank were due to Austrian borrowing. Popovics (1925: 154–5) argues that from 1917 this was largely an outcome of increased subsistence payments to soldiers' families and indemnities for war damages, the latter being more severe in the Austrian lands. These issues fell into the competence of the individual states, rather than the imperial administration. To sum up, the Habsburg state proved incapable of controlling inflation, which from 1916 ran ahead of the rate of money growth. This, it would appear, was less an outcome of hesitant use of long-term bond finance per se than a reflection of a desperate attempt by the authorities to extract through money creation a larger claim on a progressively less elastic supply of goods. In fact, Austria-Hungary's wartime inflation record compares extremely unfavourably with almost every other major belligerent in World War I (Hardach, 1987: 171–2; Ferguson, 2000: 424–5) – taxation failed to mop up excess private expenditure, and price controls on foodstuffs and other commodities failed to prevent open inflation.

The effects of wartime borrowing on the stock of national debt are illustrated in table 3.20. During the war, the Habsburg Empire's debt increased to more than six times its prewar level, measured in current prices. However, apart from a brief rise in Austria in 1914–15, the debt/GDP ratio remained barely above peacetime levels and, in the Austrian case, even fell below this in the last year of the war. This demonstrates clearly the constraints that a relatively small, underdeveloped domestic capital market placed upon the ability to sustain wartime borrowing. Although the Habsburg authorities were able to tap foreign funds, principally from their German allies but also from several neutral countries, these were overall of only minor quantitative significance. Apart

Table 3.20. *Austria-Hungary: national debt (billion crowns and percentage of GDP)*

Austria			Hungary		
Year	Billion crowns	Percentage of GDP ^a	Year	Billion crowns	Percentage of GDP ^a
1913	12.61	72.6 ^b	1913	6.20	62.3 ^b
1914	17.96	110.2	1914/15	11.06	71.0
1915	27.05	100.6	1915/16	17.20	69.7
1916	43.27	77.6	1916/17	22.93	72.7
1917	64.05	71.8	1917/18	33.08	70.4
1918	82.32	63.9	1918, remainder	36.00	62.7

^a GDP reflatd using Winkler's cost of living index for Austria and Teleszky's wholesale price index for Hungary (cited in Winkler), as GDP deflators are not available.

^b If housing were included in GDP: 65.9 per cent for Austria, 56.5 per cent for Hungary.

Note: Austrian level of debt 1917–18 and Hungarian debt 1916/17–18 estimated, using increase in war loans finance and central bank advances.

Sources: Austria – *Österreichisches Statistisches Handbuch 1916/17*; Hungary – *Magyar Statisztikai Évkönyv 1916/18*, Popovics (1925: table II), Winkler (1930: 40–1, 225, 271–2), tables 3.10 and 3.11.

from their limited subscription to Austrian and Hungarian war loans, German banks provided continuously prolonged credit against mark-denominated bills issued by the treasuries in Vienna and Budapest. Over the course of the war, these bank loans added up to about 3.5 billion marks (or 4.1 billion crowns at the prewar exchange rate) – less than 4 per cent of the Habsburg debt in 1918 (table 3.20; Popovics, 1925: 120–2). Numerically these were by far the most important foreign funds made available to the empire's war effort. Their main purpose was to acquire marks for the purchase of goods from Germany – the country's main ally and trading partner. By 1917, for example, merchandise imports from Germany (2.14 billion crowns) accounted for 42 per cent of all Austro-Hungarian imports, while exports to Germany (1.35 billion crowns) made up 75 per cent of the export total. Cumulated over the whole duration of the war, the empire's negative trade balance with Germany amounted to a quarter of her total trade deficit (table 3.21; Austria-Hungary – *Statistik des auswärtigen Handels 1917 (I)*). However, with few overseas assets to dispose of, overseas remittances rapidly drying up (and stopping completely with the US entry into the war), no significant access to international capital markets, and the few credit arrangements with neutral countries severely limited in volume, the remainder of the

Table 3.21. *Austria-Hungary: balance of visible trade (billion crowns and current prices)*

	1913	1914	1915	1916	1917	1918 ^a
Merchandise imports	3.51	2.98	3.85	6.09	5.08	3.79
Merchandise exports	2.99	2.24	1.43	1.63	1.81	1.64
Merchandise balance	-0.52	-0.74	-2.42	-4.46	-3.27	-2.15

^a First ten months only.

Source: Winkler (1930: 62).

balance of trade deficits had to be financed largely by the depletion of gold and foreign exchange reserves (table 3.19).

The key issue here is how large a trade deficit a country can run as a means to augment its resources for fighting the war. In the Habsburg case, the increment to domestic product was small indeed. Whether measured in nominal or real terms, the wartime deficit accounted only for between 2 per cent and a maximum of 5 per cent of GDP (table 3.8; table 3.21; Winkler, 1930: 61–3) – in terms of percentage points, and ignoring the vast absolute differences in foreign trade and national product, this was about one-seventh to one-half of the additional resources made available to the British war economy through merchandise trade (Broadberry and Howlett, this volume). In short, the Habsburg Empire's war effort was subject to a strong balance of payments constraint that was effective at a low level of net imports.

The costs of war to the Habsburg Empire

Quantifying the costs of World War I is a difficult task on both conceptual and empirical grounds. In the case of Austria-Hungary, one type of 'cost' stands out apart from the horrendous loss of human life: the empire's dissolution and territorial division among successor states. Evidently, this was not only of political but also of economic significance, for it effectively meant the undoing of much of the cross-regional market integration that had underpinned growth and development over the preceding century or so (Komlos, 1983; Good, 1984). The postwar tariff and non-tariff barriers to trade between the former lands of the empire cut across established inter-regional input–output links, negated patterns of regional specialisation and reduced market size. In the short run, at least, this was to the detriment of producers and consumers in the successor states. However, dealing with this issue and the effects of economic

disintegration in the postwar period is beyond the scope of this chapter. Instead the focus is on those studies that seek to measure the costs of war in terms of expenditure flows and /or changes in stock magnitudes such as national wealth.

For Austria-Hungary, reliable data on actual property losses and reasonably detailed measures of human capital losses are not available. In the latter case, all that is readily at hand refers to either the basic measure of the number of people killed (in ratio form or otherwise), or the economic ‘value’ attached to them by some more or less crude methods that seek to approximate the capitalised value of human life lost. What are missing, then, for a national balance-sheet-type approach to quantifying the human capital losses are data on the basic prewar costs of rearing and educating a child and on the age-group-specific costs of educating the labour force (cf. introduction to this volume).

Two studies are of particular significance in the present context. First, Bogart’s (1920) investigation into the costs of World War I that covers a fairly large number of countries. Second, Grebler and Winkler’s (1940) study of the cost of the war to Germany and Austria-Hungary. One problem with both these enquiries is their tendency to conflate flow and stock magnitudes in the estimation of so-called ‘indirect costs’ (Broadberry and Harrison, this volume). For instance, estimates of output losses due to war are lumped together with losses of physical capital, or changes in the trade balance.

However, fairly solid evidence is available on Austria-Hungary’s war expenditure (here to include military expenditure, family subsistence payments, indemnities for war damage, and relief to refugees) which Grebler and Winkler (1940) classify as ‘direct costs’. Bogart (1920), in contrast, estimates the total ‘direct costs’ as all wartime borrowing and converts the nominal sum into US dollars at the prewar gold standard parity. Given the high rates of wartime inflation, his totals overestimate the real expenditure or ‘costs’ by a large factor. A comparative summary of their estimates is set out in table 3.22.

The difference between the two estimates (if expressed in constant 1913 or current prices) is fairly modest, and due to the practice of parts of wartime borrowing by the Habsburg state being used to cover interest charges and civil expenditure. The preferred measure here is that of Grebler and Winkler (converted into 1913 prices) for this reflects actual expenditure streams and can be readily related to aggregate output.¹⁶ Table 3.23 shows that war expenditure accounted for 81 per cent of prewar GDP, and about 21 per cent of the total wartime GDP of Austria-Hungary. These numbers point to a markedly lower scale of mobilisation, in both absolute and relative terms, than has been

Table 3.22. *Austria-Hungary: alternative estimates of the 'direct costs' of World War I, 1914–1918*

	Grebler and Winkler: Expenditure	Bogart: Borrowing
Million crowns:		
current prices	93,268	103,100 ^b
1914 prices	21,951	–
1913 prices	22,148 ^a	24,483 ^c
prewar gold crowns	53,032	–
Prewar dollars	–	20,623

^a Converted from 1914 into 1913 crowns using price index from Mühlpeck et al. (1979).

^b Converted into current prices using K5 = \$1, reversing Bogart's procedure.

^c Converted into 1913 crown prices using implicit price index from Grebler and Winkler.

Note: Grebler and Winkler expenditure data exclude 'costs before the war' and 'costs after war', given as 1,000 million crowns and 8,000 million crowns, respectively, in 1914 prices. The former refers to armament expenditure for 1900–13, the latter to estimated payment of war pensions after 1919.

Sources: Grebler and Winkler (1940: 139); Bogart (1920: 255).

achieved in France, Germany, and the United Kingdom. Russia appears to have spent more in absolute terms, but less as a proportion of GDP, while Italy's economic commitment to the war was weaker than that of the Habsburg Empire on both measures. That is what Mendershausen's (1941: 305) comparative expenditure figures (in 1913 prices) would suggest when read in conjunction with the evidence on prewar GDP levels (cf. table 3.3). Note that Mendershausen's country rankings by war expenditure (in both nominal and real terms) correspond with Bogart's ranking according to (nominal) 'direct costs' (Bogart, 1920: 267).

However, Austria-Hungary's relatively low levels of war expenditure, which could be read as evidence of fighting the war 'on the cheap' at least in comparison with the major western powers (Ferguson, 2000), were not the outcome of deliberate policy choices. Rather they were the result of serious constraints and consistent with the country's low borrowing capacity.

Table 3.23 also informs on some basic measures of the human capital loss World War I meant for Austria-Hungary. Excluding Bosnia-Hercegovina, about 1.06 million Habsburg subjects were killed in action, or died as prisoners of war or from wounds. These battle and non-battle

Table 3.23. *Austria-Hungary: indicators of war expenditure and the destruction of physical and human capital during World War I (per cent)*

	%
War expenditure, percentage of:	
GDP, 1913	81.1
cumulative GDP, 1914–18	20.8
War deaths, percentage of:	
labour force, 1913	3.9
population, 1913	2.2
Total casualties, percentage of:	
labour force, 1913	6.4
population, 1913	3.3
Property losses, percentage of prewar total net assets	6.5

Note: total casualties include war deaths and number of missing in action.

Sources: tables 3.4, 3.5, 3.6, 3.7, 3.22; Bogart (1920: 287, 289); Fellner (1915: 561).

deaths accounted for about 2.2 per cent of the 1913 population and nearly 4 per cent of the prewar labour force. Only France, Serbia-Montenegro, Romania, Germany, and Turkey suffered higher war deaths as a percentage of the population than the empire. Austria-Hungary's war death rate was thus about twice the average for a sixteen-country sample (table 1.7). If the number of those missing in action are included as well, total casualties rise to more than 6 per cent of the prewar labour force and more than 3 per cent of the prewar population. Urlanis (1971: 209, cited in table 1.8) uses war deaths as a percentage of the population aged 15–49 as a proxy for human capital losses. By this measure, the extent of human capital destruction in the empire during the war matched the unweighted average of the six major belligerents (with a range from 0.3 to 7.2 per cent).

Fellner (1915: 561) estimated Austria-Hungary's prewar net national wealth (or net value of assets excluding land) as 77,476.06 million crowns. This figure can be combined with Bogart's (1920: 287, 289) 'guesstimate' of total physical capital losses of \$1 billion at the prewar parity. According to this measure, which must be treated with particular caution as Bogart cites no specific sources of evidence supporting his quantification of the extent of wartime destruction, Habsburg property losses may have added up to about 6.5 per cent of prewar net assets. This is more than twice the level of loss estimated for Germany (excluding reparations), but only a

small proportion of the damage calculated for France and lower than the estimates for Britain, Russia, and Italy (table 1.8).

Conclusion

The main conclusions from the preceding discussion of Austria-Hungary's war economy can be summarised as follows. First, the war effort was sustained into 1918 on the basis of a rapidly decreasing resource base. Constrained by scarcity of input materials and cumulative labour shortages, aggregate output fell continuously over the course of the war. Moreover, the share of war expenditure in real GDP fell from an initial peak of 30 per cent (1914/15) to about 17 per cent in 1917/18. Hence the scale of mobilisation, both in absolute terms and relative to the size of the economy, was small compared to that achieved in major belligerent economies such as the United Kingdom and Germany. Second, the Allied blockade worked and its impact was augmented by a serious lack of foreign exchange: Austria-Hungary's foreign trade was far too limited to reduce significantly the shortage in essential war materials and foodstuffs. Third, the empire's complex macropolitical structure, a legacy of the 1867 constitutional compromise between Austria and Hungary, undermined the efficiency and effectiveness of intra-empire resource allocation and utilisation. Fourth, a small domestic capital market proved incapable of sustaining wartime borrowing at high levels. After a short-lived rise in the initial stages of the war, the debt/GDP ratio remained just above peacetime levels. To the extent that Austria-Hungary did fight this war on the cheap, that was not an outcome of choice, but of necessity in light of inadequate resources. Finally, the persistent and widespread food scarcity and resultant physical exhaustion of both the civilian population and the armed forces was a key factor in bringing about the collapse of the Habsburg Empire.

Notes

- 1 Herwig (1997: 18) argues that the initiative for war lay in a Vienna that, dominated by fear, dictated both the direction and the pace of the July crisis of 1914: 'fear of Pan-Slavic nationalism; fear of losing the military advantage to Serbia, Russia and France; and fear of forfeiting Berlin's avowed support ... Each scenario "gamed" at the Ballhausplatz [the Austro-Hungarian Foreign Ministry] had one cardinal feature: Austria-Hungary had to emerge from the crisis as the dominant political force in the Balkans, supplanting Russia and keeping out Germany. In July 1914 nothing short of war could achieve that purpose.'

- 2 Note that the use of net *domestic* product rather than net *national* product has no discernible impact on the ratio for Austria-Hungary. The few data that are available for the immediate prewar period show that net factor payments from abroad accounted for just 1 per cent of NDP.
- 3 In the following, 'Austria' refers to all Kingdoms and Lands Represented in the Imperial Council, 'Hungary' refers to all territories of the Hungarian crown (Hungary proper, Fiume, Croatia-Slavonia). Bosnia-Herzegovina, occupied in 1878 and annexed by Austria-Hungary in 1908, is not included in the estimates unless noted otherwise.
- 4 The Hungarian census for 1910 undercounts the agricultural labour force in general, and female participation in agriculture in particular, by a large factor (Eddie, 1968).
- 5 Note that the indices of female labour reported in table 3.6 may still overestimate actual employment levels, since some of the increase in female industrial workers is likely to have resulted from a mere shift of labour out of lower-paid personal services into higher-paid industrial jobs during the war, rather than a genuine increase in female participation (cf. Winkler, 1930: 211).
- 6 The methods of estimation are set out in Schulze (2000), although the overall less rich source material available for the war period compared to the pre-1914 decades required some adjustment in the handling of the underlying series. Maddison's (1995, 2001) estimates are of no use here. First, they refer only to the territories of modern-day Austria and Hungary. Second, the sources he cites for Austria, for example, make no reference to wartime output; hence it is not clear where his GDP figures for 1914–18 originate from.
- 7 The evidence on price movements and sector-specific output performances seems to suggest that the degree of cross-border economic integration between the Austrian and Hungarian halves of the empire declined rather than increased during the war. As pointed out below, the peculiarities of state intervention may have been a major factor in this process.
- 8 Note that the share in GDP would be about 3 to 4 per cent lower if the calculations in table 3.9 excluded wartime family subsistence payments, war damage indemnities, and relief for war widows, orphans, and the disabled.
- 9 Unfortunately, expenditure side estimates of Habsburg GDP are not available. The *exact* extent to which the increase in state activity was accommodated by a fall in private consumption remains, therefore, unspecified.
- 10 Note the early opposition of both Austrian and Hungarian government ministers to the purchase of foreign-produced equipment as a means of alleviating the shortage for reasons of protecting domestic industry (Wegs, 1977: 126).
- 11 Note that *officially fixed* producer and consumer prices were increased over the course of the war, yet without reflecting absolute and relative scarcities. In the case of wheat and rye, for instance, Austrian producer prices rose by about 200 per cent. Prices of bread in Vienna increased by 290 per cent between July 1914 and the end of the war, and those of milk by nearly 250 per cent. Meat prices, on the other hand, were subject to far less stringent controls and rose by up to 1,000 per cent (Löwenfeld-Russ, 1926: tables 7–11, 104–7).
- 12 This holds under the assumption that all Austro-Hungarian net imports of bread grains and flour (table 3.16) went to the Austrian half of the empire, and

Hungarian deliveries of 800,000 tons (upper limit) to the army (see Gratz and Schüller, 1930: 67). For Austrian imports from Hungary, see Löwenfeld-Russ (1926: 61).

- 13 This figure includes the quota transfers to the joint Austro-Hungarian budget that covers the common affairs of the two halves of the empire, i.e. foreign affairs, the joint army and navy, and the finances common to both. Note, though, that expenditure on joint affairs was met out of the two countries' quotas plus the customs revenue from the common external tariff.
- 14 According to Grebler and Winkler (1940: 135; tables 2, 6, 7, 8), Austrian war expenditure for 1917/18 added up to between 17,199 and 19,555 million current crowns, depending on the way debts incurred are accounted for. The same source reports Hungarian war expenditure as 11,765 million current crowns for the fiscal year 1917/18; in 1913, Hungarian military expenditure amounted to 432 million crowns (Austria – *Österreichisches Statistisches Handbuch 1915*; Hungary – *Magyar Statisztikai Évkönyv 1914*).
- 15 Winkler (1930: 225) reports the following fiscal year averages for consumer prices in Austria and wholesale prices in Hungary as percentages of early 1914:

	Austria	Hungary
1914/15	139	167
1915/16	291	276
1916/17	650	403
1917/18	1,004	684
July/Oct. 1918	1,512	893

- 16 Grebler and Winkler (1940) emphasise the necessity of using price indices that seek to capture changes in wartime purchasing power and point to the severe problems of measurement in terms of 'gold crowns', which relies on movements in the official exchange rates. Again, the vast extent of exchange control and exchange rate manipulation makes using the exchange rate for these purposes virtually meaningless.

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4 The Ottoman economy in World War I

Şevket Pamuk

Introduction: the economy on the eve of the war

On the eve of World War I the population of the Ottoman Empire, comprising present-day Turkey, Syria and Palestine, Iraq, and parts of the Arabian peninsula, was close to 23 million. Of these roughly 17 million lived within the modern borders of Turkey, more than 3 million in Syria and Palestine including Lebanon and Jordan, and about 2.5 million in present-day Iraq. In addition, approximately 5.5 million lived in Yemen and the Hijaz on the Arabian peninsula under nominal Ottoman rule (Eldem, 1970: 49–66; McCarthy, 2002). Despite considerable economic transformation and some economic growth during the nineteenth century and especially after 1880, the Ottoman economy was still mostly agrarian on the eve of World War I. Moreover, the real GDP of the empire in total and per head of the population was substantially below that of the countries of western and central Europe. Perhaps more than anything else, these basic limitations of the Ottoman economy hold the key to understanding the capacity and performance of the Ottoman military during World War I.

For the Ottoman Empire the nineteenth century had been a period of political, social, and economic reforms designed and implemented by the centre in order to keep the empire together in response to external and internal challenges. For the Ottoman economy it had also been a period of rapid integration into the world economy. Between 1820 and 1914 the foreign trade of the empire had expanded more than tenfold. On the eve of World War I, about 12 per cent of Ottoman output was being exported. More than 90 per cent of the exports were a diversified basket of agricultural commodities, foodstuffs, and raw materials, led by tobacco, cotton, barley, raisins, figs, raw silk, and raw wool. Rapid expansion of foreign trade had also turned the empire into an importer of manufactured goods, most importantly of cotton textiles, both cloth and yarn, but also of machinery and intermediate goods. The empire also imported some foodstuffs, most importantly wheat and flour for Istanbul, Beirut,

and some other urban centres, as well as sugar, coffee, and tea. Coastal areas were supplied with grains and other foodstuffs from imports because of the shortcomings of the internal transportation network. In many regions the grains from the interior could not compete with imports since the free trade treaties in effect made it impossible to favour domestic producers. More than three-fourths of Ottoman external trade was directed towards industrialised Europe with Germany, France, and Great Britain the most important trading partners.

On the eve of World War I, the Ottoman economy remained predominantly agrarian. In the countryside, small peasant holdings co-existed with larger enterprises. Family enterprises with a pair of oxen and a plot of land large enough to be cultivated by them remained the basic unit of production. Peasant households that did not own a pair of oxen or land of reasonable quality offered their services as sharecropping tenants to larger landowners. While the coastal plains were densely cultivated, scarcity of labour and lack of availability of land prevailed in the interior regions. The commercialisation of agriculture during the nineteenth century was accompanied by a shift from cereals and other subsistence crops towards cash crops and industrial raw materials.

Manufacturing activity was still largely based on artisanal forms. Modern factories such as tanneries, textile mills, flour mills, glass works, and brick factories under private ownership began to emerge only towards the end of the nineteenth century. The Ottoman Industrial Census of 1913 indicates that within the present-day borders of Turkey there existed only about 600 manufacturing establishments employing ten or more workers. Total manufacturing employment in these establishments remained around 35,000 or about 0.2 per cent of the population. Most of this industrial employment was in textiles, food processing, paper and printing, and construction materials. The numbers of enterprises employing at least 100 workers remained fewer than sixty. The Ottoman government had agreed, through a series of international treaties in the 1830s, to fix ad valorem tariffs on imports at 5 per cent. While these low tariffs met with considerable criticism from guilds and manufacturers, they were raised only slightly and remained at 15 per cent on the eve of World War I. Low tariffs on imports made it especially difficult for new manufacturing enterprises to take root in the empire.

Another important dimension of nineteenth-century globalisation for the Ottoman economy was the large amount of direct foreign investment by European capital. On the eve of World War I, total direct foreign or European investment in the Ottoman Empire had reached £75 million. Close to 60 per cent of this amount had been invested in various railways, especially in Anatolia and Syria. By linking the fertile agricultural regions

to major ports, these railways facilitated the commercialisation of agriculture and integration of the Ottoman economy into world markets. European direct investment also went into other forms of infrastructure such as ports, utility companies, insurance, and shipping. In contrast, foreign investment in agriculture, mining and manufacturing remained limited (Pamuk, 1987: 55–81).

Another aspect of foreign investment and a source of long-term vulnerability for the empire was the external debt outstanding. Ever since the Crimean War, the government had attempted to finance the budget deficits that often arose from the need to increase military expenditures by borrowing in the European financial markets. The Ottoman state had declared a moratorium on its debt payments in 1876 and the subsequent negotiations had led, in 1881, to the establishment of the Ottoman Public Debt Administration, an organisation of European bondholders. This institution was given the right to develop and collect taxes from some of the leading revenue sources of the empire and direct them towards debt payments. Even though the Ottoman state managed to generate a budget surplus and maintain orderly payments on its outstanding debt during the last two decades of the nineteenth century, rising military expenditure after the turn of the century and especially after 1908 began to create serious fiscal problems once again. Budget deficits began to be financed by further borrowing and the need to secure additional loans created important complications for Ottoman foreign policy. By 1914, the outstanding debt of the government had reached £140 million or close to 60 per cent of the GDP of the empire. French investors held more than half and the German investors held more than 20 per cent of this debt. The share of the British was less than 15 per cent.

Even though the external debt burden was rising and the empire's industry was in poor condition, the Ottoman economy was not in a bad state on the eve of World War I. Except for the loss of territories due to the Balkan Wars of 1912–13, the population of the empire had been growing at 1 per cent annually during the decades leading up to World War I. Standards of living and incomes per head were also rising slowly at a little less than 1 per cent annually from 1880 to 1914. Some figures for Ottoman GDP in 1913 are shown in table 4.1. GDP per head in 1913 has been estimated at about £10 at the prevailing exchange rate (Eldem, 1970: 302–9). In US dollars at purchasing power parity of 1990, this was equal to about \$1,200. At such levels, average real incomes in the Ottoman Empire on the eve of World War I were above those of its southern and eastern neighbours, Egypt and Iran. They were, however, below those of eastern and south-eastern European countries such as Serbia, Bulgaria, and Greece. Moreover, Ottoman GDP per head in

Table 4.1. *Ottoman Empire: estimates of the GDP in 1913*

GDP at current prices:	
Ottoman liras, million	240
£ sterling, million	220
GDP per head, approximately:	
£ sterling and current prices	10
US dollars at PPP and 1990 prices	1,200
GDP by sector of origin, per cent	
Agriculture and mining	48
Industry	12
Trade	10
Government services	8
Other services	22
GDP total	100

Note: PPP = purchasing power parity.

Sources: Eldem (1970: 303–5) and Pamuk (2001).

1913 stood at approximately one-third of income levels in France and Germany and one-fourth those of the United Kingdom. Similarly, the total GDP of the Ottoman Empire on the eve of World War I at purchasing power parity was less than one-fourth of the French and less than one-sixth of that of Germany or the United Kingdom (Pamuk, 2001, which provides the basis for the figures for the GDP of the Ottoman Empire before World War I presented by Maddison, 2003: 156–7).

Military preparedness

The Ottoman Empire was less prepared than most of the other combatants to face the economic consequences of a general war of long duration. Excluding territories on the Arabian peninsula, the empire covered a large territory with borders of over 12,000 kilometres and a coastline in excess of 8,000 kilometres, exceeding 1.7 million square kilometres in area. Until the outbreak of the war, most of the external trade of the empire and a large part of its internal trade had been seaborne. After the Allied powers intercepted sea transport in the Mediterranean, the war effort had to rely almost entirely on land transport. In the years leading up to the Great War, government infrastructure programmes had gained momentum. The deposed sultan Abdulhamid II had been a builder of railways, roads, and telegraph lines and the Young Turk government continued this tradition. Nonetheless, the Ottoman transportation network over this sprawling geography remained poor. The total length of railways

over this large territory was less than 6,000 kilometres. Railways were lacking completely in eastern Anatolia, an important theatre of the war, because the Ottoman government had agreed not to build them in this region without the consent of the Russian government. Moreover, the railways did not yet link Anatolia to Syria and Mesopotamia when the war broke out. Until tunnels in the Taurus mountains in southern Anatolia were completed in January 1917, materials and men still had to be unloaded, transported by road and reloaded back on the trains in this region. The existing roads were poor and much of the transport was undertaken by draught animals. The empire was also poor in modern means of communication. The network of telegraph lines was very limited (McCarthy, 2001: 95–8; Erickson, 2001: 51–73).

Just as important is the fact that Ottoman manufacturing of war materials remained very limited. On the eve of the war, production of pig iron and steel was insignificant. There was very little chemical production and petroleum refining. There were one cannon and small arms foundry, one shell and cartridge factory, and only one gunpowder factory. All of these facilities were located just outside Istanbul. One of the key shortages to emerge during the war was energy. Although the empire had been self-sufficient in coal before the war, coal had to be imported from Germany after the Russian bombardment of the Ereğli coal mines on the Black Sea coast and the sinking of transport ships. As a result, wood was used on the railways in southern Anatolia and Syria for most of the war (Eldem, 1994: 78–9).

Despite these shortcomings, the Ottomans were forced to fight on several fronts: against the British and French at Gallipoli; against Russia in the southern Caucasus and eastern Anatolia; against the British in Iraq, in the Suez Canal area and later in Syria and Palestine; against the Arab insurgents in the Hijaz and Yemen in the Arabian peninsula; and on various European fronts, against Russia in Galicia, Hungary, and Romania; and against the British in Macedonia.

The Ottomans had made use of military advisers from western European countries since late in the eighteenth century. German military missions to the Ottoman Empire had begun in the 1880s during the reign of Abdulhamid II. By the early twentieth century, the Ottoman army was modelled mainly on the German army. Nonetheless, its disastrous performance against an alliance of other Balkan countries during 1912 and 1913 had made clear that radical changes were urgently needed. The military budget was immediately doubled and steps were taken to modernise the Ottoman military. New battleships were ordered from British shipyards, and an air force was established. In 1914 a new contingent of German officers led by General Liman von Sanders was invited to reform and reorganise the Ottoman army. There were important changes in the

short period of time leading up to the war. Ancillary corps such as the quartermaster corps, military intelligence, and communications advanced rapidly towards twentieth-century standards. Older officers were retired to make way for better-educated younger men. While the organisational chart of the army showed few changes, Ottoman military power increased considerably.

Nonetheless, in 1914 the military was still exhausted from its involvement in the Balkan Wars. It did not have mobilisation plans designed to manoeuvre an armed mass to a decisive point for early offensive operations (Erickson, 2001: 19, 51, 73). The Ottomans needed many years to develop an army up to European standards, not just one or two years of intensive effort. There also existed serious obstacles in the capacity of the government to mobilise the male population of the empire into the armed forces. Most of the non-Muslims, which made up 20 per cent of the population of the empire, could pay a tax and avoid the draft. The government also had difficulties in drafting and keeping the Muslim population under arms. The maximum size of the Ottoman army during the war was below 800,000. The government was thus able to mobilise less than 4 per cent of the population into the armed forces, a ratio well below that of most other belligerents. The Ottoman army also remained dependent on imported arms and military equipment until the end of the war. Until the restoration of railways lines and other overland communication lines with central Europe after the defeat of Serbia in late 1915, the empire suffered crippling shortages of war supplies and raw materials. Despite all these shortcomings, however, it is remarkable that the Ottoman military managed to stay in the war right until the end in October 1918 while many others were forced to abandon their effort, (Zürcher, 1996).

When the war broke out in 1914, German military assistance was primarily in the form of high-level advisers. Financial and material support was very small. These resources began to increase towards the end of 1914, however, and continued to rise in later years. Nonetheless, German fighting forces inside the Ottoman Empire remained small. In August 1916 there were 640 German officers and 5,900 German soldiers stationed within the Ottoman Empire. By the end of the war, German material assistance to the empire included as many as 20,000 men, 650,000 rifles, 600 guns, and other materials. In contrast, the total of Ottoman men mobilised during the war reached 2.8 million. The sterling value of materials given to the Ottoman side by Germany during the war has been estimated at about £29 million and those from Austria-Hungary at £5.5 million. Additionally, loans from Germany were used to finance imports of various non-military goods from that country. While the

importance of German logistical support is debatable, especially in view of the large distance between the two countries, German technical assistance and advisory support played an important role in enabling the Ottomans to make the most of their existing resources and keeping the Ottoman military in the war for as long as possible (Erickson, 2001: 51–73; McCarthy, 2001: 95–8; see also Swanson, 1975; Erickson, 2003; Trumpener, 1968).

To date various estimates have been offered for the total numbers of Ottoman soldiers that died during World War I; these range from over 400,000 to more than 1 million. The most recent figures fall roughly in the middle of these two extremes. In his latest work on the Ottoman army during World War I, Edward Erickson (2003) estimates 2.9 million as the total number of soldiers mobilised into the Ottoman army during the war and 770,000 as the total numbers of soldiers that died or were missing afterwards. To this number should be added the possibly even larger number of civilians who lost their lives due to armed conflict, disease, and malnutrition during the war (Erickson, 2001: chapter 8). Leading causes of civilian casualties are discussed further later in this chapter; the last section of the chapter also deals with demographic changes within Turkey's modern frontiers.

The disruption of external trade and production

It has been pointed out that the Ottoman economy relied on imports not only for its manufactures and war materials but also for meeting the food needs of some of the coastal areas, most importantly the capital city. The earliest and most immediate impact of the war was thus the disruption in external trade which was compounded by the commercial embargo of the Allies around the Mediterranean. As a result, external Ottoman trade was quickly reduced to the movement of goods obtained by rail from Bulgaria alone. Direct trade with Germany and Austria resumed overland only after the German occupation of Serbia at the end of 1915. By 1916, the volume of Ottoman external trade had declined to approximately one-fifth of its prewar levels and more than 90 per cent of this trade was being conducted with Germany and Austria-Hungary (Eldem, 1994: 66). As a result, shortages quickly appeared in both foodstuffs, such as grains and sugar, and various kinds of manufactures.

The shortages provided an opportunity to the supporters of policies of economic nationalism. Even before the war, in the aftermath of the Young Turk Revolution of 1908, an interesting debate regarding economic strategy had emerged between the two wings of these urban intellectuals, activist bureaucrats, and military officers. On one side were the defenders

of the western type of decentralisation and economic liberalism who emphasised an open economy model promoting trade and agricultural development. Arguing against them were the proponents of Listian protectionism and a more self-reliant strategy based on industrialisation. Of equal interest was the growing recognition by both sides that the traditional and overriding concern of the Ottoman state for fiscal revenue needed to be abandoned in favour of state policies that promoted economic development. The Ottoman government, however, had already committed itself to the free trade treaties and a concessionary regime that gave extraterritorial privileges to foreign companies and citizens in economic and legal affairs. As a result, these debates had had little impact on policy until the war. One notable exception was legislation passed in 1913 to encourage domestic industry (Toprak, 1982: 166–78).

After its entry into the war, the Young Turk government moved unilaterally to redefine the empire's external economic relations in three key areas. First, it eliminated the low rate ad valorem tariff structure in favour of higher specific tariffs on selected goods. In order to support domestic industry, the government also revised and extended the existing legislation that encouraged and supported domestic industry. Secondly, the government declared a moratorium on payments on the external debt, most of which was held by the citizens of France, Germany, and Great Britain. Thirdly, it abrogated the concessions and thus subjected foreign companies and individuals to Ottoman laws.

The first impact of the war on domestic industry was positive, as some import substitution occurred. Soon afterwards, however, raw material shortages began to emerge. In addition, the decline in coal production after the Russian bombing of the Ereğli coal mines on the Black Sea coast unfavourably affected the industrial production that was being carried on. Equally importantly, the urban areas had faced moderate labour shortages, especially of skilled workers, even before the war. The mobilisation of large numbers of males thus exacerbated labour shortages in industry. The mobilisation and employment of large numbers of women in urban areas did not resolve these shortages until the end of the war. Compared with the 1913–14 average, coal production was down by 40 per cent in 1916 and by 75 per cent by 1918. Production of various minerals also fell by between 50 and 80 per cent compared to prewar levels. Even cotton textiles production was down by 50 per cent in 1918 compared to its 1913 level. There is no estimate of the overall decline in industrial output during the war, but this was most probably between 30 and 50 per cent (Eldem, 1994: 75–82).

Wartime conditions also created difficulties for Ottoman agricultural production. Since mechanisation had remained limited, agricultural production

Table 4.2. *Ottoman Empire: wheat production, 1915 to 1918 (percentage of 1913–1914 average)*

	Area under cultivation	Yield per unit of land	Total production
1913–14, average	100	100	100
1915	93	86	80
1916	87	82	73
1917	79	80	64
1918	75	78	62

Note: Parts of eastern Anatolia, Syria, Iraq, and Arabia are excluded.

Source: Eldem (1994: 33–9), based on official statistics or official estimates.

did not depend on imported inputs or machinery. Nonetheless, it was unfavourably affected by the special requirements of the military during wartime. In an economy that experienced labour scarcities in both the rural and the urban sectors even during peacetime, the conscription of males and the requisitioning of draught animals created serious difficulties. As many as 2.8 million males were drafted for military service during the four years of the war. In addition, requisitioning of draught animals by the military reached crippling levels in many parts of the country. The agricultural sector experienced a sharp decline in herds of draught and dairy livestock during the war. By 1918 numbers of draught animals had fallen by more than one-half, and numbers of sheep and goats by about 40 per cent. Even though women assumed a greater burden in agriculture, the acreage under cultivation and levels of output declined sharply. The official statistics (table 4.2) suggest that, as a result of these pressures, both land under cultivation and yields began to decline from the first year of the war. By 1916, total wheat production had declined by nearly 30 per cent. Declines in the output of most of the exportable cash crops were even greater. By 1918, the decline in production in comparison to the 1913–14 levels was close to 40 per cent in wheat, more than 50 per cent in tobacco, raisins, hazelnuts, olive oil, raw silk and cotton. It is possible, however, that these official estimates overstate the extent of decreases in production because the peasant producers hid or understated their production levels in order to avoid wartime taxes or forced deliveries to the military.

Estimates for Ottoman GDP have not been constructed for the war period. On the basis of the available sectoral evidence, some of which has been presented here, it appears that by 1918 the GDP of the empire had declined by at least 30 per cent, and perhaps 40 per cent or more, from its prewar level.

Food supply policies

Wartime conditions were often likely to create significant imbalances between the supply and demand for food. In this respect, however, there was a qualitative difference between the wartime experiences of developed economies and those of the underdeveloped or poorer economies. Typically, the more developed economies showed greater flexibility and a greater ability to maintain levels of food production close to peacetime levels. Since their agriculture used a variety of inputs, the reduction in the availability of one or more of them did not need to affect severely the levels of output. Other inputs could be substituted for the scarce input. If labour became scarcer, for example, it was easier to substitute machinery or fertilisers to maintain the earlier levels of production.

This flexibility was usually not available to the less-developed economies. Their structures of production were much more rigid. Since agricultural techniques of production were rather primitive, machinery could not be easily substituted for labour or draught animals. In addition, the less-developed economies had less-developed transportation networks which were so essential for linking the areas with food surpluses to the areas of food deficit during wartime. In short, less-developed economies were less flexible and much more vulnerable to the disruptions of wartime (Prest, 1948; Millward, 1977).

It is not very surprising, therefore, that wartime conditions created major difficulties for the Ottoman food supply. While imports and production declined sharply, demand for food did not decline during wartime. If anything, demand for food actually increased because of the need to feed a larger army to a better standard. In addition, the Ottoman transportation network could not respond satisfactorily to wartime pressures.

The shortages of food and hunger experienced in the Ottoman empire during World War I were not always due to a decline in food availability, however. As Amartya Sen (1981) has argued in an insightful study of poverty and famines, even though total availability of food may remain unchanged or decline only slightly, hunger and famine will result if some groups in society lose the ability to command food, or what he calls food entitlements. For example, wartime conditions may drive food prices beyond the reach of some segments of the population such as the urban poor or landless agricultural workers. Food shortages and hunger depended, then, not only on the total food availability but also on the distribution of the available food amongst different groups (see also Tilly, 1983).

In short, with or without a decline in total food availability, there was the potential for severe inequities in the distribution and consumption of

food among different groups in society to emerge, which would seriously affect morale and hamper the war effort. For this reason, securing the food supply of the urban population and the military, and distributing the available food in an equitable manner, were considered to be some of the most important economic policy issues facing the Ottoman government during World War I.

Governments' wartime food supply policies covered many areas, ranging from intervention in agricultural production to transportation and distribution and finally consumption. At one end, the government attempted to reduce consumption of the limited food supplies and ensure a more equitable distribution of the available supplies by implementing a more or less comprehensive system of rationing in the capital city. At the other end, the government attempted to intervene in food production and increase it directly. The Ottoman parliament passed an Agricultural Obligations Law in September 1916 which made large corporations in the urban areas responsible for securing the necessary equipment and labour and cultivating specified amounts of land. Moreover, all farmers were required to cultivate a minimum area for each pair of oxen that they had. The law also gave the government the power to require all men and women not under arms to engage in agriculture. The government could ask families or individuals to work on farms experiencing labour shortages due to wartime mobilisation. In extreme cases, battalions of women were organised by the army and were sent to the fields to help with the cotton harvest in southern Anatolia. In short, a system of war agriculture was apparently in place by the end of 1916. However, the real effectiveness of this dramatic legislation and the related measures was rather limited (Yalman, 1934: 119–34; Toprak, 2003: 81–98; Okçün, 1983).

Another area of intervention was the transportation of cereal supplies from Anatolia to Istanbul. The capital city relied heavily on grains and flour imported by sea until 1914 despite the availability of the Anatolian railway. With the outbreak of the war these imports were disrupted and Istanbul was forced to turn, for the first time, to the grain-producing plains of central Anatolia. Under more normal conditions Anatolian agriculture was capable of producing enough for Istanbul. The wartime decline in production combined with the transportation difficulties, however, to create severe problems for Istanbul.

For most of World War I, the bottleneck in provisioning Istanbul was lack of space on the railway connecting central Anatolia to Istanbul and in ships arriving from the Black Sea. There was an intense struggle regarding their allocation. The environment of shortages created by the provisioning needs of Istanbul gave the Union and Progress Party leadership the opportunity to select a small group of merchants close to the party and allow

them to supply the city. Railway truck space and shipping permits were allocated to Muslim merchants linked to the Union and Progress Party in power. This system enabled the Union and Progress Party to share in the wartime profits, as some of them were ploughed back into the party. Equally importantly, it provided an opportunity to create a new group of Muslim-Turkish entrepreneurs with close links to the party. Monopolies were created for importing and distributing many scarce commodities and these were then awarded to the Turkish supporters of the party in Istanbul and the provinces. This strategy, of course, was well in line with the embrace of Turkish nationalism during World War I, if not earlier, as the leading ideology of the Union and Progress Party (Toprak, 1982: 22–35; Yalman, 1934: 135–43; Tekeli and Ilkin, 2004: 1–26).

Another important aspect of food supply policies during the war involved the direct procurement of cereals from rural producers. This was where the government came face to face with the farmers, large and small. Three distinct stages can be observed in the evolution of government procurement policy and the farmers' response. In the first stage, early in the war, the government relied on the market mechanism to provide the cereal supply to the urban areas. The producers were left free to sell their produce at market prices to whomever they liked. The merchants were then expected to transport the cereals to the urban areas and sell it there. The basis for this non-interventionist attitude was the belief early in the war that the conflict would not last long (Ahmad, 1983, 1988; Eldem, 1994: 33–47; Toprak, 1982: 267–312; Oğün, 1999).

Shortages soon began to emerge, however, leading to sharp increases in food prices in some urban areas. The shortages were due to a combination of factors. They were, in part, due to a decline in production. There was also the poor transportation network. In addition, the expectation of shortages by merchants, shopkeepers, and even consumers led them to start hoarding. The second stage began with the emergence of shortages. At that point, it became clear to the government that the food supply problem could not be resolved by market forces alone and that intervention was necessary. This stage was reached in the autumn of 1916. The first response of the government was maximum intervention in the procurement process. It was announced that the government would allow all cereal producers to retain only enough for seed and the maintenance of their households and they were required to surrender the rest to designated government agents at fixed prices that were substantially below those prevailing in the market at the time. The government did not have the administrative capacity to implement this new and ambitious system, however.

All producers were affected adversely by this policy, but those who stood to lose most were the larger landowners who had greater market

surpluses. The response of all cereal producers was to resist. Small and large producers alike hid their crops, bribed government officials, and did all they could to minimise the amount they surrendered to the government. Although they were not allowed to move the harvest from the field until the government agent arrived, for example, the producers often attempted to smuggle the harvest from the field and hide it. They tried to bribe the local officials to underestimate their obligations and to deliver grains of lower quality. What they did not surrender, they either consumed themselves or sold to private merchants on the black market. In other words, resistance to wartime state demands often occurred covertly, on a local scale, employing the 'weapons of the weak' as James Scott (1984) has described them: foot dragging, concealment, and evasion. As a result of all of these, the amount of cereals reaching the urban areas declined after this government measure was put into effect. As the food supply problem in the urban areas became more acute, it was further complicated by the hoarding of cereals by others, especially merchants and shopkeepers. In short, not all of the difficulties in the urban areas were due to a decline in production. It is clear that the urban shortages were also due to government policies and the responses of agricultural producers, merchants, and shopkeepers (Yalman, 1934: 119–35; Toprak, 1982: 267–312; Tekeli and Ilkin, 2004: 1–26).

There was a good deal of regional variation within this general picture. Typically, rural areas fared better during the war since most of the rural population cultivated some land and had direct access to food unless the harvest collapsed altogether. It also made a big difference whether a region was a net food exporter or importer. Most of the difficulties occurred in large urban areas located in food deficit regions. Military operations or the presence of large numbers of troops in a region added to the difficulties. The prohibition of internal trade in grains and confiscation of the surplus grain by some local commanders exacerbated the shortages.

The most severe food shortages occurred in eastern Anatolia, northern Syria, and Lebanon. In eastern Anatolia, the forced deportation of Armenians to the Syrian desert by the government in 1915, as well as attacks on them by civilians and government-linked forces, and the subsequent flight of Muslim peasants when the region was occupied by the Russian army in 1916, resulted in the deaths of as many as 1 million civilians, both Armenian and Muslim. Most of these people died of disease and starvation. The policy of forced deliveries certainly also contributed to the difficulties in Lebanon and Syria after 1916. When shortages began to emerge in Syria, because of locusts and poor harvests, the government demanded deliveries from the producers at fixed prices and the producers resisted. As the government intensified the pressure on

the villages close to the urban centres, peasants began to flee to the interior where they were given seed and land to cultivate by the Druze shaiks. This only made things worse in the urban areas. But the wartime food problems in Syria and Lebanon were not only due to poor harvests and government policy. Tribal chiefs refused to sell grain to government agents or private merchants for political reasons, or they demanded payment in gold rather than paper currency. There was also a good deal of hoarding by the merchants. Moreover, the British and French governments refused to lift the blockade of Beirut despite widespread starvation. The shortages assumed catastrophic dimensions towards the end of 1916, resulting in hundreds of thousands of deaths, perhaps as many as half a million in Lebanon and Syria (Schatkowski Schilcher, 1992).

With the deteriorating situation in the urban areas, the government recognised that the policy of coercion was not working and it was necessary to provide better incentives to the producers. As a result, a third set of policies was adopted in 1917. In this third stage all cereal producers were asked to surrender some proportion of their produce to the government, either as tax in kind or at some fixed price below the market. They were then left free to sell the rest to anybody they wished. This was, in effect, a mixture of intervention and a free market. Moreover, the responsibility for provisioning both the army and the civilian population was given to the Ministry of War. This change in policy improved the food supply situation in the urban areas as producers responded to higher food prices by selling more. These policies remained in effect until the end of the war.

The freedom to sell at market prices did not mean that all cereal producers benefited from the new policy. The government continued to take away some of the output from the smaller producers, which left them very little or nothing for sale at the market. Since they were still required to surrender part of their crop to the government, they continued to carry the burden of wartime difficulties. The beneficiaries of the new policy were the larger landowners who still had cereal surpluses after delivering part of their crop to the government. They were able to take advantage of high market prices until the end of the war (Yalman, 1934: 132–5).

To sum up, Ottoman agriculture was less flexible and much more vulnerable to the disruptions of wartime than its counterparts in the more developed economies. Wartime conditions thus created major difficulties for the Ottoman food supply. While food production and imports declined, the provisioning and political stability of the urban areas and the army quickly became a matter of political and military survival for the government. There was much less regard for the welfare of the peasant producers. The Ottoman government also lacked the capacity to adopt and implement controls over the food surpluses. In response to the

various forms of coercion employed by the government, agricultural producers managed to avoid taxes and other demands and keep a large part of the food for themselves.

Financing the war

In the years leading up to World War I, the Ottoman government had used external borrowing as the basic method of financing its budget deficits, which arose mainly from increased military expenditure. As a result, the total debt outstanding had begun to increase after the turn of the century, and at a more rapid pace after 1908. On the eve of the war, annual payments on the external debt approached 40 per cent of government revenues. In addition, roughly 20 per cent of government revenues had been under the control of the Ottoman Public Debt Administration since 1881. While the outbreak of World War I sharply increased the need for military expenditure, it also eliminated the possibility of external borrowing.

One method of financing the war was to increase taxes. Before the war, the government's tax revenues equalled approximately 12 per cent of the GDP of the empire (Eldem, 1970: 243, 303). More than two-thirds of these revenues were collected from the agricultural sector. Most important amongst the taxes on the rural economy was the 10 per cent tithe collected in kind from agricultural producers by private tax-farmers. With the outbreak of the war, the government increased a variety of direct and indirect taxes that were collected from consumers as well as businesses. Taxes on consumer goods such as sugar, petroleum, matches, coffee, tea, alcoholic beverages, and cigarettes were put in place in 1915. These taxes were increased in 1916. The government also legislated new income and war profits taxes to be collected from individuals and businesses (Yalman, 1934: 157–8; Eldem, 1994: 83–94). In addition, the government and the local administrators, mostly civilian but also military in some cases, increased the tithe demanded from the agricultural producers to 12.5 per cent and even higher in some regions.

These efforts did not succeed in increasing tax revenues, however. One important reason for the decline in revenues was the decline in agricultural and industrial production that began after the outbreak of the war. With the sharp decline in foreign trade after 1914, tariff revenues, which had accounted for close to one-fifth of government revenues before the war, also declined despite the sharp increases in tariffs on some imported items after 1915. Secondly, many taxes, including payments to the government by the tax-farmers, who collected taxes in kind from the agricultural producers, were fixed in nominal terms. With the acceleration of

Table 4.3. *Ottoman Empire: estimated tax revenues and state expenditure, 1913/14 to 1918/19 (fiscal years and million liras at current prices)*

	Revenue	Expenditure	Deficit
1913/14	29.4	35.3	5.9
1914/15	24.9	57.8	22.9
1915/16	22.3	65.6	43.3
1916/17	25.2	83.0	57.8
1917/18	27.7	109.0	81.3
1918/19	34.0	122.5	88.5

Note: 1.1 Ottoman lira = £1 sterling in 1914.

Sources: Yalman (1934: 157–60) and Eldem (1994: 84).

inflation after 1915, nominal revenues lagged far behind prices. Government attempts to adjust the nominal rates of some taxes, such as income tax or the tax on sheep and cattle, with greater frequency were not very effective. Thirdly, and perhaps most importantly, with the emergence of hardships and falling production and incomes, the tendency to evade taxes increased and the government's capacity to collect them actually declined, both in the urban areas and amongst the rural producers. As a result, revenues from the tithe which accounted for more than one-fourth of all government revenues before the war, for example, fluctuated around their prewar levels in current Ottoman liras during the war years, despite the sharp increases in the price level. While the quality of the available data is not very good, they nonetheless indicate very clearly that state revenues in current Ottoman liras actually remained below their prewar levels until the last year of the war, while prices increased about twenty-fold until the end of 1918. As will be shown, most of the inflation occurred in the last two years of the war.

Since budget revenues in current Ottoman liras remained below or close to their prewar levels, rapid increases in expenditure led to increasingly large deficits which can be followed from the estimates of the Ottoman war budgets made after the war (table 4.3). The government tried hard to keep these deficits in check. One obvious target was official salary payments, which had accounted for at least 40 per cent of prewar outlays. During the early years of the war, the government levied minor taxes on official salaries. As inflation accelerated after 1915, the state provided only minimal increases in the salaries it paid. By 1918, therefore, the share of salary payments was reduced to less than 18 per cent of all state expenditure

despite an increase in the number of state employees during the war of more than 20 per cent. Reducing the salaries of state employees thus emerged as an important method of financing the war. In addition, many services and requisitions obtained by the government during the war remained unpaid. These have been estimated at 50 million Ottoman liras for the war as a whole (Yalman, 1934: 165; Eldem, 1994: 99).

The government also borrowed modest sums from its allies during the war, a total of 56 million Ottoman liras from Germany and 8.5 million Ottoman liras from Austria-Hungary in addition to the war materials obtained from these countries. In prewar terms, the value of these loans can be estimated at about £20 million. These debts were later cancelled by the treaties of Versailles and St Germain. In addition, in 1917 the Ottoman government attempted to sell German government bonds to the Ottoman public and use the proceeds for war finance, but this bond issue failed. The government also tried to sell its own bonds to the Ottoman public. However, it could manage to sell only 18 million liras (less than £4 million) worth of war bonds towards the end of the war in 1918 (Yalman, 1934: 161–5; Eldem, 1994: 83–93).

When all other methods fell short, especially in the later stages of the war, the government obtained additional revenue by issuing *kaimes* or paper bills. Printing paper money thus emerged as by far the most important instrument of war finance for the Ottoman government. In the prewar period, the only paper currency circulating in Ottoman markets was the gold-backed paper notes that the French-controlled Imperial Ottoman Bank issued in limited amounts. The government issued wartime paper bills with the promise that the state would buy them back in gold within a specified period after the end of the war. This period ranged from six months to seven years depending on the issue. For the first series of paper bills the government deposited their equivalent in gold with the Ottoman Public Debt Administration. For subsequent series, until the last year of the war, German treasury bonds borrowed from the German government were set aside as guarantees.

Paper bills started circulating in 1915. Their volume reached 46 million liras at the end of that year, 124 million liras at the end of 1917, and 161 million liras by the end of the war. They started exchanging at par against the silver and gold coins in circulation in 1915. As the volume of paper bills began to expand and their denominations began to get smaller, however, their exchange rates against gold-backed currency began to decline and the silver coinage soon disappeared from circulation. Most of the daily transactions during the later years of the war were thus undertaken with paper currency whose denominations began as low as 1 piaster. During this later period the Ottoman monetary system thus

Table 4.4. *Ottoman Empire: money and prices, 1915–1918 (end of year)*

	1915	1916	1917	1918
Paper bills in circulation (million Ottoman liras)	8	46	124	161
Exchange rate of gold lira against paper bills (par = 100)	105	188	470	438
Consumer price index in Istanbul, percentage of 1914	130	212	1,465	2,205

Note: 1.1 Ottoman lira = £1 sterling in 1914.

Sources: Yalman (1934: 144–54), Eldem (1994: 47–56), Toprak (2003: 169–8).

consisted of gold plus inconvertible paper with the gold circulating at the market rate against a paper currency which had become the unit of account. The exchange rates of the *kaima* in Istanbul rose from 120 piasters per gold lira early in 1916 to 400 in mid-1917 and 500 at the end of the war. Their rates were even lower in the provinces. In August 1917, for example, while 1 gold lira exchanged for 430 piasters of paper currency in Istanbul, it exchanged for 450 piasters in Bursa and Izmir, 540 in Aleppo, 555 in Beirut, and 766 in Mosul (Toprak, 1982: 232–63; Pamuk, 2000a: 222–4).

Partly because of this monetary expansion and partly because of the difficulties in provisioning the capital city, prices spiralled, especially during the last two years of the war. The cost of living index prepared by the Ottoman Public Debt Administration for Istanbul increased more than twenty-fold from July 1914 to the end of 1918 and more than eighteen-fold by the last quarter of 1918 (Toprak, 1982: 331–3) (see table 4.4). Since Istanbul experienced greater difficulties in its food supply during the war than most other regions, it is likely that the increases in consumer prices in the capital city were greater than the average. Nonetheless, even correcting for such regional differences, it is clear that Ottoman price increases during the war were unprecedented for this part of the world. The annual inflation rate of 600 per cent for 1917 remained unmatched in Turkey for the rest of the twentieth century. Moreover, the overall increase in Ottoman prices was much higher than that experienced not only in western Europe but also in Austria-Hungary and Bulgaria during the war. Ottoman price increases are comparable with the inflation in Russia before the Revolution of 1917.

While consumer prices in the capital city increased more than twenty-fold until the end of the war, increases in wages and salaries lagged far behind. Even though detailed statistics are not easily available, it is clear that real wages and salaries declined, on the average, by at least 80 per cent, in many cases by even more from late 1914 until the end of the war. The decline in the purchasing power of salaries and wages paid

by the state was greater than the decline in real wages paid by the private sector (Eldem, 1994: 55). Because of the acceleration in rates of inflation after 1916, most of the decline in real wages and salaries occurred during the last two years of the war (Eldem, 1994: 113).

It is very difficult to calculate the total financial cost of the war to the Ottoman government. Nonetheless, some calculations were made after the war during the period of Allied occupation. These studies have estimated the total cost of the war to the Ottoman government including debts incurred at 400 million current Ottoman liras. A similar estimate was provided in a postwar British study (Yalman, 1934: 144–51; Eldem, 1994: 83–117; Great Britain, Parliamentary Papers, Accounts and Papers, 1920). It is not easy to assess the reliability of these figures. Nonetheless, in the absence of better figures, we will use these estimates as the basis of a discussion of the Ottoman methods of war finance. These estimates suggest that cutting back civilian expenditure, and reducing state salaries, payment arrears, and borrowing abroad and domestically can explain how the Ottoman government met more than 50 and up to 60 per cent of the total financial cost of the war. The remaining 40 per cent was financed by printing inconvertible paper currency after 1915 in ever growing sums.

In the absence of annual series it is also not easy to calculate what percentage of the economy's resources the government was able to direct into the war effort. Nonetheless, the available figures suggest that the Ottoman government mobilised close to but still less than 10 per cent of the GDP of the empire during the four years of the war. In addition, the materials and loans obtained from Germany and Austria-Hungary for military purposes during this period amounted to a little over 1 per cent of the empire's GDP.

These rough estimates allow us to compare the total resources commanded by the government before and during the war. For the prewar period, the government's share in the GDP of the empire has been estimated at 12 per cent. Total resources commanded by the government as a percentage of GDP thus clearly increased during the war, perhaps to somewhere between 16 and 20 per cent. However, because of the considerable decline in the GDP during the war, which may have reached 40 per cent by 1918, the absolute increase in the real total of resources commanded by the government was quite limited.

The substantial decline in GDP and the rise of the government's share in GDP both point to a dramatic decline in private consumption during the war. The available evidence may not be sufficiently detailed for good estimates in this respect, but it would not be an exaggeration to suggest that aggregate private consumption in 1918 must have been 35 to

45 per cent lower in 1918 than prewar levels. In other words, the wartime decline in private consumption was not much greater than the decline in GDP. This is consistent with our earlier point that the government had only limited ability to squeeze private consumption and direct these resources to military purposes. Both the urban and the rural populations were in large part able to evade government demands. While the share of consumption in GDP may not have declined by much, there is no question that there occurred a sharp decline in both the level and the share in GDP of investment expenditure during the war.

The Ottoman case during World War I thus offers the example of an underdeveloped economy and a government with limited administrative capacity which were unable to function effectively under the extraordinary pressures created by war. The Ottoman economy was not prepared militarily or otherwise for a war of long duration. Production, both agricultural and industrial, declined substantially when faced with the pressures created by the war. The government was not able to increase substantially the resources it could direct towards the war effort. As the government's ability to collect taxes declined, reduced salaries and the printing of paper currency emerged as the most important forms of war finance. The government oscillated between coercion and markets as mechanisms for the mobilisation of resources during these four years. Both alternatives provided limited possibilities, however, because of the limitations of the underlying technology and production structure. Despite all these shortcomings, and the fact that they were forced to fight on many fronts, it is remarkable that the Ottoman war effort did not experience a total collapse. The Ottoman side managed to stay in the war and continue to hold its own on most fronts until the end in 1918.

The legacy of the war

To discuss the long-term consequences of the war in the Ottoman case, we need a wider focus than on these four years alone. From 1912 the Ottoman Empire and its principal successor state of Turkey were engaged in a series of wars that continued for a decade. The Balkan Wars of 1912–13 were followed by the World War and then the War of Independence from 1920 to 1922. Demographic changes were one important and long-lasting legacy of this decade. The population of the areas that were later included in Turkey was close to 17 million in 1913. Total casualties among Muslim Turks and Kurds during this decade, military and otherwise, are estimated at close to 2 million. Moreover, the Armenian population of Anatolia declined from close to 1.5 million to less than 100,000 as a result of the deportation of most Armenians to the Syrian desert by the Young Turk

government in 1915. Many Armenians as well as Muslims were massacred during this process, even more died of hunger and disease, and the rest of the Armenians fled Anatolia. Finally, in the largest agreement of population exchange signed between two governments, approximately 1.2 million Greeks left Anatolia, and in return approximately half a million Muslims arrived from Greece and the Balkans after 1923. These figures include the large numbers of Greeks who left western Anatolia after the defeat of the Greek occupation army in 1922.

As a result of these massive changes, the population of Turkey stood at around 13 million at the end of 1924; of the decrease of about 20 per cent on a decade previously more than half had died and the rest had fled or emigrated. Ethnically speaking, the population of Turkey emerged as much more homogeneous than the Ottoman population in the same areas, with Muslim Turks and Kurds making up close to 98 per cent of the total. Most of the remaining minorities, Greeks, Armenians, and Jews, now lived in the Istanbul area. The dramatic decline in the Greek and Armenian populations had long-term economic as well as political, social, and cultural consequences. Many of the commercialised, export-oriented farmers of western Anatolia, as well as the artisans, leading merchants, and moneylenders, who linked the rural areas with the port cities and the European trading houses in the long century before the war, had gone. In addition, agriculture, industry, and mining were affected adversely by the deterioration and destruction of equipment, draught animals, and vegetation during this decade. The private sector of modern Turkey would be led by a Muslim bourgeoisie that had benefited from the wartime nationalist policies of the Young Turk government and had also acquired the land and other assets of the departing Greeks and Armenians. Nonetheless, their power remained limited and their strength was confined to small and medium-sized enterprises until the second half of the twentieth century (Owen and Pamuk, 1998: 10–12).

Another important and related legacy of this decade of wars was nationalism, and specifically economic nationalism, both of which were strongly supported by the international environment of the interwar period. The leaders of the new Turkish republic, military officers, bureaucrats, and intellectuals were strongly influenced by the wartime experience. They had strong political and social ties to the Young Turk movement that governed the Ottoman Empire until 1918. The new leadership viewed the building of a new nation state and modernisation through westernisation as two closely related goals. They embraced the nineteenth-century westernising reforms of the Ottomans and, under the determined leadership of Mustafa Kemal, were to carry them further in the interwar period.

Their economic goals followed directly from this outlook. From the outset they strove to create a national economy within the new borders. The construction of new railways and the nationalisation of existing companies were also seen as important steps towards the political and economic unification of the new state. Even more importantly, industrialisation and the creation of a Muslim Turkish bourgeoisie were viewed as the key ingredients of national economic development. The Kemalist leadership was also keenly aware that Ottoman financial and economic dependence on European powers had created serious political problems. The economic policies of the war years, devised in large part out of necessity, would provide the new leadership with an important precedent for departure from the open-economy model and interventionist and protectionist economic policies during the interwar period.

In economic affairs, the first challenge to the new regime occurred at the Lausanne Peace Conference (1922–3) which was to define, among other things, the international economic framework for the new state. After protracted negotiations, agreement was reached in three key areas representing the beginning of a new era in relations with the European powers. First, the regime of privilege for foreign holders of concessions was abolished, and this restored greater freedom of action to the Turkish authorities. This shift also paved the way for the gradual nationalisation of many foreign-owned enterprises, most notably the railways. Secondly, the Ottoman external debt was renegotiated and apportioned to all successor states. The Turkish government assumed 67 per cent of the total to be paid in gold sterling beginning in 1929. Thirdly, the free trade treaties, which had been renewed periodically during the nineteenth century, were discontinued. It was also agreed, however, that the existing structure of low tariff rates and restrictions on the use of quotas would continue until 1929 when the new republic would be free to pursue its own commercial policies.

Beginning in 1930, the economic policies of the Turkish government turned increasingly protectionist, and this sharply reduced the share of foreign trade in the economy. In 1932 the government explicitly adopted *étatisme*, or state-led industrialisation, as the basic strategy of economic development. The acceptance of *étatisme* without much resistance from the private sector was due partly to the wartime experience of state interventionism and perhaps more importantly to the destruction and expulsion of the non-Muslim bourgeoisie during and following the decade of wars. By the 1930s the Muslim-dominated private sector was too weak and too dependent on the state to oppose this important shift. *Etatisme* remained influential in Turkey after World War II right up to 1980. A strong case can thus be made here for path dependence – the importance of history and historical legacies in understanding long-term

change. This model also influenced the thinking of many Arab governments after World War II, beginning with Nasser in Egypt in the 1950s.

Another important and interesting legacy of the war years, especially for the 1930s, was the long-lasting memory of wartime inflation. This traumatic experience, combined with the bitter and lingering memories of Ottoman external debt, convinced the leadership of the Turkish republic that it should avoid public borrowing and deficit finance during the interwar period, even during the Great Depression. As a result, the macroeconomic policy mix in Turkey during the 1930s was unusual compared with activist government initiatives in other developing countries in Latin America and Asia. Government interventionism in Turkey was not designed, in the Keynesian sense, to increase aggregate demand through devaluations and expansionary fiscal and monetary policies. The preference of the government was for balanced budgets and a strong currency. Instead of expansionary macroeconomic policies, the emphasis was placed on creating a more closed, autarkic economy through protectionism and increasing central control through the expansion of the public sector. Such preferences were, in turn, directly related to the bureaucratic nature of the regime. These cautious policies still led to reasonably strong economic performance in the 1930s because of the performance of urban import-substituting sectors and the recovery of agriculture (Pamuk, 2000b).

The experiences accumulated during the decade of wars from 1912 to 1922 thus contributed strongly to the rise of Turkish nationalism and shaped the inward-looking economic policies of the new nation state. Self-sufficiency and preparedness for another war remained leading priorities for its economic policies during the interwar period.

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5 Between the devil and the deep blue sea: the Dutch economy during World War I

Herman de Jong

Notwithstanding all the vicissitudes falling to the lot of a small neutral nation hemmed in on every side by belligerents, Holland has prospered during the war. This was particularly true up to and through 1917. Since then, because of the very great reduction in commerce, prosperity has not been so marked as formerly, but financially Holland is in excellent condition (Moore, 1919: 85).

The blockade also seriously affected the economies of the European neutrals; despite the initial wartime boom and the high profits deriving more especially from shipping and commerce, there can be no doubt that the economic consequences of the war were negative so far as the neutrals were concerned (Hardach, 1987: 34).

Introduction

The history of the Dutch economy during World War I is an example of the fortunes and behaviour of a neutral country in the military and economic warfare between the Allies and the Central Powers, and more specifically between the United Kingdom and Germany. In the first place, an important characteristic of the Dutch economy is its precarious geographical location, literally between the belligerent countries, and its integration with the economies of both the United Kingdom and Germany. Secondly, the developments in the Netherlands reflected the way in which the political goals and political actions of the British and the German governments towards the neutrals were inspired by strategic economic motives. And being a neutral did not mean that there was much room for manoeuvre for politicians and businessmen. Thirdly, in no other neutral country in Europe did the relative trade positions of Germany and the United Kingdom experience such a large shift during the war. Although before 1914 the German economy had already overtaken the British in key sectors of manufacturing (Broadberry and Fremdling, 1990: 404), the war reinforced the trend towards the growing importance of German–Dutch trade. The fourth issue concerns the

continuity or discontinuity of the period of the Great War in relation to the long-term development of the Dutch economy. In many recent publications on Dutch economic history these years have been characterised as a crucial period, in which war-related circumstances, such as the growth of the domestic market, import substitution, and postwar distress among neighbours, paved the way for the rapid industrialisation and productivity growth of the inter-war economy (de Jong and Albers, 1994; van der Bie, 1995; van Zanden, 1997).

The structure of this chapter is as follows. The next section focuses on the effects of the international economic policy of neutrality for Dutch trade and commerce. In the following section key figures on economic growth and productivity are presented. Given that we now have reliable estimates of Dutch GDP for the war period, the paradox in the positions of Hardach and Moore presented at the beginning can be resolved. The fourth section presents facts and figures about economic developments at the level of sectors and specific branches of the economy. In the fifth section the focus is on the position of the Dutch government regarding the mobilisation of resources and the financing of the war economy. The sixth section evaluates the role of the government in managing the domestic economy, and the seventh section explores the costs and benefits of the war for the Dutch economy and its long-term effects on economic development.

At the mercy of the waves: Dutch neutrality and commercial warfare

Around 1910, 50 per cent of the GDP of the Netherlands was made up of exports. The country was very much dependent on the free trade of raw materials, colonial goods, and finished products. During the First World War the measures taken by the belligerent countries to prevent trading with the enemy had a major impact on the levels of commerce and domestic output in the Netherlands. The Allied blockade, the German U-boat campaign, and finally the requisitioning of Dutch vessels by the Allies in the last year of the war, were devastating for the volume of trade. However, private companies, shipowners and exporters were sometimes more than compensated for these setbacks as international freight rates and output prices increased strongly.

Already before the war Germany was a large trading partner of the Netherlands, with a share of roughly 25 per cent in Dutch imports and 50 per cent in Dutch exports, including transit trade. Long before August 1914 the political and military leaders in Berlin were convinced that in case of a European war the German economic interest would be served

best by the Netherlands remaining neutral. In 1909 the Declaration of London sanctioned the right to blockade the coasts and harbours of hostile countries in case of an armed conflict. Having a relatively short coastline, Germany was an easy target for such policies. However international maritime law recognised free trade for neutral countries. So German politicians regarded a neutral neighbour with access to the seas as an important lifeline for Germany. But foreign observers also expressed this opinion. Sir Francis Oppenheimer, British consul and attaché in Frankfurt before the war, labelled the port of Rotterdam as 'quasi-German'. Through this city, on 'the world's highway to Germany', large volumes of transit goods were shipped up and down the river (Frey, 1998: 38–44, 181–2).

Likewise, the British war cabinet developed the idea that it was in the strategic interests of Britain to keep Dutch neutrality unimpaired. Initially, at the outbreak of the war, the British had offered the Dutch government an alliance. The war cabinet was convinced that in case of a German victory the Netherlands would lose its independence. The Dutch government declined this offer, however. The idea was that an alliance with the United Kingdom would increase the threat of a German invasion of the Netherlands, which could not be prevented by the British navy. An invasion was in nobody's interests. After the first months of warfare M. F. Olivier, an expert on the Netherlands in the British Admiralty reported to Churchill that:

The policy most favourable to the naval operations is one which draws her into the Alliance, particularly if she can be brought in of her own accord for her protection of Germany. If, however, she cannot be brought in, it is best that she should remain a neutral, favourably disposed to us. In any case, every possible effort should be made to prevent her from joining the enemy, even though trade concessions in some degree unfavourable to us should be necessary to obtain that end (Frey, 1998: 97).

These lines characterise in a nutshell the British position towards the Netherlands during the war years.

The start of commercial warfare between the Allies and the Central Powers forced Dutch businesses to adapt to new circumstances. Exports were quickly regulated, in compliance with the rules imposed by the belligerents. During the early years of the war, the British were in a position to dictate terms. The Allied blockade started off economic warfare, with the purpose of starving Germany of foodstuffs and raw materials. The blockade gave the Allies far-reaching control over the seas and consequently all Dutch overseas trade. To a large extent the Allies dictated the policy of the Netherlands Overseas Trust, a shareholding company of shipping lines, trading companies, and banks that acted as a

Table 5.1. *Netherlands: agricultural exports, 1913–1921 (percentage of 1913)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Export volume:									
Arable	100	97	98	91	39	10	55	86	110
Livestock	100	106	98	99	48	8	36	48	65
Horticulture	100	105	139	124	135	93	94	77	87
Total	100	104	104	100	58	20	47	60	77
Total export value in current prices:	100	112	139	171	96	41	118	132	137

Source: Pilat (1989: 69, 80).

sanctioned representative of the Dutch government during wartime. The Trust provided guarantees to the Allies that imported goods would be used for domestic consumption only and not be re-exported to Germany.

Hardach has pointed to the fact that the blockade was at the same time a deliberate attempt by the British to penetrate new markets. Consequently, during the first months of the war British exports and re-exports to the Netherlands and to the other northern neutrals increased. Many shipments were re-exported to the economies of the Central Powers. As a result luxury goods as well as foodstuffs from the British Empire ended up in Germany, despite the blockade (Hardach, 1987: 18–19; Frey, 1998: 99).

The neutrals were free to export their domestic output to both sides. A major category of export goods consisted of agricultural products and processed food products. Table 5.1 provides index numbers of traded volumes.

During the first years of the war the total volume of agricultural exports increased, but after 1916 there was a decline. Volumes remained below the level of 1913 until well into the 1920s. However, export levels in current prices show a different picture and reveal the rise in export prices. Only in the years 1917 and 1918 was income from agricultural exports lower than in 1913.

The Dutch agricultural sector was very dependent on agricultural imports and fertilisers. In the decades before the war free trade policy had moved the economy into specialisation in internationally traded crops and livestock products (Roos and Wieringa, 1953: 89; Knibbe, 1993: 124). Large quantities of cereals had to be imported, not only for human consumption but also for livestock products. In 1913 the

domestic production of cereals like wheat, rye, barley, and oats was 1,554 million kilograms and at the same time 1,903 million kilograms were imported for home consumption (van der Flier, 1923: 38).

Between 1914 and 1916 the Dutch developed a policy that has been characterised by Frey as ‘symmetrical neutrality’ (Frey, 2000: 235). The government gave way to the Allied blockade and at the same time consented to the German demand for a liberal policy regarding agricultural exports. Germany in particular drew heavily on the resources of the Dutch agricultural sector. During the period 1914–16 nearly all agricultural surpluses were exported to Germany, and sometimes more than just surpluses. The Dutch government had passed a statute in 1914 authorising the Minister of Agriculture, Industry and Commerce to prohibit exports, but restrictions were initially hardly applied. The so-called Distribution Act of 1916 gave the minister unlimited powers to requisition food supplies for domestic use and to ration and sell food at prices below market value (Moore, 1919: 54). This system functioned as long as farmers were allowed to sell some of their products in Germany at very high prices. Therefore export licences were given as long as producers would co-operate in transferring parts of the output to the government at below-market prices. This reinforced farmers’ incentives to grow internationally traded crops instead of cereals for domestic use. The Allies tried to prevent the Dutch from exporting food products to Germany by restricting food imports in the Netherlands. With the so-called Agricultural Agreement of 1916 the British claimed about half of all Dutch agricultural exports, thereby seriously curtailing foreign policy options for the Dutch government (Posthuma, 1928: 293–5). Similar agreements had been made with other neutral countries like Switzerland and Denmark (Frey, 1998: 78–87). Dutch farmers, however, showed great reluctance to co-operate because price levels in the United Kingdom were much lower than in Germany.

In 1917 the entrance of the United States into the war restricted policy options for the neutral countries still more. American policy makers were in strong favour of a total embargo against trade with the neutrals. They were convinced that imported cereals were also used by the neutrals for livestock products for the German market:

I know it is said that the cattle and the pigs of Denmark and Holland are fed on imported foodstuffs, and that when fattened by these imports they are sold into Germany. It is even picturesquely asserted that a pig is nothing else but some maize on four legs (Lord Robert Cecil, 1917, cited in Frey, 1998: 152).

Pressure increased more with the Allies’ demand that Dutch vessels should service inter-Allied trade, otherwise bunker facilities and export

Table 5.2. *Netherlands: the coal balance, 1913–1921 (thousand tons)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Domestic output	1,902	1,984	2,332	2,655	3,126	3,549	3,542	4,117	4,244
Net imports	9,273	7,334	6,712	5,610	2,474	1,095	2,850	2,965	4,337
Consumption	11,175	9,318	9,044	8,265	5,600	4,644	6,392	7,082	8,581

Source: CBS (2001: 42–3). Figures on domestic output reworked by Ben Gales.

licences would stop. However, the Germans regarded such cargoes (and ships) as hostile, and therefore the Dutch government refused to concede to the Allies. As a result, Dutch ships in British and American harbours were requisitioned. Shipowners were not totally against it, to put it mildly. The Allies paid high charter rates and this was better than ships lying idle in the port (Moore, 1919: 83).

Consequently, the strengthening of the blockade isolated the Dutch economy. From 1917 unrestricted submarine warfare by Germany made overseas trade, and for that matter the supply of raw materials, increasingly difficult. In this way, Germany was able to exert stronger influence on the Netherlands, which was very dependent on German coal. Before the war 70 per cent of Dutch coal imports came from Germany, whereas the United Kingdom and Belgium supplied 20 and 10 per cent, respectively. Table 5.2 shows that there was a big increase in the home production of coal. However, in 1917 and 1918 net imports dwindled, resulting in coal rationing schemes for private homes, railway companies, and gasworks and in the closing down of factories (Moore, 1919: 13).

During the second half of the war coal became the most important item in all of the war negotiations between the two countries. In exchange for coal the Dutch delivered food and later also credit facilities to Germany up to a maximum of 200 million guilders. This loan – during the war the largest loan to Germany – was not an agreement between governments but between private companies and banks. The British did not protest because of the known Dutch dependence on German coal (Moore, 1919: 14–15; Smidt, 1991: 117–19).

How successful were the policies of the belligerent countries towards the Netherlands? For this we need to have some evidence related to the volumes of international trade. From the official Dutch foreign trade statistics, Moore concluded that the British share of Dutch exports rose steadily, while the German share declined: ‘notwithstanding the fact that transportation to Germany was much easier than to England. This

evidence seems to answer decisively the question whether or not the trade policies affecting Holland adopted by the Allies were successful in diverting her supplies from the Central Powers to the Allies' (Moore, 1919: 65). Indeed the unadjusted trade figures might support this argument. Total exports to Germany via the Netherlands *including transit trade* fell back from 1,500 million guilders in 1913 to less than 200 million in 1918. Trade to the United Kingdom declined from 700 million guilders in 1913 to less than 100 million in 1918.

Note, however, that the exact measurement of annual volumes and values of Dutch international trade is extremely difficult for the period before 1917. The Dutch foreign trade statistics contain serious shortcomings related to the unreliable administration of transit trade, to lack of product differentiation and classification, and to unreliable price data. Furthermore, there is no statistical account of the evolution of the balance of payments before 1926. However, there is a historical reconstruction of the period before 1914 (Smits et al., 2000). During long periods of the nineteenth century there was always a negative trade balance, which was compensated by earnings from international services, and net private and public incomes. Incomes from colonial investments, especially in Indonesia, had increased to more than 150 million guilders per year (Keesing, 1978: 40–1; Smits et al., 2000: 182, 215; CBS, 2001: 49).

A look at the figures on annual exports and imports, *excluding re-exports and transit trade* reveals the following. In 1913 total exports were 1,428 million guilders, declining to 386 million in 1918. Imports fell from 1,950 million guilders to 618 million in 1918. Still, an account on the basis of these statistics only provides a limited view. For instance, not directly visible in the Dutch foreign trade statistics are the net exports from the Netherlands to Germany. During 1913 and 1914 there were still large volumes of transit trade between the countries, which fell back completely after 1914. But from the Dutch figures it is not clear whether Dutch *net exports* to Germany followed a similar pattern. Using not only Dutch, but also British and German reports on international trade with the Netherlands, Frey recently showed a very different picture from Moore's. He convincingly demonstrates that there was a substantial rise in exports from the Netherlands to Germany after 1913 (Frey, 1998: 51, 155). A similar adjustment for Dutch exports to the United Kingdom does not provide identical results: Dutch exports to the United Kingdom remained fairly constant (see table 5.3).

Exports to Germany increased from 200 million guilders in 1913 to 767 million in 1915. Most of the exported items were agricultural products like livestock, meat, pork, butter, cheese, fish, and horticultural products. The

Table 5.3. *Netherlands: foreign trade with Germany and the UK, excluding transit trade, 1913–1921 (percentage of 1913)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Exports									
to Germany	100	136	387	284	161	78	293	214	130
to UK	100	103	99	94	84	33	93	146	159
Imports									
from Germany	100	89	74	48 ^a	60	78	106	221	159
from UK	100	104	159	161	106	29	325	307	170

^aJanuary–June only.

Source: Bordewyk (1928: 117, 216); CBS (1970: 95–6); Frey (1998: 51, 153).

Dutch agricultural exports had a substantial impact on the German economy and society. Frey calculated that the exports in 1916 alone covered the daily necessities of almost 4 million people on the basis of a minimum daily ration of 1,200 calories (Frey, 1998: 194). Squeezed between the belligerents the Dutch economy provided Germany with the energy to maintain its war effort, which was approved by the British government.

GDP, population, and comparative productivity

Until recently there was only a rather crude estimate of the growth of Dutch real national income and product for the period 1913–21 (CBS, 1941). Quantitative information on the growth of the Dutch economy before 1921 has improved a lot since the completion of the historical national accounts (van der Bie, 1995; Smits, Horlings and van Zanden, 2000). Van Ark and de Jong reworked and combined these with data on population and with new estimates on employment and hours worked (van Ark and de Jong, 1996: 201).

The calculation of real GDP still suffers from measurement problems, because it is difficult to establish a ‘true’ GDP deflator for the war years and the early postwar period. Inflation rates were high during the 1910s, but not all prices developed in the same way. Likewise, the decline in price levels from the second half of the year 1920 shows up in all relevant price indexes, but not for all products alike. Table 5.4 shows the development of real GDP. From 1913 to 1916 real GDP declined to 96 per cent of what it had been in 1913; then there is a drop in 1917 and 1918 to a level of about 80 per cent. The quick recovery after 1919 was caused by postwar trade expansion and an influx of foreign capital. For the period

Table 5.4. *Netherlands: real GDP at factor cost, 1913–1921 (percentage of 1913)*

	Total	Per head	Per worker	Per hour worked
1913	100.0	100.0	100.0	100.0
1914	99.1	97.4	100.3	102.1
1915	95.7	92.3	95.9	99.4
1916	95.9	90.7	92.8	97.9
1917	86.9	80.5	83.0	89.1
1918	81.7	74.6	77.0	84.5
1919	91.5	82.9	85.8	95.4
1920	104.4	93.9	95.3	107.9
1921	123.1	109.7	112.6	129.8
Annual growth, 1913–21	2.60%	1.16%	1.48%	3.26%

Source: van Ark and de Jong (1996: 201), revision of GDP by J. P. Smits.

1913–21 the compound growth rate of GDP is 2.6 per cent per year, which is far above the north-west European average of -0.43 . Growth was also higher than in neutral Scandinavia and Switzerland. Seen from a twentieth-century perspective, these years of the war and its aftermath stand out as a period of rapid growth. Only during the 1920s and the golden years between 1950 and 1973 did the Dutch economy experience higher growth (van Ark and de Jong, 1996: 201).

Between 1913 and 1921 the Dutch population increased from about 6.2 to 6.9 million people, the annual growth rate being 1.46 per cent, which is a full percentage point above the north-west European average of 0.39 per cent (van Ark and de Jong, 1996: 201). This fast population growth can be explained by two factors. Firstly, there were comparatively few military and civilian casualties because of the war. Due to war-related accidents at sea, about one thousand Dutch sailors lost their lives (van der Flier, 1923: 55). Secondly, population growth rates were high because of a combination of extremely high birth rates and relatively low death rates. Not surprisingly, the statistical effect of high population growth results in a slower increase of GDP per capita compared with GDP, with an annual rate of 1.16. But this still differs considerably from the north-west European rate of GDP per capita growth for 1913–21, which is at -1.04 . What is intriguing is that Moore's position about the per capita level of prosperity mentioned in the introduction of this chapter only seems to be vindicated during 1921; yet he was writing in 1919, when real GDP per head was only 82.9 per cent of the 1913 level. A later section will elaborate more extensively on this issue.

Table 5.5. *Comparative levels of GDP per hour worked, UK and Germany with Netherlands, 1913 and 1929 (percentage of Netherlands)*

	UK : Netherlands	Germany : Netherlands
1913	110	87
1929	88	69

Source: Maddison (1995: 47).

The scale of military mobilisation was relatively modest. The armed forces increased from 200,000 men in 1913 to about 450,000 men during the war. Mobilisation reduced temporarily the long-term growth of the labour force. Recent estimates of unemployment rates show a sudden increase of unemployment during the first months after the outbreak of the war, but the rate moved downward again to about 5 per cent during the rest of the war period (van der Bie, 1995: 21; Kuypers, 2002: 82). Women did not replace the males in the labour force, unlike in many other countries. Female labour force participation remained very low, at less than 25 per cent of the total labour force (van Ark and de Jong, 1996: 206).

Shortly after the war participation rates in general were reduced significantly through the official reduction of the standard working week. Before 1913 average working hours per person employed can be estimated at 60 hours per week. The Labour Act of 1919 introduced the 48-hour working week. The reduction in average hours worked for the total economy proved to be much bigger than the increase in the number of persons employed. Consequently, total hours worked in the Dutch economy showed a decline between 1913 and 1921. Calculations reveal that in 1921 GDP per hour worked was 30 per cent higher than in 1913. However, adjusted for quality, the Dutch human capital input remained unaltered between 1913 and 1921. The reduction of the hours worked is statistically counterbalanced by the increase in average years of schooling per person employed, from 6.4 to 6.8 years (van Ark and de Jong, 1996: 237).

When we look at comparative levels of income and productivity, the amount of detail is much less. Table 5.5 nevertheless provides some indicators of levels and movements of comparative productivity for the total economy between 1913 and 1929. Unfortunately, we do not know the comparative level of Dutch productivity in 1921. In 1913 the Dutch comparative level of GDP per worker was 10 per cent below the British

level and more than 10 per cent higher than the German. Comparative productivity levels for the total economy for 1929 reveal a substantial change from the 1913 levels. Both the United Kingdom and Germany show much lower comparative levels of productivity, some 10 and 30 per cent below the Dutch level respectively. This may be related to the high productivity performance of the Dutch economy during the 1920s. However, given the fact that all north-west European countries, including the United Kingdom and Germany, experienced high productivity growth during the 1920s, I would suggest that the gap was already there around 1921 (van Ark and de Jong, 1996: 201). Especially during the period of postwar recovery Dutch per capita growth was substantially higher than in Britain or Germany.

Agriculture, industry, and services

In 1913 the shares of agriculture, industry, and services in the total economy were 16, 33, and 51 per cent, respectively. For the branches within the sectors wartime circumstances temporarily increased both domestic and foreign demand, while foreign competition practically disappeared, because of the limitations caused by the commercial warfare. This in itself opened up exceptional opportunities for industry, trade, and agriculture.

Agriculture

As was shown on p. 141, farmers were in a very favourable position to penetrate domestic and foreign markets, and they were hardly curtailed by domestic governmental control. Laissez-faire principles were still predominant among policy makers, even in wartime. Prices of agricultural products soared. The development of agricultural exports is mirrored in the output figures in table 5.6. During the first years of the war there was an increase in production, with a decline during 1916. At the end of the war gross production in constant prices of arable production and horticulture was close to the 1913 level. Only the output of livestock had declined sharply, due to a shortage of fodder.

Industry

The industrial sector in total experienced a decline in real output from 1913. After 1916 industrial output fell from a level of about 90 per cent to less than 60 per cent, mostly as a result of a lack of raw materials and intermediate products. However, there are also branches that initially enjoyed favourable production opportunities. Table 5.6 illustrates that

Table 5.6. *Netherlands: Real output of selected items in agriculture, manufacturing, shipping, and banking, 1913–1921 (percentage of 1913)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Agriculture	100	109	108	105	115	108	90	104	111
Industry	100	97	89	88	69	52	78	95	121
Services	100	97	94	96	87	89	100	110	129
Arable products	100	103	113	98	102	108	109	119	112
Livestock	100	103	105	101	87	58	65	79	101
Horticulture	100	102	108	99	94	93	98	98	102
Cocoa	100	118	107	79	35	54	74	105	104
Cotton	100	–	–	122	–	–	–	–	130
Metals	100	103	95	72	47	49	80	94	85
Paper	100	–	–	106	–	–	82	–	122
Shipbuilding	100	104	128	137	125	112	122	153	218
Soap	100	–	196	–	–	–	149	–	240
Tin	100	96	80	65	35	30	47	72	86
Wool	100	–	–	184	–	–	–	–	150
Ship arrivals	100	74	36	26	10	9	39	62	91
Rhine shipping	100	69	23	27	20	14	16	35	43
New capital issues	100	99	103	113	132	120	183	206	105
Capital funds	100	106	89	99	102	99	117	128	157
Bank accounts	100	106	124	142	165	167	184	193	186
Credits	100	100	109	131	150	152	179	197	192

Source: Real GDP in agriculture, industry, and services: van der Bie (1995: 86) and revised by J. P. Smits, compromise estimate. Arable production, livestock and horticulture: gross production in constant prices, Knibbe (1993: 287–9). Physical output manufacturing branches: CBS (1920), CBS (1921), Van der Schalk (1938), de Jong and Albers (1994: 18–22). Ship arrivals (1913 level: 18 million net tons): CBS (2001: 57) and deMonchy (1928: 143). Rhine shipping: CBS (2001: 63). New capital issues: Renooij (1951: 116). Annual average 1910–13 = 100 (125 million guilders), values adjusted with GDP deflator. Capital and reserve funds (1913: 145 million guilders), bank account totals (1913: 288 million guilders) and credits granted to customers (1913: 368 million guilders) by the five major banks in the Netherlands: Vissering and Westerman Holstijn (1928: 76–9). All values adjusted with the GDP deflator in table 5.10.

in the cocoa, cotton, shipbuilding, wool, and soap industries the volume of industrial production continued to grow until 1916. Although prices of raw materials increased rapidly, manufacturers could simply pass this on in their product prices. Moreover, many stocks had been built up during the early war years, when prices were still relatively low. During the first half of the war companies made huge profits. Long-established industries such as the cotton, margarine, and shipbuilding industries, as well as new

industries, expanded quickly. Most of the latter were driven by import substitution, such as rubber and chemicals, coal, pharmaceuticals, machinery, and electrical appliances.

In general the circumstances of the war reinforced the trend towards broadening the industrial base of the Dutch economy. This process had already set in before the war. Between 1910 and 1913 capital issues in private business had risen to 125 million guilders per year, which was 50 per cent above the level of the first decade of the twentieth century (van Dorp, 1920: 238–40; Renooij, 1951: 116). Table 5.6 shows that the real value of capital issues increased further during the war. Growth was also financed out of retained earnings. Companies like Philips (electric lighting), Van den Bergh, and Jurgens (margarine manufacturers, later to become part of the Unilever concern) and Royal Dutch/Shell (oil production and trading) became leaders in the world, because they were in a position to amass large capital gains, with which expansion could easily be financed and which also enhanced activities to protect their newly created markets after the war (Brugmans, 1983: 474–7).

During the early war years monopoly profits were extraordinarily high, leading to wartime dividends that were at least 30 per cent higher than in 1913 (Brandes de Roos, 1927: 34–53; CBS, 1939: 20; van der Bie, 1995: 158). In the second half of the war profits quickly evaporated. During 1917 the supply of raw materials, fuel, and intermediate products decreased quickly. In 1918 the cotton, paper, and food and beverage industries lay almost completely idle. However, in most industries financial and technical requirements remained quite favourable. Wage subsidies and labour hoarding (partly financed by the government) averted large-scale redundancies. Although this resulted in declining labour productivity levels, it made possible a fast recovery of industrial production directly after the war (van Zanden, 1997: 133).

The relatively new sector of metal production was 60 to 90 per cent dependent on German coal, iron, steel, and other metals. During the first years of the war Dutch producers were able to secure a fairly good supply of iron and steel. Profits were considerable as an effect of rising prices. The German share in supplies of iron and steel increased (Moore, 1919: 64–5). In fact, there was a direct German interest in Dutch shipbuilding because of an expected shortage of tonnage after the war. The Netherlands became a very important export market for German steel and other intermediate inputs for shipbuilding. This situation lasted until the second half of 1916, when the so-called Hindenburg-Programm mobilised all domestic economic sources for warfare and curtailed virtually all German exports (Hardach, 1987: 27). In 1916 imports of inputs decreased, from more than 200,000 tons in the second half of 1916 to

100,000 and 91,000 tons in 1917 and 1918, respectively. German exports of coal showed a similar development: from 11.9 million tons in 1913 to 5 million in 1915 and 4.2, 2.6, and 0.8 million tons in 1916, 1917, and 1918, respectively (Frey, 1998: 163, 296, 315). Quite surprisingly, despite decreasing German output of coal, there were still shipments of coal destined for the Dutch market. This is a good illustration of the desperate attempt by Germany to hold export markets, and to find ways of getting foreign currency.

Saalfeld characterised the war-related shortages of raw materials as a blessing in disguise for the business sector. Due to the large windfall profits Dutch shipyards were able to reinvest these into new capital structures. For example: in shipbuilding the number of shipyards increased as well as the tonnage built, from 3.5 per cent of world production before 1913 to more than 9 per cent of world production during the first half of the war (Saalfeld, 1927: 149–50). Shortages of raw materials thus prevented an overexpansion in metal manufacturing and shipbuilding (Saalfeld, 1927: 20).

Services

The outbreak of war reduced overseas transport activities. Ship arrivals in the Netherlands declined to 10 per cent of the 1913 level during the second half of the war. In 1914 the Dutch sea-going merchant fleet consisted of 709 ships, with a total volume of about 1.4 million gross tons. Due to the extraordinary activity in shipbuilding the number of ships had grown to more than a thousand in 1921, with a gross tonnage of 2.2 million, the Dutch merchant fleet ranking seventh in the world (Nemry, 1925: 176). During the war 105 Dutch vessels (200,000 tons) were destroyed. Furthermore there was loss of tonnage because many ships were sold to foreign owners because of high prices for used ships. The Dutch government tried to curtail this practice by enacting the Ship Export Act in 1916 (Treub, 1917: 322).

Average freight rates rose by more than 400 per cent. The price at which British coal was shipped to the Netherlands may serve as an extreme example: in 1914 the rate was 2.9 guilders per long ton, in 1916 it was 6.5, in 1918 it was 29.4 and in 1921 it was again 3.9 (CBS, 1939: 8). The seventeen largest steamship companies prospered as never before, paying wartime dividends as high as 30–50 per cent (deMonchy, 1928: 157). Reserves had grown from 28 million in 1913 to 148 million guilders in 1917 (Moore, 1919: 82). Due to the postwar expansion and general optimism among investors, capital issues by the large companies was as high as 157 million guilders between 1918 and 1920. Soon

overcapacity in shipping pushed down freight rates as well as share prices, bringing companies severe problems and forcing many of them into liquidation.

Frey considers the Dutch banks as the firms that profited most from the circumstances of the war (Frey, 1998: 328). Before the war banking in the Netherlands consisted of relatively small-scale trading banks, not related to industry. In 1910 several mergers within the Dutch banking sector resulted in seven leading banks, of which two were to disappear again in the financial depression of the early 1920s (Vissering and Westerman Holstijn, 1928: 75). The resulting concentration of capital and activities shortly before the war made the banks big enough to enter industrial finance, leading to an unparalleled extension of the volume of banking operations, which is shown in table 5.6. Secondly, banks profited from the growth of deposits. Before the First World War Dutch businesses usually invested surplus cash in monthly loans on the Amsterdam stock exchange (so-called prolongation loans). In the first months of the war, however, the stock exchange was closed down. From then on funds were deposited in the banks. Furthermore, banks profited from the abundance of money, the influx of foreign balances, and foreign operations. There was an increase in large credit facilities to foreign debtors, to guarantee export trade (Vissering and Westerman Holstijn, 1928: 82). In October 1918 credit facilities granted by Dutch lenders to foreign countries amounted to a total of 475 million guilders (excluding government loans), of which almost 200 million was lent to Germany, 140 million to the United Kingdom, and 85 million to Austria-Hungary. As a result, Amsterdam became an important international centre of finance in Europe after the war.

Government, mobilisation, and war finance

Neutrality shielded Dutch society from the direct disasters of warfare. But there were financial costs involved, such as the military mobilisation in 1913 and price subsidies to combat the rise in food prices. Government expenditure increased considerably after 1913. However, in practice it is not easy to specify which part of the expenditure was ordinary and which was war-related. The government itself confused ordinary and extraordinary services in its war budget estimates (van de Flier, 1923: 33). Likewise it is difficult to make such a distinction for government fundraising and revenues, as these were already volatile by nature before the war.

During the period 1913–18 expenditure at current prices increased more than fourfold (see table 5.7). Initially total revenue increased only moderately, resulting in a government deficit of 6–8 per cent during 1915 and

Table 5.7. *Netherlands: government spending and revenue, 1913–1921 (million guilders and per cent)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Expenditure, total current prices	239	354	507	543	704	1,074	852	935	1,032
Constant prices and % of 1913	100	142	168	154	170	214	150	160	216
Revenues, total current prices	227	246	289	343	577	604	744	917	847
Constant prices and % of 1913	100	104	101	102	146	127	138	165	187
Deficit	12	108	218	200	127	470	108	18	185
GDP	2,416	2,444	2,864	3,365	3,594	4,082	4,652	6,092	5,792
Deficit/GDP, %	0.5	4.4	7.6	5.9	3.5	11.5	2.3	0.3	3.2
War expenditure	–	84	209	256	380	637	251	110	79
War revenue	–	–	–	33	220	220	220	185	95
Government loans	–	275	–	250	500	350	–	450	–

Source: van der Flier (1923: 34), Nemry (1925: 30), de Roos and Wieringa (1953: 9), CBS (2001:71, 92). Price-level adjustments of expenditures and revenues made by applying the GDP deflator from table 5.10.

1916. In the final year of the war the deficit rate even peaked at 11.5 per cent, which, however, is quite modest compared to the deficit rates of the belligerents. Nevertheless, expenditure in real terms more than doubled. Because total real revenue did not change much during the first half of the war, the first impression might be that the burden of the extra war-related expenditure was shifted into the future. Total expenditure directly related to the war can be calculated at 2,006 million guilders. War-related revenue through additional direct and indirect taxation amounted to 973 million guilders between 1913 and 1921. This leaves a net war expenditure of 1,033 million guilders that had to be funded in another way.

Direct expenditure for mobilisation involved the purchase of weapons, military goods and provisions for the men in the army and navy, and the allowances paid to their families. The number of men in the armed services increased from 200,000 to 450,000. The estimated total costs of the mobilisation were 1,387 million guilders, which is about 70 per cent of all war-related expenditure between 1913 and 1921. Costs involved with the support and accommodation of the 700,000 refugees from Belgium and France amounted to 35 million guilders. Other support schemes (such as the Royal National Relief Committee and Unemployment Insurance) cost about 45 million. The other major part of war-related expenditure consisted of costs related to the introduction of production and distribution schemes for food, including subsidies: in total 300 million guilders.

In what way was this extra government spending funded and what were the monetary consequences of deficit finance? In practice three ways of funding can be distinguished: borrowing, extra taxes, and the issue of Treasury bills/short-term bonds, redeemable at the Central Bank for banknotes. The monetary authorities in the Netherlands operated according to what was known in the Netherlands as the 'golden rule of finance', which prescribed that only extraordinary government expenditure like investments and capital outlays could be financed out of government loans. Ordinary expenditure and also deficits should be funded through taxes, on a pay-as-you-go basis. War-related expenses thus had to be funded in another way. Initially the government proposed to cover the extra expenditure through long-term loans, together with extra taxation to such an extent as was necessary for interest and redemption of domestic debt (van der Flier, 1923: 64). However, as the war went on, several solutions came up to cover extra costs, resulting in a pragmatic combination of taxation, an increase of the floating debt, and lending on the capital market (de Roos and Wieringa, 1953: 92).

The level of taxation increased substantially during the war. To begin with, the government needed revenue for the covering of interest and redemption of the loan of 1914. This was done by levying extra charges of 20–40 per cent on existing direct taxes on property, persons, income, and

capital and on several duties (spirits, wine, sugar), yielding 137 million guilders between 1914 and 1918 and 187 million between 1919 and 1922. Next, three supplementary so-called defence taxes were introduced of a highly progressive nature. The actual revenue of these taxes surpassed the estimated revenue of 100 million by 200 per cent, leading to a total of 310 million guilders. On top of this came, in 1916, the so-called war profit tax. This tax was levied upon persons and companies and had a rate of 30 per cent of estimated war profits. During the war and the early postwar period revenue from this tax alone would amount to a total of 722 million guilders (van der Bie, 1995: 139). During the second half of the war the three supplementary taxes and the war profit tax brought in some 500 million guilders. Average revenue from all direct taxation increased to almost 200 million guilders per year, which was about four times the level of pre-war taxation. As in the United Kingdom the war had resulted in a shift from revenues on indirect taxes towards revenues on direct taxes and to a strong increase of the rate of progression in the tax system. Because inflation partly eroded the real value of debt, the cost of the war was not shifted to future generations. A combination of expenditure cuts, higher import tariffs, and extra levies on consumer goods brought the government budget into balance by 1925 (Keesing, 1978, 60–2).

Two other ways of financing the budget deficit were long-term debt and floating debt. From the First World War on, capital demand of the central government became an important factor on the capital market (Renooij, 1951: 160). During the period 1913–21 several large loans were issued (see table 5.8). The 1917 loan was partly used for a reconversion of the 1914 loan. Between 1914 and 1917 interest rates on loans had dropped half a percentage point from 5 to 4.5 per cent. From then on interest rates on government bonds moved up again, partly due to the great popularity of new industrial equity. In case loans were not fully subscribed, the Minister of Finance was in a position to issue obligatory loans on less favourable conditions.

Short-term debt increased very fast during wartime, to a level above 500 million guilders. During the period 1913–21 the total national debt in current prices increased by a factor of 2.5. However, as GDP increased by the same factor, the national debt as a share of GDP remained fairly constant, with a peak in 1918 of 60 per cent. The floating debt consisted mainly of Treasury bills on the open market (de Roos and Wieringa, 1953: 103). The need for credit facilities obliged the government to issue large sums in Treasury paper in order to meet immediate cash requirements. But also after 1918 state expenditure continued to exceed revenues. Treasury paper was issued in large sums and after some time was consolidated into long-term loans.

Table 5.8. *Netherlands: national debt and GDP, 1913–1921 (million guilders)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Floating debt	13	174	168	251	335	614	643	514	859
Government debt, total ^a	1,157	1,307	1,571	1,753	1,938	2,459	2,691	2,760	2,872
GDP at market prices	2,416	2,444	2,864	3,365	3,594	4,082	4,652	6,092	5,792
Debt/GDP, %	47.9	53.5	54.9	52.1	53.9	60.2	57.8	45.3	49.6

^a Gross consolidated government debt (excluding provinces and municipalities), including floating debt.

Sources: CBS (2001: 92), Keesing (1978: 57).

During the First World War the commercial banking system began to operate as a money-creating institution. The influence of these changes in debt service and banking operations on the money supply, the interest rate, and the movement in prices is difficult to measure. Table 5.9 presents the development in the stock of gold, foreign exchange reserves, and the money supply (M1). There was a considerable movement in the stock of gold. From 1913 the stock of gold within the Central Bank increased more than fourfold, from 162 to 712 million guilders in 1918. The central banks of other neutral countries like Switzerland, Sweden, Norway, and Denmark experienced increases of a similar magnitude. One of the main reasons for this gold inflow was the stability of the exchange rate of the guilder. Gold was still accepted against the prewar rate, which attracted a lot of flight capital. Cash sales of products, incomes from shipping, and foreign capital inflow because of liquidation of foreign assets (especially in the Americas) increased shipments of gold to Amsterdam. The Dutch Central Bank did not develop an active bank rate policy. It was thought that lowering the discount rate would not have any dampening effect on the inflow of gold.

The amount of currency held by the public together with demand deposits increased nearly fourfold. The percentage of M1 in net national income doubled from 20 to 40 per cent. Liquidity was fuelled through an expansion of credit facilities by the banks (see table 5.6), foreign capital inflow, and war profits. The banknotes in circulation increased from 310 million in July 1914 to 1,101 million in January 1919. However, during the war a large number of these notes were not really in circulation:

The longer the war lasted, the dearer became long-term credit and the cheaper became short-term credit. As production became more difficult and manufacturers

Table 5.9. *Netherlands: stocks of gold, foreign exchange, and money, 1913–1921 (million guilders)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Monetary gold	162	193	397	581	671	712	650	653	617
Foreign exchange	14	9	3	8	8	8	26	35	29
M1	543	791	1,010	1,379	1,707	2,093	2,277	2,458	2,233
M1: NNI, %	19.6	26.5	29.2	37.5	44.0	43.5	38.5	40.8	40.0
Call rate Amsterdam, %	4.1	4.7	3.9	2.6	3.0	3.6	4.0	4.4	3.6

M1 = currency held by the public and demand deposits in commercial banks.

NNI = net national income.

Source: Vissering and Westerman Holstijn (1928: 57), de Roos and Wieringa (1953:126), CBS (1975: 105).

had less opportunity to replenish their exhausted supply of raw materials, an ever-increasing amount of capital, secured from the sale of finished articles, became available ... Manufacturers ... preferred to keep their money floating, in expectation of better times; this they did as a rule by holding bank-notes (van der Flier, 1923: 77).

To combat inflation, the Central Bank promoted a policy for foreign countries to purchase goods against credit facilities. In the Dutch economy there was ample supply of short-term money, due to a large influx of foreign balances escaping inflationary tendencies elsewhere. Therefore, call rates in Amsterdam remained low (Vissering and Westerman Holstijn, 1928: 44).

Managing the wartime economy

The government was not able to curtail wartime inflation. There were simply too many inflationary tendencies resulting from external factors, like the growth of the stock of gold, flight capital, the blockade, insurance costs, foreign price increases, international freight tariffs and domestic factors such as the decline in labour productivity by almost 25 per cent. The ongoing inflation after the war, however, was partly the result of the latent monetary overhang of the preceding period (CBS, 1939: 26; Keesing, 1978: 16). Compared with the domestic price increases in the Second World War inflation was high. However, compared with the other European countries the Dutch economy performed quite well: that is, the rate of inflation between 1913 and 1921 was comparatively low (Svennilson, 1954: 32).

A detailed comparison with price levels in the United Kingdom reveals that wholesale prices in both countries were quite similar during the early war years, but started to diverge during 1917 and 1918 when unrestricted submarine warfare and shortages of tonnage boosted international freight tariffs (CBS, 1939: 7).

Nevertheless the extensive government intervention in the economy influenced the movement of price levels. Price controls and distribution systems were established and enforced, with the help of 300 temporary government agencies. As early as 1914, the government had set maximum prices and implemented export restrictions for basic foodstuffs such as potatoes, wheat, meat, milk, rice, sugar, and butter. But this was not enough to stabilise the situation for wage earners. The already mentioned Distribution Act of 1916 authorised the government to control imports and exports, to regulate prices and to issue ration coupons. Again price ceilings were set for food products. Producers, however, were compensated for this to avoid excessive exportation of food products. In total the government spent about 300 million guilders on food-related regulation schemes.

Table 5.10. *Netherlands: prices and wages, 1913–1921 (percentage of 1913)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
GDP deflator	100	104	126	148	174	210	237	245	200
Wholesale prices	100	106	144	219	246	280	282	259	202
Consumer prices	100	100	115	128	136	162	176	194	167
Industrial wages	100	101	104	115	122	143	191	236	248

Sources: Methorst (1928: 321), CBS (1948: 103–5), van der Bie (1995: 215–16).

A comparison of the cost of living index with the movement of wages shows that there was an ongoing deterioration of living standards between 1913 and 1919 (see table 5.10). The daily menu of a large part of the population showed less and less variation: less meat, coffee, and tea and an increasing share in the daily rations of domestically grown potatoes. Estimates reveal that in 1918 expenditure per capita was 13 per cent below the level of 1913. In 1918 real consumption of food and beverages was 25 per cent lower than in 1913 (CBS, 1939: 21). Kuypers estimated a decline of the caloric value per capita from 3,000 in 1913 to 2,300 per day at the end of the war (Kuypers, 2002: 116). By then domestic bread rations for the Dutch population had fallen below that of neighbouring countries (Hardach, 1987, 130). But long before that the extraordinary rise in demand for food products by the belligerents, together with fewer overseas supplies, had already increased the threat of exhaustion of domestic food supplies, leading to social upheavals in 1916. Obviously self-sustainability had never been an explicit aim of the Dutch government. Food prices rose much faster than in the Second World War, because farmers were allowed to export their products on a large scale.

The effects of price policies can be estimated by studying the cost of living index. The Dutch index for this period is a Fisher ideal index constructed from two series consisting of thirteen weighted food items (bread, vegetables, beverages and meat, of which meat and bread have a share of 50 per cent) and nine weighted non-food items (rent, clothing, heating, soap, and furniture, of which rent and furniture have a share of 50 per cent). Prices of food rose from 100 to 142 and 228 in 1917 and 1920, respectively. Non-food items increased from 100 to 127 and 167 in 1917 and 1920, respectively. Applying the available weights, the effect of the government measures in moderating the rise in the cost of living can be estimated at 8–10 per cent. The downward effect on the rise in food prices was about 20 per cent in 1917 (CBS, 1939: 9; van der Bie, 1995: 123).

The moderation in the cost of living postponed wage demands. Industrial wages increased only moderately during the war years. However, real wages declined until 1919. In 1917 there were many strikes to protest against high prices, food shortages, and low wages. The spirit of revolution made itself felt in Dutch society. Employers were willing to give in rather quickly, which resulted in considerable wage increases from 1918 to 1921 (Kuypers, 2002: 235–6).

It is quite difficult to employ a methodology for judging policy effectiveness. The many governmental war agencies that had come into existence between 1914 and 1918 disappeared literally without a trace, most of them already before 1920, which makes it impossible to evaluate the goals and performance of the bureaucracy. In 1920 an independent war commission studied the government measures taken between 1914 and 1918 and concluded that despite inevitable mistakes most policies adopted and implemented had been beneficial to society at large (Eindverslag van de Staatcommissie, 1922: 233, cited in Van der Bie, 1995: 137).

Knibbe recently argued that the agricultural policy of the government was quite effective during the first two years of the war. During 1915 and 1916 the supply of food, fodder, and fertilisers was sufficient. And although exports were regulated real exports rose fast. But in the second half of the war effectiveness declined; the longer duration of the war necessitated a reorientation of production, away from livestock towards arable production. Already in the spring of 1917 it was clear that the slow process of ploughing up pastureland for grain would threaten the level of self-support, which eventually could lead to famine. Because of fodder shortages drastic action had to be taken leading to the slaughter of a part of the animal stock. A bill to force large-scale conversion of pastures into arable land was only passed in 1918. In the last phase of the war, export policy was more successful than agricultural policy. The *laissez-faire* tradition was deeply rooted within agriculture: ‘government policy seems to have been successful as long as control of foreign trade was sufficient to reach the warranted goals. As soon as interference with domestic production and trade was necessary, success was less imminent’ (Knibbe, 1993: 178–9).

Government interference on the housing market was to have serious consequences in the postwar period. House rents were kept low by law to keep down living costs. At the same time construction costs increased fast because of high input prices. Shortages of new dwellings increased likewise. To prevent shortages the government subsidised construction costs by giving advances to municipalities and building societies. Between 1919 and 1923 total advances amounted to 700 million guilders, increasing the government debt substantially (de Roos and Wieringa, 1953: 91).

After the postwar depression had set in, real estate prices declined considerably, which caused massive capital losses, up to several hundreds of millions of guilders (Bordewyk, 1928: 151).

What were the effects of the financial policies of the state? Van der Bie concluded that, albeit unintentionally, government policies in fact were counter-cyclical during the period 1913–21, except from the years 1916 and 1917, when a decrease in output coincided with a declining debt/GDP ratio (van der Bie, 1995: 132–3). The growth of the national debt was nevertheless considerable, as well as the growth of the stock of money. From tables 5.7 and 5.8 we can infer that in the years 1914, 1918, and 1921 the floating debt increased and the consolidated debt decreased; these were years of inflationary finance with an upward effect on prices. In the years 1915 and 1919–20 there was a reverse effect. Government finance had no upward pressure on interest rates on the money market (Keesing, 1978: 58).

Finally, taxation policies had a great effect on the redistribution of income and wealth. Tax levels increased to four times the prewar tax levels. Direct taxes on income from labour and capital increased from a level of 4 guilders per capita to approximately 25 guilders per capita. The total tax sum per capita (including municipalities, etc.) increased from 33 guilders in 1913 to 139.20 guilders in 1921 (Bordewyk, 1928: 173). The war gave a boost to public finance. The new or additional taxes were characterised by very progressive taxation schemes. During the first part of the war income inequality rose, because many of the self-employed saw their income increase considerably, while wage earners were still confronted with constant money wages. From 1916 the defence taxes and the war profit tax on property and income had a levelling effect, because the exemption limit of these taxes was much higher than that of the regular income tax. In the second half of the 1913–21 period the functional income distribution changed too. From 1917 wages began to rise fast, which resulted in an increase in the share of wages in national income from 45 to 52 per cent (de Meere, 1983: 20–2; van der Bie, 1995: 145).

Economic costs and benefits of the war and long-term development

Attempts to estimate the costs of the war for the Dutch economy date back to the 1920s. The Belgian consul in The Hague, Léon Nemry, estimated total war costs at 2,300 million guilders. On the basis of the revenue of the war profit tax (the 30 per cent tax on war profits), he calculated the total war profits of the Netherlands at 2,600 million

guilders, excluding all additional investments. This flow was equivalent to the volume of national income in 1913. Later on the CBS arrived at the same figure (CBS, 1939: 19). Surprisingly, in April 1916 a journalist on the *Economist* mentioned a similar figure for war profits of 2,400 million guilders, with the comment 'Not unsatisfactory for a nation of six million people' (cited in Frey, 1998: 324–30).

In the 1920s the Dutch economist Bordewyk rejected this method of calculating war profits. According to him a lot of these revenues originated from domestic factors, such as price increases, while additional investments were financed out of taxed profits. Therefore, the resulting misinvestment and over-investment into excess capacity could hardly be seen as gains from the war, something which he illustrated by giving many examples of postwar industrial overcapacity and bank failures and by the growing government debt, related to residential building (Bordewyk 1928: 204). In his view nearly all profits had melted away in the deflationary period after 1920, when sales stagnated and share prices tumbled.

I believe that as such these indications of overexpansion do not make the earlier gains smaller. However, what should be added to the losses is the change in net overseas assets and the loss of investments in Russian bonds and money sunk in Russian banks, timber, and oil. For instance, Royal Dutch/Shell lost all its production sites in Russia. Brandes de Roos (1927: 74) estimated all these losses at 1,500 million guilders. This is 8.6 per cent of the total national wealth of 17,342 million guilders according to the latest estimate (Smits et al., 2000: 209). A full balance sheet approach with a calculation of losses and gains would require consistent estimates of national wealth in the trans-world war period. Such a study does not exist. Therefore I will restrict myself to giving some evidence on domestic capital formation and capital stock growth.

There are many examples of new capital outlays in the secondary sector, in mining, basic metals and pig iron, rayon, chemicals, rubber, electrical engineering, and electrification. During the war period light-bulb manufacturer Philips invested all surpluses in new supplies, its own glass factory, a hydrogen factory, paper factories, a printing office and 600 cottages and sport facilities for workers. Profits in 1919 and 1920 were more than 10 million guilders each year, which was much higher than Philips' own working capital of 6 million guilders (Heering, 1986: 405). Royal Dutch/Shell increased its own stock of capital from 56 million in 1914 to 171 million in 1918 (Frey, 1998: 327). The statistics of domestic capital issues show that capital increases of Dutch companies were on average 300 million guilders per year between 1913 and 1921, with a total of 2,500 million. The increase in share capital was three times as high as the annual average for 1900–13. Table 5.6 shows that even after

adjustment for price movements these kinds of investments were still 30 per cent higher than in the decade before 1913 (Renooij, 1951: 116).

Capacity growth was driven by import substitution, by absence of foreign competition, and by technological development. Together these expansions of industrial capital marked a new phase of industrialisation. This new phase was also characterised by the growing share of 'big business', concentration in the banking sector, and the rise of industrial banking. Between 1913 and 1920 the share of companies employing more than 500 workers increased from about 17 to 24 per cent (van Zanden, 1997, 137–8).

What were the effects of higher investment levels in new productive assets on capital stock growth? Jan Tinbergen was the first to make an attempt to measure capital stock growth. The estimates were all based on weighted indicators of the physical stock of ships, locomotives and railway equipment, industrial horsepower, dwellings, and road transport. Later refinements were published by the CBS (1942). The approach of Tinbergen and his successors centred on physical indicators of quantity, size, and capacity for a number of capital goods for which there was information. These were then weighted according to their approximate shares in national wealth. In summary the following growth rates were calculated for the period 1914–19: cattle –2.3, industry 6.7, railways 0.6, shipping 1.5, road traffic 4.6, and residential buildings 0.8, the average being 2.5, almost as high as in the United States (2.8) and higher than Sweden (1.9) (Tinbergen, 1932: 14).

However, conceptually there are great differences between these kinds of physical capital stock calculations and modern methods of standardised capital stock estimation. A more recent estimate by Groote et al. followed the procedures of using perpetual inventory assumptions to calculate the capital stock accumulated in machinery and equipment and the total non-residential capital stock (buildings and civil engineering works). Data on gross fixed capital formation in buildings and civil engineering works were derived from data from the railway companies, electricity companies, and central government's construction of roads and telephone and telegraph networks. Livestock, increase in inventories, and work in progress were excluded to guarantee international comparability. For machinery, capital formation was estimated using a commodity-flow index, based on the domestic production of machinery, vehicles, and ships on the basis of the inputs of materials and the wage sum in the capital goods industry, combined with output levels of the engineering and shipbuilding industries. Net imports of machinery were taken from the trade statistics (Groote et al., 1996: 5–6). The results are given in table 5.11. I also included two series based on physical indicators:

Table 5.11. *Netherlands: the capital stock, 1913–1921 (percentage of 1913)*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Machinery and equipment	100	104	107	112	111	111	112	120	128
Non-residential capital	100	102	103	104	104	103	103	105	111
Boilers	100	–	107	–	–	–	–	126	129
Merchant ships	100	112	112	111	110	117	121	144	174

Source: Nemry (1925: 104, 175); van Ark and de Jong (1996: 237); Groote et al. (1996: 23).

the capacity of steam boilers and the total capacity of merchant ships in gross tons.

The table reveals a small increase of the real gross capital stock from 1913 to 1919 and a steep rise after 1920. The relatively slow growth is mainly caused by the fact that capital formation in non-residential buildings, with a share of 50 per cent in total non-residential capital, stagnated during the war years. The annual compound growth rate for total non-residential capital is 1.3 per cent and for machinery and equipment 3.1 per cent. Both figures are below the average capital growth rates for the period 1900–29, being respectively 2.5 per cent and 4.4 per cent. This suggests that the 1913–21 period and, more precisely, the period 1913–18, stands out as one of relatively modest capital formation. Wartime investments were biased towards productive assets and activities that generated additional output quickly. Therefore machinery investment, financed out of new equities and retained profits, rose more quickly than outlays on structures (Groote et al., 1996: 11–13).

The relatively modest capital stock growth combined with large GDP growth (see table 5.4) suggests a high growth of total factor productivity (TFP). Between 1913 and 1921 growth of TFP was almost 2.5 per cent annually, which is significantly above TFP growth before 1913 (van Ark and de Jong, 1996: 211). Only during the period 1947–73 did the Dutch economy experience TFP growth rates of similar magnitude. Applying econometric tests for parameter stability for GDP and TFP growth during the period 1816–1996, Smits et al. found a statistically significant break in the series which is situated around the year 1916: the structural break in the GDP and TFP series marks a new era in which growth rates are substantially higher than in the century before 1916 (Smits et al., 1999: 8). This would suggest that for the Dutch economy as a whole the period of the First World War is a significant milestone in long-term economic growth. The authors explain this by pointing to the role of new capital outlays, the broadening of the industrial base, and the start of

a new technological regime, in the form of the introduction of electrical motors and the electrification and motorisation of the economy. Estimates on the comparative productivity levels in manufacturing support this view. From 1913 to 1921 the Dutch manufacturing productivity level vis-à-vis the United Kingdom increased from 76 to 90 per cent and compared with Germany the level rose from 67 to 92 per cent (de Jong, 2003, 72). A major additional positive effect on productivity improvement is associated with the introduction of the shorter working week in 1919. Hourly wages of workers increased considerably, thereby forcing businesses to develop more efficient methods of production (van der Bie, 1995: 184; de Jong, 2003: 182). In this process the capital- and energy-saving bias of electrification increased not only labour productivity but also capital productivity and thus total factor productivity growth in a way that had never been experienced before. This catching-up process by the Dutch economy was definitely stimulated by the specific dynamics of the First World War and its immediate aftermath.

Conclusions

Although the majority of the Dutch population sympathised with the Allies, Dutch policy makers, businessmen, and farmers maintained many political and economic relations with Germany for commercial reasons and reasons of national security. The Dutch preserved neutrality, for instance through the Netherlands Overseas Trust Company, but had to accept many compromise measures against its own sovereign rights. Trade and exports continued, with declining volumes but rising prices. The Dutch government did not reach an agreement with the Allies to stop trade with Germany before November 1918.

Exports into Germany increased considerably and Dutch agricultural products helped Germany to continue its war effort. After the defeat of Germany the Dutch cabinet had the conviction that German recovery after the war was in the interests of the Netherlands. But this was mutual: Germany also had this conviction: 'In the Netherlands the prerequisites for co-operation were present. The war had accelerated industrial modernization and the expansion of Dutch financial resources, which enabled the country to re-establish itself as a major European banking, finance, and service center in the post-war period – a position that it had lost at the end of the eighteenth century' (Frey, 2000: 242).

For the period 1913–21 as a whole economic growth in the Netherlands was considerable. Only the years 1917 and 1918 stand out as years of low economic activity due to trade limitations. After 1918 the Dutch economy underwent a quick transformation towards the peacetime economy, not

troubled by the traditional problems related to conversion (van Zanden, 1997: 129). On the sector level there were different experiences between branches and industries depending on their access to raw materials and foreign markets. The circumstances of the First World War caused specific dynamics through the growth of the domestic market, rising investment levels, higher profits, and better access to the money and capital market (van der Bie, 1995: 189). Import substitution promoted the establishment of many plants and industries, which broadened the base of Dutch industry. There was the threat of overexpansion, but trade restrictions during the second half of the war frustrated additional capital outlays, which proved to be a blessing in disguise in the depression of 1921–3. The effects of this downturn on the Dutch economy were quite modest and not as great as in Scandinavia (van Zanden, 1997: 141).

Economic policies were inspired by laissez-faire principles and directed towards maximising exports. Although the government was not well equipped, it obviously made decisions that turned out to be quite favourable most of the time. At the end of the war the purchasing power of wages had increased, interest was low and during most years government expenditures dampened the economic cycle. Price levels remained comparatively low, which improved international competitiveness and did not necessitate the strong deflationary policies employed by other north-west European countries. Also unemployment remained low during and after the war. But it must be stressed that the outcomes of these policies reflected good fortune as well as design. Agricultural policies were not able to secure enough food for the population during the last phase of the war (Knibbe, 1993: 179). The armistice in November 1918 came just at the right moment for the Dutch government and the population, because it allowed new supplies of food into the country.

The postwar period revealed the catching-up potential of the Dutch economy. Productivity levels vis-à-vis Germany and the United Kingdom had increased substantially. There were many profound changes with long-term structural effects. The drastic reduction in hours worked due to the shortening of the standard working week and the rise in real wage costs stimulated productivity, enhancing mechanisation (de Jong and Albers, 1994: 17). Investments in capital-saving outlays (such as electrification) contributed further to the growth in total factor productivity.

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6 Was the Great War a watershed? The economics of World War I in France

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Introduction

The dominant view is that the ‘Great War’ represented for France the end of an economic and social era that is often considered with nostalgia in France and with condescension abroad.¹ In this view, not only the *belle époque* but the entire nineteenth century is considered to be an era in which economic liberalism was counterbalanced by a strong state which guaranteed the ‘equilibrium’ of a well-balanced economy of ‘moderate’ industrialisation. This is symbolised by the image of its ‘three pillars’ – agriculture, manufacturing, and services – being of similar size, or by a similar balance between the urban and rural areas. Another view, mostly developed by economic historians, highlights the rapid changes in the French economy and society before the war. Dynamic industrial change was underway, best symbolised by the automobile and aircraft industries. Complex firms, whose mere size contradicts the view of ‘garden-like France’, were developing rapidly in manufacturing and financial services. Social change and workers’ movements were important and relatively well integrated in increasingly democratic politics. This view, when comparing the *belle époque* with the 1920s, leads to an emphasis on the continuity that dominated in terms of technology and organisation at the firm level and even in the private economy as a whole. But it was not sufficient to modify the dominant view, maybe because the war introduced new economic phenomena and policies, gave to the state a much increased role in macroeconomic management, and started a long period of economic and international instability.² In sum, it was as much a watershed for France as the Great Depression has been termed for the United States (Obstfeld and Taylor, 1998).

Surprisingly, the economic history of the Great War has not been much used to discriminate between these views, in spite of the fact that France’s ability to resist industrial Germany’s attack was a powerful test of the strength of its economy. The fact that, because of the invasion, changing boundaries, and a massive mobilisation in the statistical administration, economic statistics – mostly budgetary ones – deteriorated during the

war, does not help in studying the continuities between the pre- and postwar periods. The situation is even more difficult for the direct study of the war economy itself. This chapter uses the data recently produced by Villa (1997) on the whole twentieth century to present a synthetic view of the economic dimensions of the war, and tries to shed more light on that most difficult question of the degree of discontinuity that the war introduced in various aspects of the economy. In doing so, the chapter also highlights some problems with this data set and suggests some further research on this under-studied subject.

The second section describes quantitatively the various shocks that the war imposed on the economy. The third section considers the macroeconomic impact of war-related economic policies, mostly war finance and foreign relations. The fourth section presents in more detail the changes in the state's intervention in the economy that were favoured by the war, and tries to evaluate the capacity of the economy to accommodate the shocks that it suffered. The fifth section provides some concluding remarks on the consequences of the war for economic growth and the structure of the French economy.

The war as a shock

If the war did not come as a surprise, its development and duration were unanticipated. The government had planned for war: army mobilisation, stocks of guns and ammunitions as well as the logistics and other requirements of a modern army had been well organised, but no long-term industrial mobilisation had been prepared, even in the 1912 *Plan de mobilisation*. Some economic measures were taken in order to limit the impact of the war's beginning, such as a special credit from the Banque de France to the Treasury, or stocks of notes distributed to the banks. A rapid intervention blocked a stock market crash and a bank run.³ Nevertheless, the war represented an enormous shock to the economy.

Contrary to the British and especially the US economies, which benefited from increased demand and suffered less drain on their resources, table 6.1 shows that the war exacted a high cost from the French economy, at a pace which paralleled the evolution of the military situation. GDP decreased sharply in the first year of the conflict, probably because of the first impact of the shocks described below. It then stabilised at a slightly higher level in 1916–17, suggesting a new equilibrium had been reached. With a further fall in 1918, French GDP fell to a trough more than 30 per cent below its 1913 level.

Three shocks affected the economy and were responsible for this depression: (1) the invasion and the following occupation of north-eastern

Table 6.1. *France: production*

	Percentage of 1913									
	1913	1913	1914	1915	1916	1917	1918	1919	1920	
Nominal GDP	50.83	100	88.7	88.7	117.2	139.1	153.9	206.6	313.7	
Real GDP	50.83	100	84.0	71.6	80.6	78.9	66.2	71.5	77.3	
Components of GDP:										
1. Agriculture	12.07	100	110.4	84.0	84.0	79.2	74.5	79.2	83.0	
2. Industry	23.64	100	68.1	60.7	76.6	74.0	50.5	54.1	59.9	
2a. Food industries	1.27	100	79.9	71.5	69.7	64.6	65.7	66.4	77.3	
2b. Energy	0.96	100	72.1	53.0	58.3	76.4	72.0	64.4	73.7	
2c. Intermediate goods	3.03	100	68.8	39.9	40.6	41.2	36.4	45.3	57.5	
2d. Investment goods	5.66	100	50.3	82.7	158.4	154.5	83.6	58.0	63.0	
2e. Consumption goods	7.48	100	64.1	50.1	52.3	55.0	45.9	64.7	69.3	
2f. Construction	5.24	100	88.9	63.1	48.4	35.0	21.6	35.0	38.0	
3. Trade	5.60	100	86.5	72.5	75.6	74.9	68.5	75.2	85.2	
4. Transportation	1.52	100	71.2	63.0	70.5	74.2	76.3	87.3	102.1	
5. Services	4.41	100	85.5	76.0	89.1	95.6	95.1	110.1	117.1	
6. Housing	3.59	100	99.3	98.6	97.8	97.1	99.1	99.7	100.1	
Wheat (million tons)	86.92	100	88.5	69.8	64.2	42.1	70.7	57.1	74.2	
Pig iron (million tons)	21.92	100	51.3	2.8	7.7	9.3	7.6	26.7	63.5	
Raw cotton consumption (thousand tons)	271.30	100	59.1	80.9	83.2	93.6	83.8	74.0	74.6	
Raw wool consumption (thousand tons)	266.00	100	78.8	33.2	34.9	29.2	23.4	65.3	63.0	
Rail (million person-kms)	19.41	100	70.6	45.3	51.5	52.0	61.3	104.3	114.5	
Rail (million ton-kms)	25.89	100	70.1	64.9	74.6	79.8	79.4	81.8	102.5	
Ships laden (million tons)	60.62	100	77.9	55.9	57.2	44.9	41.6	52.9	75.5	

Sources and notes: Nominal and real GDP and its components (items 1 to 6) in the 1981 French system of national accounts, plus various products in physical units. Industrial production is the sum of items 2a to 2f. Column 1 gives data in billions of francs (for GDP and its components) or in physical units. Subsequent columns give index numbers for 1914 to 1920 based on 1913, covering the entire French post-war territory. All data from Villa (1997) and our calculations.

France; (2) the mobilisation of labour and financial resources for the war; (3) the massive shift in demand and supply resulting from the enormous increase in government spending and from the changes in foreign trade imposed by the war. These shocks will be discussed here in terms of their direct effects on the markets for labour, capital, and goods, before the consequences for production are considered. The macroeconomic policy dimension will be considered in the following section.

The invasion as an economic shock

With Belgium, and later Italy, France was the western country most directly affected by the war, since it was fought in France and part of the territory was occupied. The invasion affected all dimensions of the economy: the production and supply of various goods, government resources, capital availability for investment, transportation networks, etc. Since the invasion began shortly after the start of the war and the front more or less stabilised after a few months, the war's destructive impact was concentrated in a relatively small area. I will come back in the last section to the long-term consequences of this destruction for the capital stock and economic growth. But in the short term the economic impact on the war effort was high, since all the ten *départements* (out of a total of 87) that were occupied stopped producing for (and paying taxes to) France.

This is not taken into account in Villa's statistics, which consider the entire (postwar) territory except, naturally, for taxes and all government activities. For these state activities, statistics necessarily consider the territory under government control, so that the invaded regions count as zero.⁴ This approach is fine when one wants to measure the long-term consequences of the war. But one cannot directly use these data to evaluate the contribution of 'French' production during the war to the war effort. This is not a mere detail. The ratio of taxes to GDP, for example, compares taxes raised in the government-controlled region alone with the GDP of the entire French national territory, and hence understates the burden of taxes on the government-controlled region. The problem is complicated still further by the fact that a number of refugees from the occupied territories moved to France during the war, modifying the relative productive capacities of the two regions.⁵ Table 6.2 gives the relative sizes of these different regions. It suggests that a rough estimate of the difference between government-controlled and total GDP is between 13 and 20 per cent of total GDP.⁶

In any case, one must add to the decrease in production a further decrease in taxable income, and the need for the French-controlled territory to replace the products from invaded regions as consumption or intermediary goods. On that account, the invasion's immediate

Table 6.2. *France: total population in regions differentially affected by the war (millions)*

Region	1911 population	1921 population
87 départements	39.65	37.50
77 non-occupied	33.15	
10 occupied	6.50	3.60 (Nov. 1918)
Alsace-Lorraine	1.87	1.71

Source: Armengaud (1980).

consequences for France were enormous, since the invaded region was among the richest: it had a highly productive agriculture (20 per cent of 1913 wheat production, 25 per cent of oats, 12 per cent of potatoes, 50 per cent of sugar beets); most of the steel (80 per cent) and electricity (43 per cent) production, coal (55 per cent) and iron ore (90 per cent) mines, metallurgy, woollen and linen textiles were either under German control or no longer functioning. So even if production did not stop, the invasion led, for example, to a shortage of coal and iron ore (and more generally of most primary products), which was a major reason for the decrease of industrial production in non-invaded France. Actually, some contemporaries consider that this was as important a shortage as the lack of manpower. Imports rose dramatically, and more than a quarter of the iron consumption was imported in 1916–18, as well as one-third of the coal consumption.

One must then take into account these shocks when trying to explain the evolution of production and investment: part of the investment and production in non-occupied France resulted from the need to replace the production from the occupied zone. The opposite was also true, but firms in occupied France faced a worse situation, even neglecting destruction, confiscation and relationships with the occupants: the territory had little autonomy and homogeneity, it had no access to the French capital market (and seemingly also to the German capital market), labour was even scarcer than in the rest of France, and the transportation network was inadequate.⁷ The economy of the occupied zone therefore certainly suffered much more than that of the rest of the territory, something existing statistics may well undervalue.

Mobilisation as a labour demand shock

The mobilisation was a major labour demand shock. The first mobilisation in August 1914 took 2.9 million men out of a male working population of 12.6 million. Within 10 months, 2.7 million followed, bringing the army to

more than 5 million men, a number that would remain more or less stable during the war. For the entire war, 8.66 million men were mobilised at one time or another (among them 0.57 million from the empire), amounting to 20.2 per cent of the total population and 75 per cent of all males aged 20 to 55. This shock dramatically affected civilian economic activities, which were crowded out of the labour market for young men. This was partly compensated for by an intensification of the work of the remaining men, women, and children. In particular, many industries that had remained entirely reserved for men were opened to women (metallurgy, armaments, etc.). Unsurprisingly, unemployment almost disappeared.

In the short term, the departure of the mobilised workers profoundly disrupted production, and many voices asked for the exemption of 'essential' workers from the army or other solutions. Augé-Laribé (1925) showed in the case of agriculture that all efforts to compensate for the departure of farm workers were small in comparison to the costs of mobilisation: soldiers were given some special *permissions* for the seed-time or the harvest, but they were negligible in comparison with the needs. For example, in 1916 they represented only 6.5 million man-days (2 per worker!) and 75,000 horse-days. Efforts were made to stimulate immigration from Spain or Portugal, but this too was very insufficient, representing less than 150,000 persons from 1915 to 1918, including women and children. This was less than the loss resulting from the fact that Italian immigrants who used to come before the war were no longer allowed to travel to France.

Even the armament industry's labour needs were little considered at the beginning of the war. Only 11,000 workers were exempted from mobilisation, almost all of them (7,600) in the public-owned arsenals, when private armaments firms employed 50,000 workers. Mobilised workers were assigned to civil activities in the civil service or on the railways before manufacturing industries, where the labour force initially decreased sharply even in metallurgy (-67 per cent in August 1914) or the chemical industries (-58 per cent). The mean employment reduction for manufacturing was -66 per cent.

Quite rapidly, nevertheless, the government allowed half a million workers to go back to the armament factories, and to some civilian industries which were given a high priority. By July 1915, metallurgy had 82 per cent of its prewar labour force and the chemical industries 66 per cent; by January 1916 they had respectively attained 100 per cent and 93 per cent. By August 1917, 518,000 soldiers were assigned to armament factories and 300,000 to farms, some 15 per cent of the total armed forces of 5.2 million men, in spite of constant pressure from the military to keep soldiers at the front (table 6.3). The progressive increase

Table 6.3. *France: employment in the armaments industry in 1918 (thousands)*

Women	430
Military	497
Civilians	425
Under-18s	133
Foreigners	108
Colonies	61
Captives	40
Wounded	13
Total	1,700

Source: Hardach (1977a).

in the assignment of military manpower to production then reflected the rising importance of the economy in the war.

Outside the armament industries, the shock to the labour force was enormous. It implied not only a reduction in the labour force but a reallocation among industries. Table 6.4 gives the changes in the number of wage earners by sector, on a 1913 basis. Except for agricultural workers (for which most 'wage earners' were probably the wives of individual farmers, which explains the stability of their number), all manufacturing industries faced a reduction of at least 20 per cent of their labour force in 1915, the worst year of the war for most activities. Even the 'investment goods' sector, which included armament production, dropped by 33 per cent in 1914, before recovering slowly in 1915 and very rapidly thereafter. In transportation, a military priority, numbers employed were maintained, even at the start of the war. By contrast, construction workers almost disappeared, at least employed ones. Unfortunately, almost no data are available on independent labour, a very significant part (around 40 per cent) of the labour force with 8.35 million people in 1913 (including 4.72 in agriculture). I discuss this below.

Government finance as a capital demand shock

The war not only mobilised men, but also required capital on an unprecedented scale. Direct use of existing capital was not negligible, with the requisition of horses, then an essential part of the agricultural capital stock, being costly for agricultural production. The priority given to military needs in access to the railways also upset a transportation system which relied heavily on railways.

Table 6.4. France: Private sector labour force (thousands)

	Private sector employees										Independent workers 1919
	Percentage of 1913										
	1913	1913	1914	1915	1916	1917	1918	1919	1920	1920	
Total	1	2	3	4	5	6	7	8	9	10	
1. Agriculture	9,175	100	85.3	75.0	83.8	89.2	89.9	100.5	103.3	8581	
2. Food industries	2,881	100	101.0	98.4	98.4	97.9	97.5	97.9	98.3	4978	
3. Energy	358	100	96.7	80.3	89.0	95.3	82.5	94.7	97.9	160	
4. Intermediate goods	272	100	87.3	77.3	79.9	91.7	91.9	92.6	107.0	1	
5. Investment goods	586	100	70.5	57.4	70.3	79.3	80.5	94.3	100.7	50	
6. Consumption goods	859	100	67.0	69.2	105.4	128.3	126.8	114.1	118.5	191	
7. Construction	1,770	100	75.6	60.8	68.1	75.1	77.6	94.9	99.7	1359	
8. Trade	483	100	40.3	18.7	24.3	30.0	32.5	93.3	93.9	145	
9. Transportation	978	100	81.8	61.0	70.2	74.8	76.9	92.9	94.3	1124	
10. Services	639	100	105.6	90.1	112.1	114.9	115.6	137.2	139.2	330	
	349	100	96.7	80.7	77.4	75.8	88.9	102.1	103.5	242	
Private sector, total	17,530	100	98.3	96.1	98.0	99.1	99.3	101.5	103.2	-	

Sources and notes: Numbers of employees in the private sector in 1913 (thousands, column 1) and from 1913 to 1920 (percentage of 1913, columns 2 to 9); calculated from series NSE and NSU01 to NSU10 from Villa (1997). Numbers of independent workers (thousands, column 10), available only from 1919 onwards, series EIU01 to 10 from Villa (1997). For the total private sector labour force (EMPE series), see discussion on pp. 194–6. In 1913, the overall labour force also included 969,000 government employees and 913,000 household employees not included in the private sector data above.

But, most importantly, financial resources were concentrated by the state for its own needs and the financial priorities it decided. I will look below at the government budget. Here, I will focus only on the impact of war on private investment, and first on the crowding-out of private firms' issues on the financial market. From the start of the war, no issue could be organised without an authorisation by the Ministère des Finances, and few were given. Table 6.5 shows the evolution of private and government issues on the capital market. The almost exclusive reservation of the capital market for the government's needs is clear, not only during the war but also for the immediate postwar period, when consolidation of short-term debt was necessary (see below).

When one looks in more detail at the distribution of issues among sectors, using the incomplete data from the *Crédit Lyonnais* summarised in Marnata (1973), one observes that the general decrease in issues was accentuated for such big prewar issuers as banks, transportation, and mining. In comparison, sectors such as iron and steel, metallurgy, the mechanical and chemical industries, were given priority access for obvious reasons. Electricity production and even textiles were also allowed to increase their share of a decreasing pie.

Unfortunately, it is difficult to compare these data directly with those of Villa for lack of equivalence between their nomenclatures, and then to evaluate the impact of restricted access to the capital market on private sector investment. Table 6.6 gives the changes in respect of total building and material investment on a 1913 constant price basis, and their relative changes for the different sectors. In real terms, total investment decreased continuously during the war, from a mean of 6.3 billion 1913 francs a year in 1910–13 to a low of 4.2 billion in 1918. But in percentage of GDP terms, investment maintained its 1913 16 per cent level in 1914 and 1915, and only decreased to a 12 per cent level from 1916 on. Investment in buildings decreased much more sharply and more durably than investment in material. While material investment never exceeded a 30 per cent decrease relative to 1913, building investment almost reached a 50 per cent reduction (in 1918) and came back to its prewar level only in 1924 (compared with 1920 for material investment). This is consistent with change in production in the construction sector.

Building and material investments have in common the rapid increase in the share of the transportation sector, and the drop in that of the construction sector. The change in investment in transportation, the only sector with a **rise** in real investment during the war, matches that of the labour force in the sector. It results from its key military role, but also from the changes in the industrial geography of France imposed by the invasion. It is striking that it occurred in spite of the fall in the

Table 6.5. France: public issues on the capital markets (billion 1913 francs)

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Shares	0.69	0.70	1.32	0.89	0.42	0.02	0.04	0.24	0.24	0.67	1.18
Private bonds	0.75	0.57	0.77	1.06	0.46	0.06	0.18	0.69	0.33	0.56	1.05
Railway bonds	0.30	0.32	0.31	0.24	n.a.	0.06	0.09	0.18	0.13	0.45	0.25
Government	0.13	0.15	0.40	0.25	n.a.	6.80	5.29	2.09	4.51	2.72	6.47
Foreign	2.87	2.02	1.51	1.44	n.a.	0.00	0.00	0.00	0.00	0.00	0.00
Total private issues	1.45	1.27	2.09	1.95	0.88	0.08	0.22	0.93	0.57	1.22	2.24
Private issues, % of private investment	0.23	0.21	0.32	0.28	0.07	0.01	0.04	0.19	0.13	0.23	0.34

Notes and sources: For private bonds, I use the Cr dit Lyonnais statistics except for 1914 where they are missing, so I use instead the generally less complete Statistique G n rale de la France (SGF) data. For shares, I use the data I constructed from the SGF and my own individual data on listed companies (for details, see Hautcoeur, 1994: 60ff.). Railways and government issues are from Cr dit Lyonnais (Marnata, 1973). The bottom row gives the ratio of private issues to the private investment figure given by Villa (1997, IE series).

Table 6.6. *France: investment (billion francs)*

	Percentage of 1913									
	1913	1913	1914	1915	1916	1917	1918	1919	1920	
Building investment	2.30	100	93.2	77.4	68.4	60.2	52.0	60.2	70.3	
1. Agriculture	0.22	100	98.6	73.4	66.9	52.1	40.6	47.0	48.1	
2. Food industries	0.17	100	95.6	100.4	86.5	78.9	75.0	75.9	81.1	
3. Energy	0.25	100	99.4	77.2	61.7	61.6	45.2	42.0	60.5	
4. Intermediate goods	0.30	100	99.1	80.5	63.5	44.3	39.1	38.5	44.3	
5. Investment goods	0.22	100	89.3	76.5	59.9	40.4	33.4	33.1	36.5	
6. Consumption goods	0.28	100	95.8	91.0	87.8	79.1	81.0	82.8	88.3	
7. Construction	0.05	100	74.1	49.4	28.5	15.8	12.0	8.9	15.8	
8. Trade	0.30	100	79.4	62.3	64.0	60.7	47.4	52.1	67.0	
9. Transportation	0.27	100	118.4	100.9	90.3	93.4	78.3	112.1	137.5	
10. Services	0.24	100	66.5	45.1	45.5	41.2	37.6	68.3	76.6	
Material investment	4.65	100	90.0	79.9	70.0	70.0	70.0	90.0	100.0	
1. Agriculture	0.73	100	100.5	86.4	84.5	84.1	81.3	98.7	95.2	
2. Food industries	0.33	100	78.1	80.2	57.6	54.5	52.8	60.5	74.5	
3. Energy	0.28	100	97.1	84.3	68.9	69.1	61.8	64.2	73.8	
4. Intermediate goods	0.70	100	90.8	86.5	71.2	63.7	63.2	77.6	88.6	
5. Investment goods	0.49	100	91.3	90.1	75.6	65.1	66.1	68.3	71.4	
6. Consumption goods	0.42	100	91.1	71.2	66.3	52.4	50.2	76.8	87.9	
7. Construction	0.60	100	75.0	58.2	35.5	25.1	24.3	19.1	31.0	
8. Trade	0.15	100	72.1	65.6	72.6	87.4	84.7	97.7	118.6	
9. Transportation	0.53	100	114.8	110.5	106.2	139.9	145.8	222.3	255.7	
10. Services	0.42	100	68.8	49.4	53.4	61.9	69.9	105.9	106.9	
Total investment	6.95	100	91.5	78.7	69.2	65.2	61.2	75.5	85.6	

Notes and sources: The first column shows nominal investment in 1913 (billion francs). Subsequent columns give the change in real investment from 1913 to 1920. Calculated from series IBZE and IMZE from Villa (1997).

resources that could be obtained from its once privileged access to the capital market. A possible answer could be a direct financing by the government or (government-controlled) price increases on the railways (although this does not appear in the transportation sector's price series from Villa).

One may be surprised to note that building investment decreased less in the consumption goods industry (including food industries) than in the investment goods sector which includes armaments. This suggests that the boom in armaments used mostly existing buildings, reconverting them from civilian use. A look at the material investment data for that sector shows that it indeed increased its share of investment, although by much less than would be suggested by the observed increase in production or even by the priority access that it obtained to the capital market. It thus appears that the rise in armaments production resulted more from a reorganisation of existing factories and materials than from a massive surge in investment.

As these few examples show, an explanation of the changes in investment would require more than the data available on a then much reduced capital market. Given the absorption of financial resources by the state, firms had to rely on their own saving capacity (retained earnings) even more than in peacetime. With no data available on profits, and insufficiently precise data on prices, wages, and production changes, we must be content with the few remarks above. Many questions remain open: do these data overvalue investment, which contemporary assertions on the exhaustion of existing capital would suggest? Do they undervalue it, as other contemporary claims on excess war profits would say? And if we accept these data as the best evaluation, to what extent did investment replace production capacities that existed in occupied regions before the war, preparing future overcapacities? To what extent was investment influenced by the disruptions in foreign trade that could also disappear with the end of the war? What levels of prices and profits were necessary as a compensation for these risks, or for investing in military production that could be adapted to civil use only with a cost? Answers to these questions would be necessary to evaluate the impact of wartime investment on postwar growth. But it is unlikely that the macroeconomic data we have will be sufficient to answer any of these questions. New research based on individual firms' balance sheets combined with stock market data, as in Grotard and Hautcoeur (2001), will be necessary to go beyond this.

Demand and supply shocks in goods markets

The most important determinants of investment and the reallocation of labour were certainly the changes in the demand and supply of goods.

The first change resulted from the rise in public expenditure, whose share in GDP increased massively: government consumption (excluding salaries and investment expenses) rose from 2.5 to 20 per cent of GDP from 1913 to 1916. Government demand oriented production towards war-related products. Nevertheless, the equipment and furnishing of the armies, from uniforms to food, did not imply a complete shift from civilian products, as shown, for example, by the resulting increase in tobacco consumption. More importantly, government consumption was probably not the only cause of changing consumption patterns: it is also likely that the civilian population's demand was modified by the war, not only because some products were no longer available, but also because of changes in household structures (now predominantly women-led) or in income. Nevertheless, in the absence of detailed studies on these subjects, the most visible fact was the enormous surge in demand for military production after the rapid exhaustion of existing stocks.

The second important shock affecting the goods markets was the break-up of trade relationships with Germany, Austria, Hungary, and soon Belgium and other invaded regions, which together represented around one-third of French imports and exports in 1913. The disappearance of this trade forced French importers and manufacturers to find new sources of supply, especially for manufactures. Imports increased sharply from 1915 to 1917, which also helped to compensate for the occupation of north-eastern France, and the decrease in French production of various goods. As table 6.7 shows, imports came mostly from the United States (whose share of imports more than tripled) and the UK (whose share doubled), even if smaller, mostly neutral, European countries like Switzerland or Spain also increased their exports sharply.

On the other hand, exports declined, reaching a low of one-third of their 1913 level in 1918. This resulted not only from the missing European markets and the difficulty of finding new markets in the war context, but also from the increased absorption capacity of the French market and from the reallocation of production towards non-tradable or domestically demanded products. The real exchange rate also probably played a role in the divergence between exports and imports, since the real rise of the franc (resulting from a somewhat higher inflation and a relatively stable exchange rate) encouraged imports and discouraged exports. This role remained nevertheless apparently limited since the appreciation of the franc was substantial only in 1918, the very year the trade deficit decreased. Then the logic of the trade deficit can probably be viewed as one of inter-temporal smoothing of consumption and investment, although more detailed studies specifying the relative weights of all these causes would be welcomed.

Table 6.7. *France: foreign trade*

	1913	1914	1915	1916	1917	1918	1919	1920
Nominal imports (billion francs and current prices)	8.42	6.40	11.04	20.64	27.55	22.31	35.80	49.90
Real imports (percentage of 1913)	100.0	74.0	114.8	182.1	181.4	124.6	121.8	114.8
Country shares in nominal imports, % of total:								
Belgium	6.6	5.0	0.2	0.0	0.0	0.0	3.1	6.7
UK	13.3	13.4	27.5	28.9	24.7	28.7	24.6	20.7
Italy	2.9	2.7	3.9	3.5	3.0	3.7	2.8	2.6
Germany	12.7	9.6	0.1	0.0	0.0	0.0	2.1	5.4
Switzerland	1.6	1.6	2.2	2.5	1.8	1.9	2.1	2.1
USA	10.6	12.4	27.4	29.9	35.5	32.0	25.7	21.8
Empire	11.3	11.4	10.1	6.3	6.5	7.0	9.4	6.9
Nominal exports (billion francs and current prices)	6.88	4.87	3.94	6.21	6.01	4.72	11.88	26.89
Real exports (percentage of 1913)	100.0	69.4	49.4	65.3	47.3	31.3	48.9	93.5
Country shares in nominal exports, % of total:								
Belgium	16.1	12.4	0.9	0.9	1.1	0.8	12.9	16.7
UK	21.2	23.9	28.0	18.1	16.9	22.9	17.8	15.8
Italy	4.4	4.4	9.9	12.6	16.1	16.5	5.7	4.6
Germany	12.6	10.5	0.0	0.0	0.0	0.0	13.1	5.6
Switzerland	5.9	6.3	7.6	6.5	8.1	8.7	6.0	6.7
USA	6.1	7.7	11.3	10.0	11.3	8.9	7.5	8.4
Empire	13.1	14.7	16.9	15.8	16.0	20.4	15.1	15.5
Nominal trade deficit (billion francs)	-1.54	-1.53	-7.10	-14.43	-21.54	-17.58	-23.92	-23.01
Real trade deficit (percentage of 1913)	100.0	85.8	285.7	487.5	532.0	368.4	312.5	170.5
Effective real exchange rate	1.00	1.02	0.96	0.94	0.95	0.81	1.00	1.48

Notes and sources: Imports and exports (by value and volume) are for *commerce spéciale* (excluding re-exports). Country rows show shares of each country in French imports and exports by value. All data from Villa (1997) and our calculations.

One important question is the extent and the impact of government intervention in the adaptation of the economy to these shocks, especially to the transformation of production and the capacity of the private sector to adapt and satisfy the military needs. The literature describes many examples of small interventions which ended up facilitating market solutions more than preventing them. For example, as early as September 1914, the government convened an assembly of manufacturers, asking them to reach a production of 100,000 shells per day for the 75 field gun. It proposed government financing, even for new factories to be built, and then helped the target to be reached in the summer of 1915. But if shells were produced by private industry, this was not the case for powder and most arms, which were produced by the arsenals, under direct government control. In a later section I will also examine the extent of government direct involvement in foreign trade as well as in production, and the extent to which the private sector was allowed and was able to adapt. Before that, I turn in the next section to the macroeconomic management of the economy (to use a quite anachronistic expression), which mainly consisted of financing the budget and the trade deficits.

Macroeconomic policy

War finance

The war involved a massive budgetary effort. Public spending increased suddenly from 10 to 50 per cent of GDP (table 6.8), most of it in the form of military spending: soldiers' pay, army provisioning (food, armaments, and ammunitions, etc). Government consumption rose from 2–3 per cent before the war to a maximum of 22 per cent in 1916, when government investment decreased. In the short term, the conviction that the war would be short-lived led to an increase in short-term borrowing through *Bons du Trésor* (relabelled *Bons de la Défense Nationale*), and *Banque de France* credit (*avances*). When the war lasted longer than expected, long-term loans were issued each year from 1915 to 1918 to raise funds and consolidate the short-term debt, which nevertheless continued to rise.⁸

The government benefited from two important institutional assets developed during the nineteenth century. First, there was a well-developed capital market, especially for long-term securities; in 1913, the capitalisation of French securities on the Paris official market represented around 140 per cent of GDP, attaining 280 per cent including foreign securities, and securities issued amounted to around 10 per cent of GDP every year before the war. Second, there was a high degree of confidence in the government, as demonstrated by the permanently low yield on the

Table 6.8. *France: government budget*

	1913	1914	1915	1916	1917	1918	1919	1920
<i>Current values (m francs)</i>								
Government spending	5,067	10,065	20,925	28,113	35,320	41,897	30,688	28,115
Government income	5,092	4,549	4,131	5,252	6,943	7,621	13,282	22,505
Budget deficit (-)	25	-5,516	-16,794	-22,861	-28,377	-34,276	-17,406	-5,610
Government financial needs (Villa)	800	3,800	16,500	23,000	30,200	32,600	34,100	27,200
Debt variation (Villa)		5,480	9,090	25,890	29,900	19,900	54,100	19,600
<i>Shares of GDP</i>								
Government spending	10.0	22.3	46.4	47.2	49.9	53.5	29.2	17.6
Government income	10.0	10.1	9.2	8.8	9.8	9.7	12.7	14.1
Government financial needs	1.6	8.4	36.6	38.6	42.7	41.7	32.5	17.1
Budget deficit	0.0	12.2	37.2	38.4	40.1	43.8	16.6	3.5
Interest paid	2.5	2.8	3.9	5.6	6.9	9.1	7.6	9.5

Notes and sources: Budgetary data are quite bad for the war years. Financial needs of the government (Villa's BFG) are estimated from sources other than the budget, and vary from the deficit which results from the difference between income and spending. The variations of the government total debt (DETTÉ) given by Villa also gives different results. Bonnefous (quoted by Mouré, 2002: 42) gives the same figures as the budget deficit above from 1913 to 1918, but proposes higher figures for 1919 and 1920 (26,690 and 17,140 million, respectively). A memo to the Président du Conseil found by Mouré at the Ministère des Finances Archives (SAEF B 33985) also gives higher figures for the later years (49,858 for 1918, 42,601 for 1919 and 25,171 for 1920) (Mouré, 2002: 42). We discuss the series in more detail in Bordo and Hautcoeur (2003).

state *rentes*, one of the lowest in the world. This confidence in government was also demonstrated by the confidence in the value of the franc and in the Banque de France, whose notes represented a high proportion of the money stock during the nineteenth century and did not suffer any loss in credibility, even during the Franco-Prussian War. These strengths allowed the reopening of the Bourse shortly after the beginning of the War, and the issuance of enormous quantities of government bonds at relatively low interest rates.⁹

These strengths resulted partly from the political and social stability of France, which was more durable than in some of the other great powers: a parliamentary democracy with universal male suffrage, organised political parties all participating openly in political debate and power, organised labour (independent of political parties); and even the revolutionary and internationalist socialist faction did not oppose war, despite the assassination of its leader Jean Jaurès a few days before the war. In sum, political stability, monetary credibility, and a well-organised financial system allowed indebtedness to rise a great deal without much inconvenience.

State indebtedness rapidly reached a very high level (124 per cent of GDP as early as 1916), partly because it was already high (65 per cent) before the war. Even considering the normal smoothing of wartime expenses, an increase in ordinary government resources rapidly appeared necessary. Taxes nevertheless stagnated until the end of the war (table 6.8). Discussions of an increase in taxation began rapidly when the size of the deficit, almost 40 per cent of GDP each year, became clear. But there was enormous opposition to the idea of adding taxes to the 'blood tax', and the recent political conflicts on the income tax (voted in 1913) were on everybody's mind. Even the application of income tax during the war was resisted; it began only in 1916, at very low rates, and raised less than 1 billion francs during the war. The only new tax, on extraordinary war profits, voted for in 1916 with very high rates, began to produce significant revenues only after the war. This is because it was administratively difficult to levy a new tax on a base income that was poorly measured since it had not been used before. Thus, income tax remained mostly a political symbol during the war (Grotard and Hautcoeur, 2001). Furthermore, income from older taxes frequently decreased because of the drop in GDP, the invasion of part of the territory, and sometimes the inadequacies of the assessment methods in an inflationary context. The few small increases in their rates were not a sufficient solution to the deficit.

Another solution was monetary financing. Recourse to direct credit or *avances* by the Banque de France to the state provided low-cost income (table 6.9) and decreased the demand on the money and financial markets, maintaining low interest rates (table 6.10), and then relatively low

Table 6.9. *France: government debt (billion francs)*

	1913	1914	1915	1916	1917	1918	1919	1920
Banque de France <i>avances</i>	0.2	4.1	5.8	9.4	15.9	20.9	29.5	30.8
Treasury bonds (TB)		1.6	7.0	12.6	19.5	22.3	46.1	48.9
Short-term debt (includes TB)	2.1	7.0	14.7	22.3	33.5	56.0	79.2	83.3
Long-term debt	31.5	32.0	33.4	51.7	70.4	67.8	98.6	114.2
Total debt	33.5	39.0	48.1	74.0	103.9	123.8	177.9	197.5
Total debt/GDP	0.7	0.9	1.1	1.2	1.5	1.6	1.7	1.2

Notes: Treasury bonds include both Bons du Trésor and Bons de la défense nationale.

Sources: Villa (1997) and Banque de France's ANNHIST project (2003).

Table 6.10. *France: inflation and interest rates (per cent per year)*

	1913	1914	1915	1916	1917	1918	1919	1920
Private bonds yield	3.84	4.31	4.87	5.33	5.46	5.16	5.18	5.80
Banque de France discount rate	4.0	4.22	5.0	5.0	5.0	5.0	5.0	5.73
Yield on 3% <i>rente</i>	3.44	3.78	4.36	4.80	4.95	4.96	4.82	5.30
CPI inflation	0.6	6.8	17.1	11.9	22.1	24.2	23.0	36.2
GDP deflator inflation	0.0	5.8	16.8	16.8	21.7	32.1	21.3	41.2
M2 growth	5.7	5.4	6.9	11.6	22.9	22.8	35.4	5.5
M3 growth	4.9	4.1	4.5	8.4	20.5	21.4	34.9	6.3

Notes and sources: Interest rates from Statistique générale de la France. Prices and money aggregates from Villa (1997) (PC and PPIB series for prices).

government interest payments (table 6.8). This was possible temporarily because liquidity held by the public increased, especially in the later part of the war (table 6.11). But, in the medium run, banks started to discount at the Banque de France the Treasury bonds they held, which accelerated the growth of the money base and the inflationary process (table 6.10). In 1916 and 1917, some flight from the currency began. As a result of increasing prices, M2 and M3 dropped back to their prewar levels as a proportion of GDP (table 6.11), market long-term interest rates rose, although slowly, and deposits in savings and loans began to decrease in nominal terms in spite of a rise in their (state-guaranteed) return.

The government tried to slow the inflationary process by direct intervention in the economy through price controls, but evasion was widespread, and since monetary financing increased, inflation accelerated. Monetary resources became of practical importance for the government, especially if

Table 6.11. *France: monetary aggregates and public holdings of money*

	1913	1914	1915	1916	1917	1918	1919	1920
M2 (billion francs)	26.1	27.5	29.4	32.8	40.3	49.5	67	70.7
M3 (billion francs)	31.9	33.2	34.7	37.6	45.3	55	74.2	78.9
Increase of liquidity held by households (billion 1913 francs)	0.8	1.4	1.0	1.2	2.9	3.0	4.0	0.7
M2 (index)	1.0	1.05	1.13	1.26	1.54	1.90	2.57	2.71
M3 (index)	1.0	1.04	1.09	1.18	1.42	1.72	2.33	2.47
CPI	1.0	1.07	1.25	1.40	1.71	2.12	2.61	3.56
GDP deflator	1.0	1.06	1.24	1.44	1.76	2.32	2.81	3.97
M2/GDP (percentage)	51.3	61.0	65.2	55.0	57.0	63.3	63.8	44.3
M3/GDP (percentage)	62.8	73.7	76.9	63.1	64.1	70.3	70.7	49.5

Notes and sources: All amounts in billion francs. All from Villa (1997).

one adds the inflation tax onto the debt. An evaluation of monetary resources as the sum of the increase in Banque de France *avances* plus the product of the public debt multiplied by the difference between the inflation rate and the nominal yields on the 3 per cent *rentes* gives rather impressive amounts (table 6.12).¹⁰

The reason for such a high inflation tax is that contemporaries did not adjust their inflation expectations sufficiently. Until the end of the war, they widely believed that the franc would be restored to its prewar gold parity and prices would come back to their prewar level. Comparing financial markets' yields with those abroad, one observes that, at most, a 50 per cent depreciation of the franc was the expected price of the war, after which stabilisation was expected. One may even consider that higher long-term rates were more a reflection of expectations of taxes on capital income (which would actually materialise) than of monetary depreciation.¹¹ Furthermore, since interest rates in the United States had not increased substantially in spite of a 70 per cent rise in prices during the war, even a return to prewar gold parity was compatible with a substantial inflation tax if remaining gold standard countries did not impose a general price decrease. Because they had forgotten the lessons from the *assignats*, the *rentiers* paid a large share of the war's price.

Macroeconomic adjustment

More profoundly, an important question for the macroeconomic understanding of the war concerns the behaviour of the main components of global expenditures. Table 6.13 shows the main tendencies. As a result of

Table 6.12. *France: an estimate of the inflation tax*

	1913	1914	1915	1916	1917	1918	1919	1920
Increase in Banque de France <i>avances</i> :								
Billion francs and current prices	0.00	3.90	1.73	3.57	6.52	4.96	8.58	1.33
Billion francs and 1913 prices	0.00	3.90	1.45	2.66	4.08	2.39	3.31	0.37
Inflation tax on debt (billion francs and 1913 prices)	-1.62	-1.27	4.80	2.80	6.69	12.25	9.70	16.21
Total inflation tax								
Billion francs and 1913 prices	-1.62	2.63	6.25	5.47	10.76	14.65	13.02	16.58
Percentage of GDP	-3.2	6.2	17.1	13.2	26.7	43.4	34.9	41.3
Percentage of taxes	-38	79	221	188	350	596	352	381

Notes and sources: See text.

war, government consumption increased sharply. Nevertheless, this was not the only factor responsible for the decrease in household consumption and in investment. Actually, the increase in the trade deficit almost exactly matched the increase in government consumption until 1915, exceeded it slightly in 1916 and 1918, and by a wider margin in 1917 (some 10 per cent of French GDP that year), something explained above as inter-temporal smoothing of both consumption and investment.

Thus the decrease in private consumption and investment resulted mostly from the drop in real GDP. It seems that, at the start of the war, the belief that it would be short-lived led households and firms not to reduce their expenditure. The increase in government expenditure then resulted in a trade deficit. But the decrease in GDP in 1915 led to a sharp reduction in households' income and consumption (especially since they did not reduce their investment), even if their shares in GDP did not vary much. From 1916 on, it is more difficult to discern a clear story, because the data appear to suffer a consistency problem. The accounting equality between resources (imports + GDP) and their uses (exports + investment + consumption) that is used to construct table 6.13, does not hold, as the size of the error term shows. Unless there was an enormous surge in stocks, we face either an overvaluation of GDP or an undervaluation of some demands, or both. This error, which represents almost 14 per cent of GDP in 1916 and 20 per cent in 1917, makes it impossible to understand the macroeconomics of the second half

Table 6.13. *Macroeconomic balance of resources and their use in France (billion 1913 francs)*

	1913	1914	1915	1916	1917	1918	1919	1920
<i>Resources</i>								
Imports	8.42	6.40	9.27	15.40	17.22	10.78	13.82	13.98
GDP	50.83	45.08	37.90	44.47	44.20	37.80	40.54	44.67
<i>Expenditures</i>								
Private investment	6.95	6.32	5.46	5.01	4.78	4.45	5.42	6.63
Government investment	0.43	0.20	0.08	0.07	0.06	0.05	1.12	0.70
Household investment	2.40	2.26	2.14	2.16	2.09	1.61	1.69	1.01
Household consumption	38.88	37.77	31.49	32.17	32.58	29.34	34.46	35.64
Government consumption	1.37	1.90	6.22	9.63	9.25	7.73	2.59	1.57
Exports	6.88	4.87	3.31	4.64	3.76	2.28	4.59	7.53
Errors and stock variations	2.34	-1.84	-1.53	6.20	8.90	3.12	4.49	5.57

Notes and sources: All series are in billion 1913 francs calculated from Villa (1997).

of the war and to evaluate the extent of the smoothing of consumption and investment.¹²

One issue which can nevertheless be examined is the role of the trade balance. As already mentioned, the rapid increase in the deficit in both 1916 and 1917 not only more than compensated for the rise in government consumption, but compensated for the decrease in GDP ($M + GDP$ was superior in 1916 and 1917 to its prewar level, with exports being much lower). Thus the French only had to 'pay' immediately for part of the increase in government consumption, an amount representing some 12 per cent of available resources ($GDP + M$).

Financing the trade deficit

How was France able to finance such an upsurge in the trade deficit, especially when traditional compensating resources such as tourism also declined?¹³ The task of financing the deficit was mostly managed by the government, in a sharp break with previous free trade and gold standard experience. The first choice was to manage the exchange rate. Convertibility was suspended on 5 August 1914, which allowed the Banque de France to bring back its discount rate to a permanent 5 per cent (a relatively high level, but below what would have been needed to preserve convertibility). But the franc did not float freely. Intervention by the Treasury and the Banque de France controlled its depreciation to less than 20 per cent; between August 1914 and July 1915, the franc fell progressively from 5.2 to 6 francs per dollar. The franc/dollar exchange rate remained below 6 until the end of the war, being pegged successively at 5.83 from July 1916, 5.7 from the US entry into the war, and even 5.45 in the last quarter of 1918. The purpose of this management was twofold.¹⁴ First, the government wanted imports to remain cheap, mostly for budgetary reasons.¹⁵ Second, and most importantly, it could not accept the economic and political risk of sharp fluctuations of the exchange rate. An ordered exchange market was a political objective, since it testified to the strength and solidarity of the Allies against the German pressure.

The financing of the balance of payments was also consistent with that objective. Since the government managed the exchange rate, it had to provide the foreign currencies required, thus leaving little room for market adjustment by private loans or through the securities markets. Blancheton (2001: 108ff.) describes how this was done. The government bought back foreign securities held by residents (a conservative estimate suggests that they amounted in 1913 to around 100 per cent of French GDP, which would have been sufficient for the entire war deficit if all of it had been bought and could be sold at its prewar value).¹⁶ The government

borrowed gold from the Banque de France to do this.¹⁷ Then it sold the foreign securities or gave them as guarantees for loans issued abroad. The first French Treasury bonds in sterling were sold as early as October 1914 and the Treasury borrowed from New York banks starting in November 1914.

But the most important move was the agreement signed on 30 April 1915 by Lloyd George and Ribot (then *Président du Conseil*) for a £60 million loan. This organised the principle of the financial solidarity between the United Kingdom and France, which had recently been mentioned by Lloyd George in the House of Commons on 15 February. Joint loans by France and the United Kingdom on the American market followed. At the end of the war, French debts to the United Kingdom reached \$3 billion and to the United States almost \$4 billion. All these amounts plus \$1 billion in gold were used by the Treasury to provide foreign currencies for French importers (through the banks) and then to stabilise the exchange rate.¹⁸ One important point is that no speculation appeared on the exchange market until mid-1917, which allowed the scheme to work quite smoothly and without exchange control, and suggests that the exchange rate was not far from equilibrium as considered by the markets.

The state and adaptation

We observed above that the impact of the state's actions on the economy increased enormously during the war because of the rise in government expenditure and related demands on the labour and capital markets. With a budget representing around half of GDP, the state seems to have been as present as it is today in the economy, and maybe more so, because of the legitimacy that the war gave to its intervention. On the other hand, liberal economic thinking dominated and nobody thought the state had the administrative capacity to organise production directly. The state actually controlled little production directly, and let the private sector work whenever possible. Nevertheless, the legitimacy of direct intervention grew, and some new mechanisms were developed. I will show that their use was limited by the relatively good adaptation of the private sector to the war shock, and that most 'normal' economic mechanisms continued to work.

State intervention: instruments and ideas

Let us distinguish between the actual development of instruments for a more centrally planned economy and the development of an ideology insisting on co-operation and organisation as substitutes for the liberal

credo. Albert Thomas, a socialist, had an important role in the former, establishing a new specialised sub-department for artillery and ammunition in May 1915. In December 1916 this was transformed into a full Ministry of Armaments, which co-ordinated all the state's productive activities directed to the war. Thomas's particular objective was to exchange the willing participation of workers in the war effort for social measures, especially compulsory arbitration (in 1917) and a minimum wage in war-dedicated factories.

But even if he intervened directly in the functioning of some markets, Thomas was more interested in co-ordination than in *étatisation* or even German or US-style cartelisation. And this policy was given a more liberal orientation when Thomas was succeeded in September 1917 by Loucheur, who nevertheless did not modify the overall organisation that had been set up. Actually, the most important change was that all social questions were transferred to the Ministry of Labour whereas Thomas had maintained an intimate relationship between social and industrial policies.

In order to maximise manufacturing (mostly armaments) production, Thomas organised private firms in groups, with which the government discussed products and prices. For example, there were fifteen groups for the production of shells, in which 375 firms were interested. This simplified the task of the administration, without subordinating it to privately organised cartels, which the famous Comité des Forges had proposed to develop. Although manufacturers frequently asked the state to guarantee that it would buy all their production, this guarantee was never given, and the state imposed reorientation of production against their initial wishes. True, this co-ordination led in many cases to an increase in the power of (relatively weak) prewar cartels, profits were sometimes high and considered justified. Hardach (1977a and 1977b) nevertheless concludes that in France there was no such fusion of cartels and the state administration as there was in Germany and the United States during the war.

This action by Thomas was reinforced by that of Clémentel, Minister of Commerce, who considered that the French economy was weakened by its insufficient cartelisation (in comparison with Germany and the United States), and that the state should create incentives for a better organisation of French capitalism which would help it to become more dynamic and growth-oriented, especially towards foreign markets (Kuisel, 1981). That central idea was shared by Henri Hauser, who, for example, proposed a reorganisation of the chambers of commerce into a smaller number of units that would be more efficient at mobilising their efforts. But all these ideas remained mostly in the rhetorical sphere, and did not lead to many state interventions during the war.

For example, direct state intervention remained limited, in spite of a permanent rhetoric, especially at the *Chambre des Députés*, of ‘industrial mobilisation’, ‘factory requisition’. Thomas never tried to have direct authority over the war industry, but created some minimal protection for the mobilised workers assigned to armament factories who, like soldiers at the front, had no normal workers’ rights such as the right to go on strike or to join a union, something which had led some manufacturers to reduce their wages or increase their work load. Even this was not sufficient to avoid an increase in strikes (by ‘free’ workers) in 1917, which involved some 300,000 workers in the armaments industry alone.

The state intervened more directly in foreign trade, but this came quite late. It was not until March 1917 that imports required government authorisation and the commercial fleet was requisitioned. The exchange control was created progressively from August 1917 on.¹⁹ These decisions led to enormous protests by manufacturers, but they had to be accepted in the face of the emergency situation, the insistence of the Allies who were financing ever-increasing French imports, and the political necessity of limiting excessive profits. They were successful at least in decreasing (sharply) imports in 1918, at an unknown economic, social, and military cost. The administration that was created in order to maximise the efficiency of remaining imports, in which manufacturers had an important representation, worked quite smoothly. Nevertheless, such an intrusion of the state into the daily functioning of the economy was never accepted and never reached the gigantic proportions of what existed for a long time in Germany. Even if it was maintained until 1926, the exchange control never really worked, and import rationing disappeared rapidly after the war.

The flexibility of the private sector: two tests

A test of the force of market mechanisms is whether production followed demand without an enormous adaptation cost. Since the allocation of the labour force among sectors was little controlled by the government and changes in production are relatively well known (and, unsurprisingly, mirror those in the labour force allocation, see tables 6.1 and 6.4), an important question is whether these changes came at a large or small cost. One key test of the flexibility of the economy is the change in labour productivity.

What does theory suggest? A big rise in the number of government ‘employees’ during the mobilisation meant a reduction in the quantity of labour available for private economic activity. If everything else was equal and the capital stock was stable, this should imply a rise in average

Table 6.14. *France: productivity in various sectors and the private economy (1913 = 1)*

	1913	1914	1915	1916	1917	1918	1919	1920
Energy	1	0.83	0.69	0.73	0.83	0.78	0.70	0.69
Intermediate goods	1	0.98	0.69	0.58	0.52	0.45	0.48	0.57
Investment goods	1	0.75	1.20	1.50	1.20	0.66	0.51	0.53
Investment goods (revised)	1	0.75	0.70	1.03	0.87	0.66	0.51	0.53
Private economy	1	0.85	0.75	0.83	0.80	0.67	0.72	0.77
Private economy (revised)	1	0.98	0.96	0.97	0.89	0.74	0.72	0.77

Notes and sources: Mean labour productivity for the private economy as a whole is PRODE from Villa (1997). Series are revised as explained in the text.

productivity and real wages. In fact, many other things were not equal. First, the army took the most vigorous and frequently the most qualified workers, especially from the fields and the factories, which may have decreased productivity and then the demand for labour. Second, disruption to the economy increased costs, with a negative impact on labour demand. Third, the shifts in demand imposed a reorganisation of many sectors, leading to price reductions and losses in some industries, and then wage cuts even when the level of productivity had been maintained. Fourth, the migration of refugees from the occupied regions to the rest of France was not homogeneously distributed, benefiting mostly cities like Lyon or Bordeaux and imposing other adaptation costs. Finally, the stock of capital and the flow of investment were affected. In the face of these negative shocks, one may consider that a small decrease in productivity would be a sign of a good adaptive capacity of the private sector, while a substantial drop would suggest that it could not resist these shocks.

Given the difficulties with the measure of the capital stock, I concentrate here on labour productivity. The first problem is that the production data include the production of independent workers whose distribution among sectors is unknown. Hence I could not calculate labour productivity indices, except for the private economy as a whole and for those sectors where independent work was negligible. This was the case in the energy, intermediate, and investment goods sectors, where in 1919, the first year for which these data are available, independent workers represented less than 20 per cent of employees, in sharp contrast with most other sectors.

The first rows of table 6.14 show the change in labour productivity in these three sectors, calculated using Villa's data. They suggest a sharp decrease in productivity for the private economy as a whole, with extreme

cases like the intermediate goods sector, where the initially high level of productivity would not be regained before the middle of the 1920s. The revised evaluation uses our revised estimate of the total labour force in the private economy (table 6.15). Productivity in the three sectors is calculated using each sector's production and dividing it by an estimate of the sectoral labour force. This estimate adds to the employees of each sector (Villa's NSU series) the same proportion for independent workers as they had in 1919, 0.3, 9, and 19 per cent respectively of the number of employees for the energy, intermediate, and investment goods sectors. The revised series for the investment goods sector results from adding to that revised labour force 500,000 (mobilised) workers for each of the years 1915–17.

There are two reasons for revising Villa's labour force series in this way. First, they suggest, surprisingly, that the total labour force of the private sector is little affected by the war, in contrast to the number of wage earners. Second, they give no figures for government workers, as if the latter were included in the private sector. If one evaluates the number of state workers from the data on wages paid by the government, and the number of independent workers in the private sector by supposing they were affected by mobilisation in a similar proportion to salaried workers (table 6.15), one finds numbers that are consistent with the size of the army (around 5 million men) and a significant elasticity of the labour force. The total labour force increases from 18.4 to 20.8 million, which represents an important rise in the participation rate if one considers the death-toll from the war.

This new estimate of the total private sector labour force gives a very different view of the change in productivity, which remained stable at the beginning of the war and decreased at the end. Such a change, because it implies that the decrease in production resulted only from the decrease in the labour force but not from a disruption of the economy, is consistent with the hypothesis of some underemployment in the economy before the war, which came back when it ended. Nevertheless, it is likely that some disruption did exist, and that some reduction in productivity occurred before 1917, which my rough estimate hides, but which seems more natural than a sudden decrease in 1917. The cases of the energy and intermediate goods sectors are consistent with that.

The investment (mainly military) goods industry has been highlighted as an example of spectacular productivity improvement. This underlay the satisfaction in the *Rapport Clémentel* (Ministère du Commerce, 1919), which explained that the war had given opportunities to introduce Taylorism to France and so raise productivity. Most of the increase claimed, however, is probably a statistical artefact resulting from the exclusion of the mobilised workers mentioned above from measured

Table 6.15. *France: revised estimates of the labour force (thousands)*

	1913	1914	1915	1916	1917	1918	1919	1920
Employees, private sector	9,175	7,828	6,884	7,685	8,185	8,247	9,218	9,474
Independent workers (estimate)	8,355	7,128	6,269	6,998	7,453	7,510	8,581	8,618
Government employees (estimate)	969	2,499	6,130	5,316	5,207	4,801	1,000	939
Total labour force private sector (Villa)	17,530	17,236	16,854	17,178	17,380	17,405	17,798	18,091
Total labour force private sector (revised)	17,530	14,956	13,154	14,682	15,638	15,757	17,798	18,091
Total labour force (private + government)	18,499	17,455	19,283	19,998	20,845	20,558	18,798	19,030
Population	39,770	41,700	40,700	40,100	39,500	38,750	38,700	39,000

Notes and sources: Employees in the private sector is NSE from Villa (1997); independent workers starts from EIE 1913 data from Villa and assumes for the war years a similar evolution each year (in relative terms) as for employees. Total labour force in the private sector is EMPE from Villa. Our revision is the sum of employees and independent workers as described in the text. State workers are estimated from the total wages paid by the state (MSG from Villa), assuming that the mean wage in the public sector changes from 1913 onwards at the same pace as the mean wage in the economy (WH from Villa). Revised total labour force is the sum of private and public sector labour forces from our estimates.

employment. Taking them into account gives a lower, more plausible estimate of the increase in productivity.

As surprising as it may appear, the productivity test suggests that the economy adapted with relatively little cost to all the disruptions imposed by the war, so that the main impact of the war on production was through the reduction in the quantity of labour available. The effects of the various disruptions mentioned may have compensated each other, but the most likely explanation is that a flexible economy was able to adapt rapidly to these shocks, with little impact on overall labour productivity. The case of the armaments industry is no exception, since it benefited from special treatment by the government because of its key role in fighting the war.

Another test of the flexibility of the economy in the face of supply and demand shocks is the change in relative prices and wages among sectors. A rise in prices, especially if it was not accompanied by a reduction in productivity, would signal a constraint on demand. It could lead to high profits and wage increases. On the other hand, a decrease in prices without an increase in productivity could be the result of a diversion of demand from its peacetime allocation, leading to losses and eventually to failures, even if the expectation of the 'return to normality' made it difficult for firms to abandon their assets.

Unfortunately, no data are available on relative wages before the end of the war (1920). I can thus only compare the change in production and prices among sectors during the war. In a normal market, an increase in production requires a rise in labour and capital inputs, and leads to price increases only if marginal productivity decreases. If I suppose that productivity was not much affected, I can use the difference between the change in production and prices as a test of the flexibility of the economy.

Agricultural production never decreased by much more than 20 per cent. Prices too remained fairly stable, decreasing slightly in relative terms, which suggests that the quantity of food available remained sufficient during the war, probably thanks to imports. The drop in the production of the food processing industries was sharper, but prices did not move much, suggesting demand also decreased. The dramatic increase in armaments production was not reflected in rising prices, which goes against the contemporary rumours of enormous war profits. Nevertheless, the investment goods sector is broader than the armaments industry, and the prices of contracts between the government and armaments producers may have remained outside price indices, so that this claim needs to be verified. Energy production, mostly coal production, was greatly affected by the start of the war, and prices rose, suggesting demand was quite inelastic. Prices decreased thereafter, probably thanks to rapidly expanding imports.

Table 6.16. *France: relative variation among sectors from 1913 to 1920*

	Wages	Prices	Production
Agriculture	1.24	0.73	1.07
Food industries	0.78	1.02	1.00
Energy	0.93	1.51	0.95
Intermediate goods	1.14	1.11	0.74
Investment goods	0.83	1.11	0.82
Consumption goods	1.36	1.62	0.90
Construction	1.15	1.24	0.49
Trade	1.06	0.82	1.10
Transportation	0.66	0.76	1.32
Services	1.04	0.31	1.52

Notes and sources: The change in index numbers of wages, production, and prices in each sector, based on 1913 = 1, relative to change across the whole economy. Calculated from Villa (1997).

The prices which rose most were those of construction, intermediate goods and, increasingly, consumption goods. It is no coincidence that these sectors experienced the sharpest and most durable reductions in production (a reduction which reached 80 per cent for construction in 1918 compared to 1913, 65 per cent for intermediate goods, and more than 50 per cent for consumption goods). In these three cases, it seems that the constraint on supply produced by the mobilisation was not followed by a similar reduction in demand. In the case of intermediate goods, it seems reasonable to observe a rise in prices when the output of the sector decreased significantly in comparison with that of other sectors which were its clients. For construction and consumption goods, one may think that the macroeconomic conditions were not without responsibility for this situation. Even if price controls were set up, an expansionary monetary policy (see below) led the population to seek refuge in real estate or in increased consumption. The control of rents (which decreased continuously relative to other prices until the mid-1920s) was intended to limit speculation in real estate. But it made more income available for consumption.

What we observe in 1920 (table 6.16) on wages confirms these observations. Wages increased more rapidly in the consumption goods, construction, and intermediate goods sectors, reflecting price increases that resulted from penury and not from increased costs. Agriculture, where relative wages increased significantly, is no exception, even if prices seemed to decline. Price control was widespread but the black market

developed widely, making the peasants who did not go to the front notoriously rich. On the other hand, transportation production increased, but price control led to increasing losses and relative wages decreased.

One may tentatively conclude that market mechanisms still worked during the war, even if government interventions on demand, the allocation of labour, and prices made these mechanisms less efficient. Much more detailed study of prices and wages at the local and industry level is nevertheless needed to confirm this provisional conclusion.

Conclusion: the war and postwar growth

The cost of the war

Sauvy (1984) gives figures for the aggregate cost of the war. Human losses relative to population are among the most important in all participating countries. In France, 1.31 million men were killed, and 1.1 million were severely wounded with permanent work incapacity. The existence of 600,000 widows and 750,000 orphans created enormous pension costs (2–3 per cent of GDP during most of the interwar period), the legitimacy of which was sometimes questioned (as in the case of the 900,000 parents that also benefited from pensions). If one adds excess mortality during the war, together with the low birth rate, the total impact on the population was around 2.95 million, or 7.2 per cent of the population, with increased imbalances between the sexes and ages. This increased the proportion of the active to the inactive population, not an asset for postwar growth.

Material destruction resulting from the war was more important in France than in any country except Russia: Michel (1932) counts, for example, 222,000 houses destroyed, 3 million hectares, half the roads, 1,800 kilometres of canals, and 5,600 kilometres of railways needing reparation or reconstruction. Villa evaluates the impact of war damages on private productive capital at a quite low 1.6 billion 1913 francs in buildings (4 per cent of the capital stock) and 1.2 for other material (7 per cent of the total). By comparison, the Reparation Commission evaluated destruction by the Germans at 34 billion 1913 francs, including 6.8 billion for manufacturing and mining, 8.8 billion for agriculture, and 7.2 billion for real estate. Sauvy (1984) proposes to add 10 billion for capital depreciation in excess of the normal rate, and 20 billion for the decrease in French foreign assets, and suggests a global cost of 55 billion, or 125 per cent of the 1913 national income.

Labour

There is a surprising discrepancy between the qualitative account of the effects of war and some quantitative data. Qualitatively, one usually considers that the war increased the homogeneity of the country by helping peasants in remote areas to discover the rest of the country, and sometimes to discover new consumption, new techniques, new ways of life. More directly, the war is supposed to have helped to decrease the share of the rural population and the agricultural labour force, increase the participation of women in the labour force, and increase the importance of large relative to small firms.

If few measures of the geographic homogeneity of France have been made in order to test the first set of hypotheses, global quantitative data do not confirm the other hypotheses. First, it seems that the war had little effect on the choice between independent and employed status, either in agriculture or in other sectors. The number of independent workers even rose slightly from 8.35 million in 1913 (including 4.72 million in agriculture) to 8.58 million in 1919 (4.98 million in agriculture); and the proportion remained stable. The same is true for the relative sizes of agriculture, manufacturing, and services. The impact of the war on women's work also seems quantitatively unimportant. The number of women in the labour force rose from 7.2 to 7.4 million from 1913 to 1919, but since the number of men was also rising slightly, the proportion of women remained constant at 36 per cent. Continuity then dominates in the facts, even if mentalities may have changed more.

Capital

The capital market was persistently affected by the financing of the war. Inflation was required to reduce the size of the public debt (Bordo and Hautcoeur, 2003), but it also affected the private capital market. All security holders were severely affected, which, combined with severe tax increases, resulted in an important decrease in wealth and income inequality (Piketty, 2001). Nevertheless, in the second half of the 1920s, private issues had regained and surpassed their prewar level, and the securities market was more buoyant than ever. Securities were favoured by the maintenance of the rent controls created during the war, which crowded out investment in real estate.

If the private capital market was dynamic, the banks were more profoundly affected, as suggested by the decrease in the real value of their deposits. One reason was the creation or development of public financial institutions that had a major role in financing the economy after the war.

The *Crédit National* was created in order to finance the reconstruction by issuing loans and providing credit, and both the *Crédit Agricole* and the *Caisse des Dépôts et Consignations* benefited from the war (Aglan et al., 2003). They may have pioneered a more centralised allocation of financial resources, intermediate between the wartime authoritarian (but limited in scope) process and earlier market mechanisms.

France's international position

All these changes were important but, as discussed earlier, the French economy apparently adapted quite well to the war, and the same looks true for the 1920s, a period during which French growth was quite rapid in comparison with its neighbours, much to the surprise of those impressed by the atmosphere of budgetary or monetary crisis which dominated until 1926. Was the growth of the 1920s artificial, helped by an inflation tax on the unproductive *rentiers*, an undervaluation of the franc, and the refusal to pay for the war debts? Probably not to a very large extent, since the growth had sound technological and manufacturing foundations, and long-term interest rates in 1929 did not incorporate an inflation premium (Hautcoeur and Sicsic 1999). Also, some currency undervaluation was probably necessary, and would have disappeared within a few years.²⁰ Hence the most important negative legacy of the war was not strictly economic. This was the difficulty France had to find a new position in the world, at both the economic and political levels. Before 1914, France had a central financial and political position in continental Europe and the Mediterranean, which balanced the industrial position of Germany and complemented the mostly intercontinental position of Britain. Its instruments were diplomacy and loans to Spain, Italy, Russia, Austria, the Ottoman Empire, Egypt, etc. The war disrupted this order and France, like other major countries, hesitated between reconstructing a new global system from scratch and a more autarchy-oriented, state-organised economy for which many thought, erroneously for a large part, the war had given an efficient example (James, 2000). Partly because of that hesitation, no solution was found. Autarky was costly and unacceptable for business, and the French, British, and German ambitions were every day in conflict over the new international order, as the example of the reconstruction and collapse of the international monetary and financial system shows. It led directly to the Great Depression and a second world war.

Notes

- 1 I thank S. Broadberry, M. Harrison and other participants at the Warwick Summer 2002 Economic History Workshop for comments. I also thank M. Trachtenberg for his suggestions and P. Villa for help with his data set. None of them is responsible for any remaining shortcomings and errors.
- 2 See the chapters under the sub-heading 'War, Crisis, War' (pp. 633–85) in Braudel and Labrousse's (1980) synthesis.
- 3 The settlement of futures on the stock market at the end of July 1914 was reported successively until the end of September 1915; a moratorium on commercial bills was decided on 31 July and suppressed progressively from 1915 to 1918; bank accounts were partially blocked until 1 January 1915 (Blancheton 2001, 90s).
- 4 Villa's data have not been produced in order to study the war; indeed, almost the contrary. He calculates production for the entire territory, including the occupied parts. From 1914 he includes the German region of Alsace-Lorraine which was returned to France legally only by the Versailles Treaty. This explains, for example, why the total population jumps by 5 per cent in 1914 compared to 1913. Data for the war years are extrapolated back from the 1921 census and from the 1924 national accounts (reconstructed by Vincent, 1965), using a half-yearly statistical survey of France's most important firms.
- 5 Adult men were also waging the war in the French army.
- 6 $\frac{6.5+1.87}{39.65+1.87} = 20$ per cent and $\frac{3.6+1.87}{39.65+1.87} = 13$ per cent. We prefer the lower figure because the flight of refugees from the occupied zone occurred mostly at the start of the war and probably included a relatively high proportion of people of working age.
- 7 The transportation system in non-occupied France was little affected since the crucial centre of the network, Paris, was saved, *in extremis*, from invasion. The same was not true for the occupied territories, which had difficulties communicating with each other because of the structure of the railway and road networks.
- 8 For summary data on these loans, see Blancheton (2001: 98); for more details, Germain-Martin (1925).
- 9 The stock market activity nevertheless remained limited during the war, first because many small bankers were bankrupt since the crash of August 1914, and most importantly because of the prohibition of the option and futures markets and the control of private issues.
- 10 One would prefer to use a market short-term interest rate, but none is available. However, it does not matter much since the government was able to borrow at low interest rates in the short term because of the discounting guarantee of the Banque de France.
- 11 For a comparison with Britain and Germany, see Balderston (1989).
- 12 For example, existing series suggest a drop in the shares in GDP of both consumption and investment with no decrease in the trade deficit, which is impossible.
- 13 France had experienced a permanent trade deficit from the end of the nineteenth century, but this was balanced by resources from tourism, service

exports, and income from assets held abroad. During the war, most of these resources also declined, the only compensation being the wages of (mostly British) foreign soldiers waging the war in France (one estimate proposes 9 billion francs on that account for the entire war). Unlike in prewar France, the balance of payments deficit was then similar to the trade deficit during the war.

- 14 As surprising as it appears, the management was organised on a bilateral basis for each currency traded in Paris (Blancheton, 2001: 115–26).
- 15 This reason is not compelling since the real exchange rate did not move that much before 1918; and it substituted foreign to domestic debt, a dangerous move even if one consistent with an inter-temporal smoothing of the cost of the war.
- 16 As is well known, a large number of French assets was tied up in Russian, Austrian, and Ottoman debts, the value of which was destroyed by the war. Securities bought by the Treasury represented around 9 billion francs.
- 17 At the same time the Banque de France asked the French to sell their gold at the official prewar parity for national defence. It was able to obtain 2.4 billion francs in gold during the conflict, mostly during the first year. Even considering the 2 billion lost as guarantees of foreign loans, the Banque held more gold at the end of the war (5.5 billion francs) than at the beginning (5.0 billion). This was more than was required for monetary credibility.
- 18 Actually, these amounts certainly exceed the French balance of payments deficit for the war, since France also lent money to other Allies such as Italy and Russia.
- 19 Except for the 5 July 1914 prohibition on gold exports, the foreign exchange market had remained free during the war. A *commission des changes* created on 6 July 1917 under banker Octave Homberg helped to prepare the 2 August law, creating a compulsory registration of all exchange operations. A law of 3 April 1918 was more restrictive of capital exports but still accepted a number of derogations.
- 20 US protectionism and Germany's reluctance to pay the reparations made the restoration of the French external position difficult. As we argue in Bordo and Hautcoeur (2003), the stabilisation of the franc would have been much more easily and satisfactorily done in a less conflicted context.

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7 The United Kingdom during World War I: business as usual?

Stephen Broadberry and Peter Howlett

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).

Introduction

World War I transformed the British economy in the short run and had a significant impact on growth and development in the long run.¹ 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, 2005). 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; 2005).

The scale of mobilisation

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.² The pattern in table 7.1 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 7.2, we see that by 1918 the 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 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 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

Table 7.1. *United Kingdom: real GDP at constant factor cost, 1913–1919 (percentage of 1913)*

	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 7.2. *UK population and employment, 1913–1919 (percentage of 1913)*

	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).

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, this was offset by lower levels of employment in traditionally female industries such as textiles and clothing (Bowley, 1930: 171; Milward, 1984: 35–6).

Combining the compromise estimate of GDP from table 7.1 with the population and total employment estimates from table 7.2 yields the series for GDP per head and GDP per employee in table 7.3. As was the case with output, GDP per head and GDP per employee increased during the war but then dropped back sharply to the prewar 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

Table 7.3. *UK GDP per head and per employee, 1913–1919 (percentage of 1913)*

	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 7.1 and 7.2, using compromise GDP and total employment.

Table 7.4. *Comparative US and German output per employee by sector, circa 1911 (percentage of UK)*

	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).

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 7.4 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

Table 7.5. *UK: components of expenditure on GDP at constant market prices, 1913–1919 (percentage 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).

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 7.5 presents data on the components of expenditure on GDP at constant market prices.³ 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.⁴ The increase in government spending came mainly at the expense of consumers' expenditure, although investment and exports also fell back.⁵ Figure 7.1 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).

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 7.6, covering agriculture and services as well as industry, since fighting a total war requires more than producing munitions.

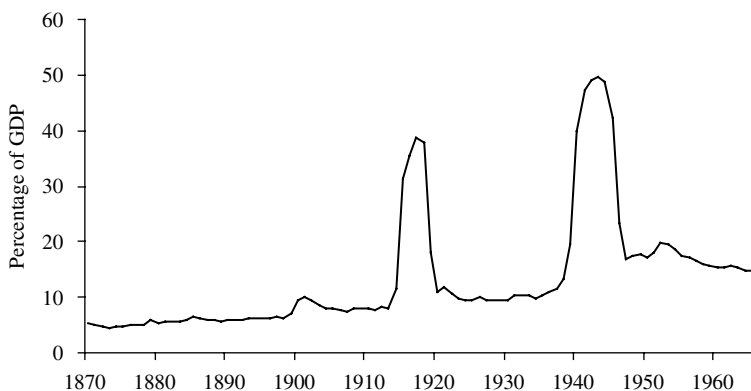


Figure 7.1. UK government spending (percentage of GDP at constant prices)

Source: Derived from Feinstein (1972: table 5).

Britain was highly dependent on imported food supplies, as a result of the prewar 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 policies adopted in Germany and many other European countries (Olson, 1963). During the five-year period 1909–13, 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 7.6 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: 94–5). 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

Table 7.6. 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: 248–9, 279, 288–9); 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, 130–1); machine guns (vol. XI, part V, 27); rifles (vol. XI, part IV, 67); shells (vol. X, part V, 78–9); 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).

1920, were quickly repealed in 1921 when prices started to fall sharply (Whetham, 1978: 139–41). Hence the prewar distribution of the land between pasture and crops was quickly restored.

Turning to industry, table 7.6 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: 257–69; 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 7.6. 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 7.6, 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 a later section.

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: 209–10). Nevertheless, shortages of skilled labour and steel, together with continuing Admiralty demand for warships, prevented merchant shipbuilding from regaining prewar levels (Fayle, 1927: 239–54). 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 7.6, 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 7.6 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: 41–3). 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: 274–91).

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: 261–5). Again, the aim was to ensure that savings were channelled into government loans.

Fiscal and financial management

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 7.1), 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 7.7 shows that total government expenditure increased by more than thirteen-fold in current prices between 1913/14 and its peak in 1917/18.⁶ 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 7.6. 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

Table 7.7. *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

Notes: Years are fiscal years (thus 1913/14 is 1 April 1913 to 31 March 1914). Until 1915/16, expenditure on munitions is 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.

Sources: Kirkaldy (1921: 214–15); Mallet and George (1929: 392–3); Feinstein (1972: table 4).

expenditure, but the onset of war overwhelmed the prewar 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 7.7 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 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 sixfold 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 taxpayers from 1.1 million prior to the war to 3.5 million in the final year of the war (Mallet and George, 1929: 322–8, 395–8). Most of these new taxpayers were wage earners who became liable for tax between 1916 and 1918 (Balderston, 1989: 236–7).

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 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 rule 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: 40–4; Balderston, 1989: 222–4).

Financing the deficit

Table 7.8 shows the principal sources of finance of the wartime budget deficit noted above. The most important source was long-term domestic

Table 7.8. *UK: financing the 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

Notes: Domestic short debt consists of Treasury bills and ways and means advances.

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

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: 124–62, 175–83). However, to a limited extent, the government also financed the deficit by allowing an inflationary expansion of the money base (Capie and Wood, 1994: 232–4).

Tables 7.9 and 7.10 demonstrate the consequences of these methods of war finance for the national debt and for inflation. In table 7.9, 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: 233–4).

Table 7.9. *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

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.

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

Table 7.10. *UK: money and prices, 1913–1919 (percentage 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.

The effect of this is shown in table 7.10, 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 7.10 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: 53–5).

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 7.11, 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.

Table 7.11. *UK: the 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

Notes: A minus sign indicates a debit item. Merchandise exports include re-exports.

Source: Morgan (1952: 304, 341).

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: 320–1). 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: 317–26). 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 7.11 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 10 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 7.11 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: 307–10). 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: 326–9).

Although Britain was effectively off the gold standard during the war, the authorities did attempt to keep sterling at the prewar 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).

Government controls and market forces

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. Prewar 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 by 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 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 reactive. 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: 206–7; 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).

Markets, distribution, and efficiency

As noted in the introduction to this volume, the classical analysis of a war economy predicts a boom as government spending does not displace private spending on a one-for-one basis and workers increase labour supply to smooth out the reduction in private consumption. This real business cycle model of Barro (1974; 1981) is adapted by Ahmed (1986) to the case of the British economy during the twentieth century covering both world wars. The model captures the crude features of the British economy during both wars, including the boom in overall activity, the smaller reduction in consumption than the increase in government spending, and the spillover of excess demand into an excess of imports over exports. Although few historians are likely to be convinced that the

achievements of the British war economy are largely the result of the smooth operation of market forces, the classical analysis does remind us that Britain had a long history as a market economy which the state was able to draw on during 1914–18.

In fact 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: 22–3). 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 into 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: 412–18) 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: 426–7). 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: 213–14).

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).

The long-run impact on wealth

In this section we use the national balance sheet framework set out in the introduction to this volume to evaluate the long-run impact of World War I on Britain's wealth. Table 7.12 presents the results using a conventional balance sheet approach that takes account of losses to physical capital and external disinvestment. 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).

Table 7.12. *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

Source: See text.

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 7.1, World War I appears to have had a dramatic impact, but not quite on the same scale as World War II.

In table 7.13, 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 childrearing 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

Table 7.13. *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

Source: See text.

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 of 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 of 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 7.1). 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 7.13. 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).

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 industries. (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 adult 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 7.1, 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, 2005). 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).

Notes

- 1 We are grateful to Forrest Capie, Stig Förster, and participants in the conference on the Economics of World War I, University of Warwick, for comments on an earlier version of this chapter.

- 2 Feinstein (1972) does not provide an output-based estimate of GDP during the war years.
- 3 The picture is very similar at current prices; See table 1.5.
- 4 Note that this definition of government spending excludes debt interest payments and transfers as well as capital expenditure.
- 5 Investment includes stock building as well as gross domestic fixed capital formation.
- 6 This definition of government spending includes debt interest payments, transfers, and capital expenditure.

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8 Poor Russia, poor show: mobilising a backward economy for war, 1914–1917

Peter Gatrell

The war taught us much, not only that people suffered, but that those who have the best technology, discipline, and machinery come out on top; it is this that the war taught us, and it is a good thing it taught us (V. I. Lenin, cited by Bailes, 1978: 49).

Introduction

Russia's participation in the First World War began on 19 July 1914 and ended on 26 October 1917 (old style), when the Bolshevik Party seized power.¹ In three and a quarter years Russia conscripted 10 per cent of its population and spent on average around 24 per cent of its national income in each year of war. Russia's premature departure from the war nevertheless brought but temporary respite from conflict. Civil war and foreign intervention erupted in the summer of 1918. Only at the very end of 1920 were peacetime conditions restored, by which time the political and socio-economic system had undergone a profound transformation. Russia thus experienced a prolonged period of upheaval, characterised by the mobilisation of resources for war and revolution (Holquist, 2002). These processes were accompanied by demographic shocks, depletion of the capital stock, a rupture of external and internal trade, and (by 1918) the collapse of the currency. This chapter devotes particular attention to the behaviour of the major economic variables, providing a quantitative illustration of the impact of war up to and including the Bolshevik Revolution.

Russia entered the First World War as one of the world's great dynastic empires and with a large and growing economy. A generation of sustained industrialisation, backed in part by foreign direct investment, enabled Russia to begin to close the gap on the west. Literacy rates had risen rapidly, infant mortality rates had begun to fall, and new urban centres were springing up. Even if the political system remained sclerotic, particularly at a national level, Russia had major achievements to its credit, leading the way in experiments with new artistic, literary, and musical forms, and making major scientific and technological advances. More to

the point, a protracted European war did not appear to pose acute difficulties. There were two main reasons for this. First, Russia had embarked on rearmament measures that alarmed the German high command, and stockpiled sufficient munitions for the war it expected to fight (Gatrell, 1994b: 297–301, 320). Second, its territorial size and population conferred advantages upon Russia vis-à-vis its rivals. In particular Russia could draw upon seemingly inexhaustible reserves of domestic manpower and food (Prokopovich, 1918: 3–32; Tugan-Baranovskii, 1915: 269–324). But the war was to demonstrate that size mattered only if resources could be mobilised effectively.

By the end of the war, following the Bolshevik triumph in October 1917, the tsarist dynasty had vanished ignominiously, the territorial unity of the old empire had fragmented, and the Russian economy lay in ruins.² Russia's much-vaunted advantages proved illusory. The bloated wartime army disintegrated, as weary peasant soldiers returned to their villages in order to seize and redistribute privately owned land. A severe food crisis prompted the mass exodus of desperate workers from once thriving urban centres. In the aftermath of revolution, leading cultural figures followed their upper-class patrons into exile. The subsequent civil war (1918–20) vindicated their predictions of further economic catastrophe, although the revolutionaries themselves retained hopes that social divisions would be overcome, cultural activity transformed, and economic advantages disseminated more widely than hitherto. All the same, from a vantage point in 1917 or 1920, this utopia was a distant vision. Russia was beset by economic calamity and social disintegration (Lewin, 1985; McAuley, 1991; Smith, 2002).

I have resisted the temptation to provide a full account of the period of 'War Communism' (Malle, 1985). However, it is important to bear in mind the words of an astute observer of the Russian scene:

In the case of Russia, civil war and revolution followed so closely upon the World War that it is almost impossible for history to measure with any degree of accuracy the effects of the World War itself upon the economic and social life of the country. Those effects were so distorted by the forces let loose in the postwar years and so confused with the disturbances of the revolutionary era that the attempt to isolate the phenomena of the War from the data of civil war has been a task of unparalleled difficulty (James Shotwell, Preface to Struve et al., 1930: ix–x.)

This chapter is a modest attempt to surmount that difficulty.

On the eve

By 1914 Russia had experienced more than a quarter-century of rapid economic growth. To be sure, this spurt was interrupted by a sharp

downturn between 1900 and 1908, a period coinciding with the Russo-Japanese War and the revolutionary upheavals of 1904–6. Yet the long-term trajectory was unmistakable. Total output grew by around 3.4 per cent per annum between 1885 and 1913, and 5 per cent per annum between 1909 and 1913 (Gregory, 1982: 56–7). Most dramatic of all was the transformation of large-scale industry, marked by the emergence of a more modern fuel economy, a modern iron and steel sector, and new industries such as chemicals and electrical engineering (Gatrell and Davies, 1990). Russia's large and notoriously unstable agricultural sector developed at a less dizzying speed. Agriculture was dominated by the production of cereals for household consumption, as well as for the domestic and export markets. (Around 25 per cent of the cereal harvest left the Russian village before the war.) Unpredictable meteorological conditions continued to ensure the volatility of grain production. Yet here too there were signs of progress. Peasants who had taken the opportunity to migrate to western Siberia found prosperity in livestock farming and in the co-operative marketing of dairy products. Meanwhile, land reform encouraged risk-taking peasants to embark upon the complex and fractious business of leaving the traditional land commune and privatising their plots. All this activity was underpinned by investment in railway transport and trade, and by the emergence of a more sophisticated financial services sub-sector (Gatrell, 1986).

The years prior to the war witnessed a sustained increase in government revenue and expenditure. However, the government fought shy of significant fiscal innovation. Direct taxes accounted for just 8 per cent of all revenue, with indirect taxes contributing a further 47 per cent (half of them from the state monopoly on the sale of spirits). The remaining items comprised net receipts from state-owned property. Government expenditure was overwhelmingly devoted to administration, defence, and debt servicing, although the proportion of spending devoted to education and land reform had slowly begun to alter the picture. Total government indebtedness increased in nominal terms but declined from 74 per cent of nominal GDP to 63 per cent between 1900 and 1913. Around three-fifths of government debt was held domestically. Interest charges absorbed 13 per cent of total spending on the eve of war, down from 17 per cent in 1900 (Shebaldin, 1959: 178–9, 190).

A sustained inflow of foreign capital and the expansion of foreign trade testified to Russia's growing integration in the international economy. By 1913 foreign capital accounted for around 41 per cent of total investment in the industrial and banking sectors. In the last prewar quinquennium Russia enjoyed a rapid increase in imports of semi-manufactures and industrial goods, without eroding the healthy surplus on the external

trade account. A potential source of anxiety was Russia's reliance on trade with Germany, which amounted to some 40 per cent of total foreign trade by value (Khromov, 1950: 490–5; McKay, 1970: 26–7).

In per capita terms the Russian economy remained relatively backward. Backcasting from estimates of Soviet GDP in 1937, Angus Maddison finds that Russian GDP per capita in 1913 was around 28 per cent of the US level. This compares with Paul Gregory's finding that Russian GDP was around 11–12 per cent of the US level. Mark Harrison has called into question the validity of the assumptions underlying Gregory's USA–Russia comparison, which is based on nominal national products converted according to official exchange rates in 1913. By contrast, David Parker has argued that Maddison's more generous estimate is untenable; Russian GDP per capita could not have exceeded 18 per cent, given what is known about relative output per worker in Russia and the USA in key sectors such as agriculture and manufacturing (Maddison, 1995; Gregory, 1982: 154–8; eh.eastbloc postings at <http://eh.net/lists/archives/eh.eastbloc>, various dates). Our present knowledge of relative sector productivities is not sufficiently secure to resolve this problem. However, it is worth noting that labour productivity in Russia's leading engineering firms on the eve of war was around 45 per cent of the German level and 30 per cent of that in the USA (Grinevetskii, 1919: 160). In the agricultural sector productivity differentials were unlikely to have been any more favourable to Russia.

Whatever the disparity, it remains the case that Russia's relative economic backwardness imposed substantial difficulties in terms of the country's ability to mobilise resources in wartime. True, Russia entered the war in the knowledge that its armed forces were large and reasonably well supplied with military *matériel*. A hectic burst of rearmament following the abortive war against Japan in 1904–5 saw the re-equipment of Russia's land forces and the creation of a powerful modern navy. In the event, however, tsarist Russia's emphasis on naval rearmament and fortress artillery proved to be badly misplaced (Gatrell, 1994b).

Economic indicators do not tell the whole story. Unresolved social divisions had helped to provoke political and social turmoil between 1905 and 1907. Some contemporaries believed that these divisions would be magnified if Russia went to war. In a famous memorandum prepared in February 1914 a leading member of the ruling elite, Peter Durnovo, issued a stark warning about the dangers of war for Russia's future stability:

The peasant dreams of obtaining a gratuitous share of somebody else's land; the workman, of getting hold of the entire capital and profits of the manufacturer. Beyond this, they have no aspirations. If these slogans are scattered far and wide among the populace, and the Government permits agitation along these lines,

Russia will be flung into anarchy, such as she suffered in the ever-memorable period of troubles in 1905–1906. War with Germany would create exceptionally favourable conditions for such agitation (Golder, 1927: 3–23).

This point is worth emphasising. Growing economic prosperity before the war did not translate into social stability and political harmony. Longstanding peasant and working-class grievances remained acute, and divisions between the state and educated society would bedevil attempts to forge national unity in wartime (Haimson, 2000).

Military misfortune

The resources available to Russia to support its war effort were eroded at the outset. Although the Russian army advanced into Galicia, the German army invaded and occupied western Poland (Lincoln, 1986). In the next phase of the war, Russia lost the territorial advantage it earlier held over Austria-Hungary. The enemy recaptured Galicia and advanced into Russia's south-western territory. Meanwhile, the Germans continued to advance through Poland and the Baltic region. The third phase of the war (1916–17) coincided with a modest revival in Russia's military fortunes, but also with a growing political crisis, social protest, and economic collapse. This period included the downfall of the monarchical regime in February 1917 and the failure of the Provisional Government to counter the growing radicalisation of labour. The final phase (1917–18) included the Bolshevik Revolution, the German military occupation of Ukraine, and a kind of 'phony civil war' that gave way to full-blown civil war after June 1918.

Military misfortune meant the loss of valuable resources and capacity. Around one-fifth of the total capital stock in Russian industry in 1913 was located on lands that were subsequently lost to Germany (Vainshtein, 1960: 368–9). Total territorial losses corresponded to 15.4 per cent of the territory and 23.3 per cent of the prewar population of European Russia. The loss of territory in 1914 corresponded to 3.7 per cent of prewar national income; further losses in 1915 accounted for 12.4 per cent of national income (Prokopovich, 1917: 69, 129; Kohn and Meyendorff, 1932: 166). Russia was deprived of around one-third of its factories, contributing 20 per cent of annual industrial output in peacetime. Some of these assets (for example, from Riga) made their way to Russian-held territory, but the process of evacuation was not well organised, partly because of a lack of planning and partly because of inadequate transport facilities. In the event, relatively few enterprises were re-established in the rear. It was more common for evacuated equipment

to be redistributed among existing firms on an ad hoc basis (Sidorov, 1973: 213–51).

Russian GDP in World War I

Against this background I attempt to examine the behaviour of Russia's GDP in 1913–18. The only estimate of national income in wartime was compiled in 1918 by the eminent Russian economist S. N. Prokopovich (see table 8.1).

The underlying observations are neither secure nor very extensive. Prokopovich computed his index for industry by tracing output per person in the Donbass coal industry and derived his index of 'agricultural productivity' from estimates of the sown area in forty-five provinces of European Russia. He assembled a composite index by applying the 1913 weights for agriculture and industry (2.2 : 1). There are obvious difficulties with this procedure. One is that the Donbass coal industry cannot be taken as representative of the performance of industry as a whole. Alternative estimates of labour productivity give a somewhat different picture. Second, Prokopovich's data on agriculture overlook the improvement in output in 1915 and underestimate the decline in output in 1917 (see below). Third, no allowance is made for the performance of other sectors and sub-sectors. The cereal harvest represented only between 35 and 50 per cent of the total value of agricultural production in 1913, and cannot necessarily be taken as representative of the entire sector (Wheatcroft, 1990: 81, 266). And since cereals accounted for only around 28 per cent of national income, and large-scale industry for 16 per cent, it is clear that more than half of all economic activity, based upon 1913 sectoral shares, is missing from Prokopovich's estimates.

In a fresh exercise (reported in table 8.2) I have attempted to improve on Prokopovich's estimates, by recalculating his index of agricultural and industrial production and by incorporating other elements of national income. This exercise takes account of some four-fifths of economic activity.

These estimates allow us to draw some broad conclusions about the phases of the war effort. First, Russian national income declined by around 5 per cent during the first year of war. (An eminent economist could nevertheless assert that 'our national economic organism not only is not being destroyed by the war, as we are already seeing in Germany, but is hardly affected by it' (Tugan-Baranovskii, 1915: 319). His view is corroborated by Prokopovich's calculation, although not by the revised estimate presented here.) In 1915 the decline was reversed to a slight extent, contrary to Prokopovich's view. In 1916 national income began to

Table 8.1. *Russia. Prokopovich's estimate of national income, 1913–1918*

	Agricultural production	Industrial production	National income
1913/14	100.0	100.0	100.0
1914/15	100.5	100.0	100.0
1915/16	98.3	92.6	96.5
1916/17	90.7	70.9	84.5
1917/18	93.2	50.0	80.0

Source: Prokopovich (1918: 173). See text and Appendix 8.1 for explanation.

Table 8.2. *Russia: alternative estimate of national income, 1913–1917*

Year	Large-scale industry	Small-scale industry	Agriculture	Forestry
1913	100	100	100	100
1914	101	98	100	79
1915	111	78	110	59
1916	104	88	90	31
1917	76	78	87	18

Year	Trade	Transport	Construction	Weighted total
1913	100	100	100	100.0
1914	84	73	96	94.5
1915	68	71	100	95.5
1916	50	43	81	79.8
1917	37	29	68	67.7

Source: For explanation see Appendix 8.1. Agriculture refers to the main cereal crops, and excludes sugar-beet and potatoes. Sectoral weights, for 1913, derived from Falkus (1968: 55).

fall – the drop would have been greater but for the resilience of output in large-scale industry. By 1917 national income reached barely two-thirds of its prewar level; this is a sharper rate of decline than that suggested by Prokopovich. The evidence of decline in the output of basic commodities (table 8.3) confirms just how serious the situation had become in 1917.

Industrial production plummeted in the aftermath of the October Revolution. This catastrophic situation was brought about by declining rates of labour productivity, related in turn to an economic, social, and political crisis that engulfed the entire country.

Table 8.3. *Russia: output of selected items, 1913-1918*

	1913	1914	1915	1916	1917	1918
<i>Agriculture</i>						
Grains, million tons	79.7	67.8	74.3	62.5-65.5	59.5-62.5	-
Sugar, thousand tons	1,794	2,130	2,578	2,354	2,030	1,166
<i>Civilian industry</i>						
Coal, million tons	29.05	31.95	31.48	34.46	31.23	12.97
Crude oil, million tons	9.23	9.13	9.30	9.88	8.73	3.84
Iron ore, million tons	9.21	6.54	5.27	6.64	4.95	0.77
Steel, million tons	4.25	4.40	4.11	4.27	3.08	0.40
Rolled iron and steel, million tons	3.51	3.58	3.26	3.37	2.44	0.36
Freight wagons, units	13,801	20,385	23,486	16,792	12,702	-
Locomotives, units	654	763	917	600	420	-
Sulphuric acid, million tons	32.2	98.4	156.2	39.2	34.9	5.5
Cement, million gallons	1,004	1,190	934	884	587	-
Cotton consumption, million kg	391.5	453.7	401.3	461.9	332.5	-
<i>War industry</i>						
Artillery guns, units		285	1,654	7,238	3,538	-
Shells, million		0.66	12.56	33.07	18.66	-
Machine guns, thousands		0.8	4.3	11.1	11.3	-
Rifles, thousands		278	860	1,321	1,120	-

	1913	1914	1915	1916	1917	1918
<i>Transport</i>						
New railway track, km	1,202	2,866	2,924	4,193	977	—
<i>Finance</i>						
Bank loans on 1 January, million rubles	—	4,741	5,075	6,044	9,359	12,500 ^a
New capital issues, million rubles	762	354	229	482	848	—

^a 14 December 1917.

Sources and notes: USSR interwar territory, unless stated otherwise. Agriculture: grain crops from Wheatcroft (1980: 216–17); sugar (refined and granulated) from Kafengauz (1994: 436). Industry: coal from Kafengauz (1994: 176, 356–7); oil from Kafengauz (1994: 177, 363); iron ore from Kafengauz (1994: 183, 371); steel from Kafengauz (1994: 183); rolled iron and steel products from Kafengauz (1994: 184, 400); Portland cement (in *bochki*, 1 *bochka* = 108.2 imperial gallons) from Kafengauz (1994: 193). Rifles from Golovin (2001: 190); machine guns from Golovin (2001: 195); artillery pieces (3 inch guns) from Golovin (2001: 211); shell (all calibres) from Golovin (2001: 220), all originally from Manikovskii (1930). Sulphuric acid from Kafengauz (1994: 422); cotton consumption from Mendel'son (1964: 269). Railway track, Russian Empire, from Khromov (1950: 462). Bank loans including discount operations, industrial and trade credits, and loans for purchase of stocks and bonds, from Shepelev (1963: 192). Capital issues for companies newly open for business (*otkryto*), plus additional capital raised by existing companies (*uzvelichenno*), from Shepelev (1969: 162).

Table 8.4. *Russia: manufacturing output to final demand, 1913–1918*
(per cent)

	Equipment	Construction goods	Household consumption	Defence
1913	9.1	3.7	81.8	5.4
1914	9.7	3.6	79.0	7.7
1915	7.3	3.9	68.1	20.7
1916	5.4	3.9	61.9	28.8
1917	4.5	3.6	59.8	32.6
1918	5.7	1.9	85.6	6.7

Source: Derived from *Trudy TsSU* (1926: vol. I, 41), based upon value of gross output from 2,287 enterprises operating continuously. Final row refers to first half of 1918 only. Equipment includes rolling stock, industrial machinery, and agricultural equipment.

Without an increase in total output, Prokopovich suggested that the Russian war effort curtailed total consumption, reducing it in 1915–16 and 1916–17 to around 57 per cent and 47 per cent respectively of its prewar level (Maslov, 1918: 223; Prokopovich, 1918: 134). We can shed further light on wartime trends by referring to the industrial census of 1918. This revealed that the percentage share of output allocated to defence increased from just over 5 per cent before the war to one-third by 1917 (table 8.4).

The share of output represented by investment goods declined from 13 per cent in 1913 to 9 per cent in 1916, as a result of the collapse in the production of transport equipment (see table 8.3). The proportion absorbed by domestic consumption fell from 82 per cent in 1913 to not much more than 60 per cent by 1916. In terms of gross value, output earmarked for household consumption remained stable through 1915, but in 1916 it fell to 89 per cent of its prewar level, and by 1917 it amounted to less than two-thirds of the prewar figure. (Further corroboration of the prewar allocation of output will be found in the estimate made by Grinevetskii (1919: 166–7).)

At a more disaggregated level it is worth drawing attention to the possibility that rural consumption increased quite markedly until 1916. Something of its magnitude can be deduced from the additional disposable income that accrued to the peasantry as a result of sales (particularly sales of draught animals) to military procurement officials, as well as from transfer payments. On top of this, peasants no longer purchased vodka. A summary of these hypothetical changes is given in table 8.5, which

Table 8.5. *Russia: estimated increase in peasants' money income, 1914–1917 (million rubles, current prices)*

	1914/15	1915/16	1916/17
Transfer payments to soldiers' families	442	760	–
Peasants' share	340	585	–
Sale of horses to the army	300	150	} 476
Other sales to the army	146	526	
Assumed gains from prohibition	600	600	600
Additional disposable income (rows 2 + 3 + 4 + 5)	1,386	1,861	1,076
Peasants' estimated cash income in 1913	1,500	1,500	1,500
Nominal increase in disposable income relative to 1913	92%	124%	72%

Sources and notes: Danilov (1922: 44–5); other sales to army from Dikhtiar (1960: 215–16). Danilov assumed that peasants' share of transfer payments was 77 per cent. He followed Prokopovich in estimating total national income at 12.8 billion rubles in 1913, and assumed that the peasant share was 4.6 billion rubles, of which 1.5 billion were in a monetised form.

suggests that by 1916 Russian peasants may have enjoyed – even without allowing for the consequences of prohibition – a nominal increase of around 85 per cent in their disposable cash income as against 1913. However, caution needs to be exercised in interpreting these figures.

Peasants in the grain-producing regions of Russia refrained from selling increased quantities of cereals at low prevailing prices in 1914–15 – Meyendorff referred to this as ‘the Russian peasant’s secession from the economic fabric of the nation’ – and consumed more of their product, until such time as prices began to rise. In the grain-consuming regions peasants traditionally survived on non-farm activity, such as handicrafts or work in the service sector. Like the permanent urban workforce, villagers here found that money wages did not keep pace with the rising price of foodstuffs (Danilov, 1922: 48–53; Kohn and Meyendorff, 1932: 178). Some elements of the Russian peasantry cushioned themselves against adverse price changes by abjuring monetised transactions. Other consumers had much less freedom for manoeuvre.

Financial policy

The rapid increase in the cost of war is reflected in table 8.6. The rising average daily cost of war can be explained by the increase in the number of men in uniform and by the increase in the price of food and other necessities purchased by the military procurement agencies.

Table 8.6. *Russia: average daily outlay on the war effort, 1914–1917, according to Prokopovich*

		Daily outlay, million rubles	Per soldier per day, rubles
1914	July–Dec.	10.0	1.8
1915	Jan.–June	17.4	2.9
	July–Dec.	27.9	4.1
1916	Jan.–June	33.3	3.8
	July–Dec.	46.3	4.2
1917	Jan.–June	55.2	4.9
	July–Sept.	82.3	7.5
Average		40.8	4.7

Source: Prokopovich (1918: 82).

These outlays contributed to a sustained budget deficit (Eliacheff, 1919; Michelson et al., 1928). The Russian government had limited options to raise additional revenue, and indeed it deprived itself of a leading source of revenue when the decision was taken to abolish the state monopoly on the sale of vodka, which before the war had brought in 675 million rubles, net of operating expenses. During the first year of the war the Treasury's receipts fell as a result of the general decline in the level of normal economic activity. Increases in the rates of tax on property and in excise duties – tobacco, sugar, and tea – did not compensate for the loss of revenue from the sale of spirits. True, the Treasury derived greater receipts from the transport of freight and passengers (including soldiers), as well as from duties imposed on imports of munitions and other finished goods. In general the increase in the volume of war-related economic activity helped to boost government revenue. The war also witnessed important fiscal innovations, including a tax on companies' excess profits and an income tax, which only came into force in 1917.

The size of the deficit is indicated in table 8.7. To judge from the German and British experience the proportion of wartime expenditure represented by deficit finance was roughly comparable.

The deficit was financed by means of long-term and short-term domestic debt (mostly Treasury bills) and by overseas borrowing (table 8.8). The Ministry of Finances embarked on a massive publicity campaign to encourage greater 'democratic' participation in subscribing to war debt (Strakhov, 2003). In an attempt to capitalise upon the new political atmosphere following the February Revolution, the Provisional Government launched a 'Liberty Loan' (the original term 'Victory Loan' presumably having been

Table 8.7. *Russia: government revenue and outlays, 1913–1918*
(million rubles)

	1913	1914	1915	1916	1917	1918
Total outlays	3,383	4,858	11,703	18,101	30,607	46,706
Total revenue	3,417	2,898	2,828	3,975	5,700	15,580
Balance	34	-1,960	-8,875	-14,126	-24,907	-31,126
Percentage of outlays	1.0%	-40.3%	-75.8%	-78.3%	-81.4%	-66.6%

Source: Michelson (1928: 70, 118–19, 129, 144). The 1917 data are from Davies (1958: 8); 1918 data from Malle (1985: 169–71).

Table 8.8. *Russia: financing the budget deficit, 1914–1917*
(million rubles)

	1914	1915	1916	1917
Total outlays	4,859	11,562	18,101	30,607
Of which, on war	1,655	8,724	14,049	26,161
Ordinary revenues	2,961	3,008	4,345	5,039
Deficit	1,898	8,554	13,756	25,568
Of which, change in:				
Long-term domestic debt	709	2,879	4,174	3,729
Overseas borrowing	82	2,140	3,665	2,554
Short-term debt	805	3,176	5,611	10,844

Source: Michelson et al. (1928: 214, 325); Davies (1958: 8).

abandoned as politically insensitive and militarily overambitious). In June 1917, the Petrograd Soviet attempted to assert its authority by calling upon all soviets to compel workers and peasants to subscribe to the loan (critics pointed out that the element of ‘liberty’ had given way to a forced loan). Middle-class subscribers were deterred by a lack of confidence in the Treasury and by the growing economic and social turmoil; they also complained that the government’s tax increases had left them short of funds.

In addition to financing the budget deficit by borrowing, the Russian government also drew upon the so-called free balance accumulated prior to 1914 and held by the Treasury, including unexpended balances from prewar budgets. These sums were substantial, amounting to around 2,612 million rubles during 1914–17. Under wartime legislation the State Bank discounted short-term Treasury bills and printed rubles (the gold

standard provisions having been suspended in July 1914). Generally speaking the note issue lagged behind the deficit, since loans and the free balance covered the deficit. After the October Revolution, however, paper money became the sole means of financing the deficit (Katzenellenbaum, 1925: 69).

In all (July 1914 to September 1917) total war expenditure amounted to 38.65 billion rubles. These outlays had been met as follows: 62 per cent (23.9 billion rubles) by borrowing, 7 per cent (2.6 billion rubles) by using free balances, and 31 per cent (12.0 billion rubles) by the issue of paper notes (Michelson et al., 1928: 220). At the outbreak of war total currency in circulation had been 1.63 billion rubles (Barnett, 2001). By October 1917 total government debt stood at around 39.0 billion rubles, of which around 20 per cent represented externally held debt (23 per cent according to Volobuev, 1962: 379).

The foreign sector

The behaviour of the merchandise account is shown in table 8.9. Cereals of all kinds (wheat in particular) accounted for 40 per cent of exports in 1913, followed by oil. Imports were predominantly machinery of all kinds, metal products, and coal and coke. Russia's reputation as a country with high tariff barriers reflected less a desire to protect specific industries as to generate revenue. Protectionism had done relatively little to support the development of new industries such as chemicals and advanced engineering products, in which Russia continued to rely heavily upon Germany, two-fifths of Russia's foreign trade having been with Germany in 1913 (Raffalovich, 1918: 310). The war was commonly regarded as an opportunity to rid Russia of the 'German yoke' (Nolde, 1928; Lohr, 2003).

Exports were hampered by the closure of established trade routes (the land frontier with Germany and Austria-Hungary, the Black Sea, and the Baltic), and the failure to develop alternative routes to any extent. Critics argued that greater export earnings could have been derived had the government supported the export of luxuries, such as caviar; they also observed that no decisive measures were taken to curtail the import of luxury items until after the February Revolution. The trade deficit grew very quickly. As a consequence the value of the ruble on the foreign exchanges plummeted. Nor were matters helped by the decline in foreign confidence brought about by the military reverses in the summer of 1915, by the failure of the June offensive in 1917, and the constant political turmoil after July 1917 (Michelson et al., 1928: 397–9).

What of other elements of the current account? Chief amongst these were payments made to foreign creditors by the government and by private corporations; net tourist expenditure; and net government

Table 8.9. *Russia: merchandise trade, 1913–1917 (million rubles)*

	Exports	Imports	Balance
1913	1,520.1	1,374.0	146.1
1914	956.1	1,098.0	–141.9
1915	401.8	1,138.6	–736.8
1916	577.3	2,451.2	–1,873.9
1917	464.0	2,316.7	–1,852.7

Source: Khromov (1950: 455).

spending on orders placed overseas. No information is available on tourist expenditure, which in 1913 amounted to a significant amount (300 million rubles). Only rough approximations can be made of payments to foreign creditors (also significant, at around 150 million rubles on behalf of private companies and 220 million rubles on behalf of the state). We are on slightly more certain ground with foreign orders. Russia ordered substantial quantities of military *matériel* from external sources of supply. One suggestion is that 25 per cent of all war expenditure went overseas up to 30 September 1916 (Raffalovich, 1918: 409). This was likely offset to only a very modest extent by foreign purchases in Russia (France ordered grain, timber, spirits, and mineral products; some Russian troops were also stationed in France).

Thus at our current state of knowledge only a crude estimate of the balance of payments during the war can be provided. (Pasvolsky and Moulton (1924: 42–3) describe the difficulties in arriving at a statement for the war years.) Table 8.10 suggests a possible scenario in 1915 compared to 1913.

Russian deposits in foreign countries amounted to 500 million rubles in 1913 (Pasvolsky and Moulton, 1924: 190). These could be sold off. Russia also shipped gold abroad (according to some accounts around 640 million rubles' worth). Between 1914 and 1917 Russia concluded new loans overseas to a total value of 8,071 million rubles. As is well known, the Bolsheviks cancelled overseas debt and refused to recognise obligations to domestic holders of debt. In calculating the balance of payments of Soviet Russia (c. 1923), Pasvolsky and Moulton estimated that all debt service payments and interest charges amounted to around 687 million rubles in prewar prices; of this around 267 million rubles represented war debt. With 'indispensable imports' of around 1,033 million rubles, Russia needed to generate export earnings of around 1,720 million rubles to meet its obligations. Even without payments on the reconstruction loan they advocated, Russia would be insolvent (Pasvolsky and Moulton, 1924: 135). The only

Table 8.10. *Russia: balance of payments on current account, 1913, 1915, and 1916: a provisional calculation (million rubles)*

	1913	1915	1916
<i>Visible items:</i>			
Visible exports	1,520	402	577
Visible imports	-1,374	-1,138	-2,451
Balance of visible trade	146	-736	-1,874
<i>Invisible items:</i>			
Interest on public debt	-221	-307	-490
Interest on private debt	-150	-136	-
Repatriated profits	-30	-20	-
Net tourist expenditures	-292	-29	-
Other	-13	-192	-
Invisible balance	-706	-684	-
Balance on current account	-578	-1,420	-

Sources and notes: Column 1 Gregory (1982: 98, 324). Column 2, line 5 from Ol', cited in Gregory (1982: 324). Estimates of external public debt in 1915 derived from Michelson et al. (1928: 325) and Volobuev (1962: 379). Interest on overseas public debt in 1915 and 1916 is assumed to be 5 per cent on total debt of 6,142 and 9,806 million rubles respectively. Repatriated profits in 1915 are assumed to be 35 per cent of 1913, corresponding to the percentage share of capital held by foreign-owned corporations, reported in Shepelev (1969: 162). Net tourist spending is remittances by Russian emigrants less private and official spending by Russians abroad. Some tourists and students remained abroad, and I have expressed the 1915 figure notionally as 10 per cent of 1913. 'Other' includes net spending overseas. For 1915 see Raffalovich (1918: 409). Part of this was presumably spent as an advance against deliveries; I assume 10 per cent advances on orders. I have assumed no Allied or private spending in Russia. I assume that spending overseas was almost entirely on orders for future deliveries of military equipment and not reflected in current imports.

hope was for an agreed moratorium, giving the economy time to recover from the ravages of war, revolution, and civil war.

Population, employment, and labour productivity

A striking feature of Russia's population history during the war was the size of the contingent drafted into the armed forces. By October 1917 a total of 18.6 million men had been called up (Volkov, 1930: 50). Another important dimension was the large number of displaced persons comprising refugees and prisoners of war. By the beginning of 1918 this displaced population represented 7 per cent of the total population (Gatrell, 1999: 3, 211-15). The numbers far exceeded the size of the workforce in manufacturing industry and mining. (It has not proved possible to estimate the size of the total population directly engaged in war work (table 8.11).)

Table 8.11. *Russia: population, 1914–1917 (USSR prewar territory)*
(millions on 1 January)

	1914	1915	1916	1917	1918
Total	139.9	142.6	142.3	142.3	140.9
Civilian population	139.5	136.5	131.0	126.7	123.3
Of which, hired labour:					
Agriculture	3.7	2.8	1.2	1.4	–
Non-agriculture	1.9	2.0	2.2	2.3	1.8
Armed forces	0.4	5.1	7.1	8.0	7.9
Of which:					
On active service	–	4.2	5.2	5.2	–
Non-active	0.4	0.9	1.9	2.8	7.9
Displaced population	–	1.1	4.2	7.8	9.7
Percentage of total population		0.8%	3.0%	5.5%	6.9%
Of which:					
Refugees	–	0.9	3.3	6.1	7.4
Prisoners	–	0.2	0.9	1.7	2.3

Source: Volkov (1930: 86–7, 90, 270–1). For a summary of other estimates of population on 1 January 1914 see Vainshtein (1960: 452). Labour employed in factory (large-scale) industry is taken from Mints (1975: 79). Data on agricultural hired labour are not reliable. Estimates here are taken from Rashin (1958: 167), for 1914, Anfimov (1962: 97) for 1916, and Strumilin (1964: 310). Data for 1915 are interpolated as appropriate.

The most obvious wartime change in employment was the conscription of large numbers of men into the army. Around 18.6 million men served in the Russian army during the First World War, including 1.4 million already in uniform at the outbreak of war. The number of mobilised men from rural areas was equivalent to 50.7 per cent of the male population of working age (18 to 60 years). The corresponding figure for urban areas was 24.0 per cent. Overall, mobilisation accounted for around 40.0 per cent of the total male population of working age (Kohn and Meyendorff, 1932: 19–20, 170). The agricultural labour force was badly depleted, as we shall see.

To compensate for these losses employers recruited female and juvenile labour, including refugees (table 8.12). Exemption certificates were eventually granted by a reluctant government. It appears that the mean daily number of hours worked did not increase in 1915, and rose only slightly, by around 6 per cent, in 1916. As a consequence of revolutionary disturbances during the second half of 1917, hours worked in the Moscow region fell to 8.36, compared to an average of 9.58 during the second half of 1916 (Mindlin, 1919: 8–14; Strumilin, 1964: 365). The number of days lost to industrial disputes jumped by nearly 50 per cent between 1913 and 1914, but the strike wave preceded the outbreak of war and

Table 8.12. *Russia: employment in large-scale manufacturing industry, 1913–1918 (USSR territory) and days lost to work stoppages*

	1913	1914	1915	1916	1917	1918
Shopfloor workers, 000	1,844	1,876	1,988	2,193	2,274	1,798
Percentage of 1913	100	102	108	119	123	98
Female percentage share	30.7	31.8	36.0	39.6	40.2	41.2
Juvenile, male and female, percentage share	10.6	11.0	12.5	14.4	12.6	12.2
Supervisory and technical, thousands	11.34	12.46	13.23	14.36	15.33	12.87
Ratio of shopfloor to supervisory staff	146	138	133	125	115	103
Total days lost, millions	3.863	5.755	1.863	4.649	3.823	–
Days lost per strike	4.35	4.30	3.45	4.88	4.39	–

Sources and notes: Rows 2–5 derived from Mints (1975: 79). Rows 5 and 6 (*administrativnyi i tekhnicheskii personal i sluzhashchie*) from 2,029 enterprises working continuously (*Trudy TsSU* (1926: 101). These data are not directly comparable with those in row 1 (here 1918 is the first half of the year only). Rows 7 and 8 from Strumilin (1966: 471), 1917, first nine months only.

quickly subsided during the second half of 1914. Strikes revived on a significant scale during 1916, when 4.65 million days were lost. But strikes were typically of brief duration, and no wartime year remotely matched 1905 in intensity, when more than 25 million days were lost and average stoppages lasted for more than a week (Strumilin, 1966: 471). Russian workers were downtrodden but not unpatriotic. Only when they felt betrayed by the liberal politicians after February 1917 did they demand ‘workers’ control’ in industry and turn to the Bolsheviks in large numbers.

One hallmark of Russian backwardness was poor labour productivity. The data on output per person in large-scale industry are presented in tables 8.13 and 8.14.

Some important steps were taken to improve labour productivity during the war. Capital equipment in industry was worked more intensively in order to meet the growth in demand. In some civilian branches, for instance textiles, the average daily utilisation of equipment increased by 50 per cent between 1914 and 1916 (Nol’de, 1918). New patterns of work were introduced, such as a three-shift system in defence factories. Mass production methods and industrial rationalisation, for example concentrating available machine tools at a relatively small number of factories, also generated gains in productivity in the manufacture of shells and explosives (Manikovskii, 1930: vol. 1, 128–31). In other branches

Table 8.13. *Russia: labour productivity in large-scale industry in rubles and 1913 prices, 1913–1918 (USSR pre-1939 territory)*

	Gross output, million rubles	Employment millions	Hours worked, per day	Employment adjusted for hours worked, millions	Adjusted output per person (col. 1: col. 4)	Adjusted output per person, % of 1913
1913	6,391	2.44	10.0	2.44	2,619	100
1914	6,429	2.48	9.7	2.40	2,679	102
1915	7,056	2.58	9.7	2.50	2,822	108
1916	7,420	2.87	9.9	2.84	2,613	100
1917	4,780	2.89	8.9	2.57	1,860	71
1918	2,160	2.25	8.5	1.91	1,131	43

Source: Column 1, gross output of census industry, Gukhman (1929: 173). Column 2 from Mints (1975: 39). Column 3, including overtime, Strumilin (1964: 365).

of industry, the picture was more gloomy. One expert recommended clearer lines of responsibility for different categories of workers. Incentives mattered, but so too did improved equipment and better layout of plant (Grinevetskii, 1919: 155–62). Others pointed instead to the declining availability of foodstuffs and clothing which – particularly in an arduous industry such as mining – made it difficult for workers to maintain energy levels and to stay warm (Sidorov, 1973: 515–19).

The rewards to labour are indicated in table 8.15. Industrial workers in defence-related occupations more than doubled their money wages by 1916. Their relative position vis-à-vis workers in civilian sectors improved. Those who suffered most in terms of real income and consumption were white-collar workers; the differential between shopfloor workers and salaried staff fell from around 4.1 in 1913 to 3.0 in 1916 and 1.8 in 1917. In the upper reaches of society industrial entrepreneurs made higher profits. A study of twenty-one observations from firms in Petrograd showed that net profits increased by 125 per cent between 1913 and 1916, whereas real wages rose by just 32 per cent (Strumilin, 1958: 247). At the greatest disadvantage were those on fixed incomes, including rentiers (Katsenelenbaum, 1917: 74–8; *Trudy TsSU*, 1926: 57). But it was workers – for so long politically disenfranchised and socially despised – and not rentiers who took to the streets in February 1917 in order to overthrow the old regime. Their gains proved to be shortlived, as the Bolshevik regime adopted strategies to improve labour discipline and curtail workers' room for manoeuvre on the shopfloor and at the ballot box.

Table 8.14. *Russia: mean output per day worked, large-scale industry, 1914–1918 (percentage of 1913)*

	1914	1915	1916	1917	1918 first half
Quarry products	95.3	91.3	87.2	71.6	56.4
Mining	110.5	132.7	92.0	52.4	40.7
Metal working	89.3	113.0	107.9	70.8	40.7
Machine building	98.3	131.6	132.1	89.4	54.2
Wood products	95.8	80.1	69.0	49.4	44.2
Chemicals	88.8	110.2	127.2	91.7	44.4
Food, drink, and drugs	121.2	106.9	87.7	62.7	31.4
Animal products	106.1	106.3	99.9	79.3	86.9
Leather	96.7	88.3	84.1	70.7	62.1
Cotton	98.8	95.1	85.1	62.2	50.8
Silk	94.8	110.2	96.8	72.9	63.0
Flax	118.2	104.7	97.7	72.1	64.7
Hemp	95.9	103.3	105.3	80.4	58.5
Other fabrics	93.6	100.0	129.6	86.2	56.6
Clothing	106.9	127.6	130.3	127.4	91.0
Paper	96.6	92.9	86.4	71.6	42.6
Printing	89.9	80.4	85.7	85.0	92.4
Art and craft items	77.1	94.3	66.0	56.3	83.5
Utilities	111.5	111.1	117.8	97.9	64.8
Large-scale industry, total	100.9	108.3	104.1	76.0	49.7

Source: Trudy TsSU (1924: 170–1). Derived from estimates of gross output, 1913 prices, at 2,287 enterprises (2,199 in 1918). The mean number of days worked for all enterprises was as follows: 264 days in 1913, 259 in 1914, 268 in 1915, 268 in 1916, 249 in 1917, and 115 for the first six months of 1918.

Table 8.15. *Russia: real wages in industry, 1914–1917 (percentage of 1913)*

	All industry	Munitions	Military equipment	Other defence	Non-defence
1914	105.0	110.9	106.7	97.4	100.3
1915	105.7	115.3	103.7	96.2	86.8
1916	107.1	122.8	102.1	93.6	84.8
1917	83.3	74.7	76.2	85.9	53.9

Source: Trudy TsSU (1926: 57).

Industry: output, capital investment, and the capital stock

The gross value of output in large-scale industry grew by about 17 per cent between 1913 and 1916, by which time defence requirements accounted for one-quarter of total production. But the aggregate increase disguised the very different fortunes of capital goods (group A in Soviet parlance) and in consumer goods (group B) industries. In 1916, output in group A was already 62 per cent above the 1913 level; by contrast, output of group B was 15 per cent lower. Thereafter both sectors collapsed. In 1917, the output of group A fell sharply; in the following year a catastrophic decline occurred. In group B the sharpest decline was reserved for 1918 (table 8.16).

So far as one can tell, the output of small-scale industry behaved in a less erratic fashion. Production declined at the outbreak of war, but then recovered between 1915 and 1916. (Defence items accounted for around 12 per cent of output in small-scale industry.) Production declined during 1917 and 1918, but at a slower rate than in large-scale industry. At its nadir in 1920, the output of small-scale industry had reached 44 per cent of its prewar level; whereas large-scale industry stagnated at a mere 13 per cent.

Industrial investment during the war years presents a confused picture, complicated by the fact that we know almost nothing about small-scale industry. Contemporary sources testified to an impressive increase in gross investment in large-scale industry. Domestic output of industrial equipment in 1916 was already some 24 per cent higher than in 1913. Supplies were boosted by imports. The overall dynamic of industrial investment in wartime is indicated in table 8.17.

Gross investment in industrial equipment and structures amounted to around 1,050 million rubles between January 1914 and January 1918. Thereafter, with the cessation of imports – the result of the Allied blockade – and the decline in domestic machine-building, virtually no fresh investment took place. The destruction of assets during the civil war reduced the capital stock from the peak it attained at the beginning of 1918. In addition, the intensity with which equipment was used, and the failure subsequently to maintain and repair the capital stock in industry, led to negative net investment after 1918, which lasted well into the 1920s. Certainly, on the eve of the introduction of the New Economic Policy (spring 1921), the stock of industrial assets, after allowing for depreciation, stood 13 per cent below its wartime peak and was no higher than the level attained in January 1914.

Table 8.16. *Russia: gross industrial production, 1913–1921/22 (USSR pre-1939 territory, million rubles and 1913 prices)*

	Large-scale industry				Industry, total	Percentage of 1913
	Total	Group A enterprises	Group B enterprises	Small-scale industry		
1913	6,391	2,582	3,809	2,040	8,431	100
1914	6,429	2,726	3,703	2,000	8,429	100
1915	7,056	3,359	3,697	1,600	8,656	103
1916	7,420	4,170	3,250	1,800	9,220	109
1917	4,780	2,667	2,113	1,600	6,380	76
1918	2,160	980	1,180	1,500	3,660	43
1919	955	551	404	1,000	1,955	23
1920	818	396	422	900	1,718	20

Source: Gukhman (1929: 173, 191).

Table 8.17. *Russia: capital stock in large-scale industry, 1914–1923 (million prewar rubles)*

	Value of capital stock on 1 January	Annual investment over year	Depreciation over year	Net change over year
1914	3,538	327	125	202
1915	3,740	291	132	159
1916	3,899	275	138	137
1917	4,036	153	143	11
1918	4,047	43	177	– 134
1919	3,913	32	231	– 199
1920	3,715	20	203	– 183
1921	3,532	19	187	– 168
1922	3,364	30	183	– 153
1923	3,211	42	113	– 71
1923, 1 Oct.	3,140	83	114	– 31

Source: *Trudy TsSU* (1926: 95–97); Gatrell (1994a: 320).

Agriculture: inputs, output, and food availability

I begin with inputs of labour and capital. The military draft immediately deprived large landowners of around 800,000 agricultural labourers, equivalent to two-fifths of the total agricultural labour force before the war. Employers began to substitute refugee and prisoner-of-war labour on a significant scale; by the beginning of 1916 the large estates employed

260,000 prisoners and a year later the numbers had grown to 430,000. Nevertheless, the agricultural hired labour force probably fell by as much as two-thirds between 1913 and 1916. A substantial decline also occurred in the numbers of peasants capable of working their allotment land, the military draft having deprived peasant households of every other able-bodied rural male (Prokopovich, 1917: 135–9; Antsiferov et al., 1930: 117).

The war brought the manufacture of most agricultural equipment and machinery virtually to a halt. Output declined by around 50 per cent between 1913 and 1916. Imports, which had accounted for around 45 per cent of the market in 1913, fell sharply. As a result, total consumption of agricultural machinery by 1916 stood at little more than 10 per cent of its prewar level. Large estates were again badly hit. Peasant farmers could do little but make running repairs (Izmailovskaia, 1920: 52). The mobilisation of draught animals caused further difficulty, particularly on the large estates in the Baltic and Ukraine. By the beginning of 1917 the army had appropriated around 2.10 million horses, equivalent to 10 per cent of the horse population (Prokopovich, 1918: 230). Villagers were left with those animals least suited for strenuous field work. However, the problems should not be exaggerated, since up to one-third of available horse power was not being utilised (Antsiferov et al., 1930: 124–5).

The war did not result in any dramatic curtailment in the sown area on the territory not occupied by enemy troops. During 1914 and 1915 the area sown to food and fodder grains, as well as potatoes, remained slightly above the prewar level (the area sown to grits and minor crops fell quite sharply). In 1916 total sowings probably contracted by just over 5 per cent compared to the 1909–13 average, most of this reduction being accounted for by a reduction in the area sown to bread grains (Kondrat'ev, 1991: 121, 424–5; Wheatcroft, 1980: 38–63). Privately owned farms reduced their sown area by 50 per cent because of the shortage of hired labour. Peasant farmers increased their sowings in 1915 by more than 20 per cent, notably in the black-earth provinces and in Siberia. Peasants in some regions had more land under plough in 1917 than during the previous year (Prokopovich, 1917: 122–3; Antsiferov et al., 1930: 150–1).

Estimates of the wartime cereal crop, on the area continuously in Russian hands, suggest that output in 1914 fell slightly compared to the prewar average (note that there was a bumper harvest in 1913), but that the harvest in 1915 was around 10 per cent above the prewar average. The harvest in 1916 was some 10 per cent lower than in 1909–13 (table 8.18).

The most obvious change in the utilisation of grain came about with the imposition of a blockade on foreign trade; as a result, the export of grain through the Black Sea came to an abrupt standstill. Russia thus had around 11 million additional tons of grain at its disposal, the average

Table 8.18. *Russia: the cereal harvest (percentage of 1909–1913 average)*

	Total harvest					
	Struve	Wheatcroft	Rye	Wheat	Oats	Barley
1913	120.4	117.8	110.9	136.3	116.3	120.4
1914	96.5	99.7	100.1	105.7	89.5	88.8
1915	110.2	109.6	123.2	112.7	98.1	97.2
1916	91.3	90.3	102.7	79.6	94.7	84.7
1917	87.6	87.0	83.1	93.8	87.6	84.7

Source: Struve et al. (1930: 308); Wheatcroft (1980: 216–17). Column 1 refers to fifty-seven provinces of European Russia and Siberia (excluding Poland, the Caucasus and Kuban, Turkestan, Kovno, Courland, Vilna, Grodno, Volynia, Podolia, Iakutsk, and the Far Eastern territories). Totals include the four principal grains listed, plus buckwheat and millet.

annual amount exported in 1909–13. This advantage quickly evaporated. Russian peasants themselves now consumed increased amounts of grain. Part of the extra-rural shipments was destined to feed the large numbers of refugees who crowded into Russia's towns and cities. The Russian army, having swelled from 7.95 million on 31 December 1915 to 9.45 million in 1916 (Golovin, 2001: 186), also purchased large quantities of cereals including buckwheat and millet, which it turned into coarse grain meal, as well as meat, fish, sugar, butter, rice, and vegetable oil, products that the peasantry had consumed in much smaller amounts in peacetime. The large army horse population also received rations well in excess of peacetime consumption norms (Struve et al., 1930: 330–1). This insatiable military and civilian urban demand ruptured peacetime patterns of consumption.

How then did the food deficit help to bring down the tsarist regime and the Provisional Government? There had been catastrophic failures in the cereal harvest, including – within living memory – the famine of 1891, but on each occasion the tsarist regime managed to survive, perhaps because newspapers and church sermons told readers and parishioners that the problems were God-given rather than man-made. But by 1916 the shortages could not be blamed on a failure of the grain harvest. Human, not divine agency was thus invoked. In urban society, a scapegoat emerged in the shape of the middlemen who speculated in stocks of food: the merchants who dealt in grain and the bankers who controlled the trade through issuing credits to the dealers. The government ruled out a nationwide system of food rationing, fearing – ironically – that it would fail and lead to a breakdown of public confidence in the government. Instead, tsarist procurement officers imposed fixed prices on official grain

Table 8.19. *Russia: estimated inter-regional grain balances, 1909/13 to 1917/18 (million tons)*

Year	NCR	SPR	CPR	EPR	Combined
1909/13 to 1913/14	-3.5	+10.0	+1.6	+0.8	+8.9
1913/14	-2.9	+11.0	+1.5	+1.0	+10.6
1914/15	-5.3	+3.5	-1.6	+4.1	+0.7
1915/16	-4.6	+3.6	+2.1	+1.0	+2.1
1916/17	-7.4	-0.8	-1.1	-0.7	-10.0
1917/18	-8.5	-0.6	-5.7	+1.5	-13.3

Source: Estimates of regional production and utilisation from Wheatcroft (n.d.: 17). Abbreviations refer to Northern Consumer Region (NCR), Southern Producer Region (SPR), Central Producer Region (CPR), and Eastern Producer Region (EPR).

purchases. In November 1916 the government attempted to introduce a compulsory grain levy. Peasants in grain-surplus regions responded by withholding grain and consuming a greater proportion of their product. An increase in the prices paid to food producers in summer 1917 did not alter this picture. Some contemporary observers believed that the women and older men left in charge of the household economy refused to sell (Prokopovich, 1917: 138; Bukshpan, 1929: 163; Kondrat'ev, 1991: 195–227; Lih, 1990: 48–56).

Wheatcroft's careful calculations enable us to gauge the hypothetical inter-regional grain balances during the war (table 8.19). This draws attention to the overall surplus on the eve of war. It demonstrates how the complex regional balance of grain production and utilisation came under pressure in 1915 and 1916, before breaking down completely in 1917. This is evident in the failure of the traditional grain-producing regions – the Volga provinces (CPR) and Ukraine (SPR) – to meet local consumption, let alone the needs of the towns in the north (NCR). Russia's urban population increased from 20.5 million on 1 January 1914 to 25.6 million four years later, representing an increase from 14.6 per cent to 18.2 per cent of the total mouths to feed (Poliakov, 1986: 128–50).

War losses: human and physical capital

In table 8.20 I cite the estimates made by the Soviet demographer Volkov of the number of Russian casualties during the war. Cumulatively Russia lost around 1.45 million men, who were either killed on the battlefield or died from wounds and poison gas. Added to these were

Table 8.20. *Russia: numbers of military casualties, 1914–1917 (thousands)*

	Killed in action	Wounded in action	Died of wounds	Contracted disease	Died of disease	Taken prisoner	POW deaths
1914	90.9	368.4	134.8	83.1	16.4	371.7	13.3
1915	226.7	842.1	308.6	423.0	88.4	2,004.5	71.5
1916	269.6	987.1	361.9	629.5	28.9	1,799.9	64.2
1917	102.4	454.1	165.0	1,292.6	22.0	918.2	32.9
Total	689.6	2,651.7	970.3	2,428.2	155.7	5,094.3	181.9

Source: Volkov (1930: 54, 56, 59, 60, 68). Prisoners of war are those held in Austrian, German, Turkish, and Bulgarian captivity.

deaths from infectious diseases (typhoid and dysentery were the most common, typhus and cholera the most lethal) and deaths in captivity. These losses were equivalent to 1.1 per cent of the total population, or 4.5 per cent of the male population of working age (Urlanis, 1971: 198, 209).

The lives of those who survived were shortened and impaired. Not surprisingly, around three-fifths of disabled soldiers were in the age group from 18 to 29 years. We still await a study of their fortunes in the world of the postwar village (Kohn and Meyendorff, 1932: 141).

In his summary of Russia's vital statistics of fifty provinces of European Russia, Kohn estimated the population deficit (the difference between peacetime rates of natural increase and the growth of given years in wartime) at between 4.5 and 5 million 'for the three years of the war'. In the absence of war Russia's population would have increased by 5.8 million. Instead, the increase was between 0.8 and 1.3 million. He concluded that 'for the whole territory of the former Russian Empire the loss probably exceeds six million persons' (Kohn and Meyendorff, 1932: 128–9).

Limited light only can be shed on the wartime destruction and depletion of physical capital. Bogart referred to 'property damage' amounting to some \$1,250 million in Russia and \$1,500 million in Russian Poland, but he does not indicate how these figures – together equivalent to 25 per cent of France's losses – are arrived at (Bogart, 1919: 286–7). I estimate the loss of physical capital as follows. Destruction of structures and stocks in the agricultural sector amounted to around 3,570 million prewar rubles (USSR territory), or 19 per cent of the prewar total (Gatrell, 1994a: 224) (this includes 1918–20 losses). A further indication of the scale of losses is the decline in the real value of the housing stock between 1913 and 1923/4, from around 16,600 million rubles to some

13,800 million rubles (Strumilin, 1958: 508, 514). Here an increase in the value of rural structures is attributed to the growth in the number of peasant households after 1918, but this was not sufficient to offset a decline of some 23 per cent in the value of urban structures. These losses should be set in the context of Vainshtein's estimate of the prewar stock of physical capital, which he put at 55,884 million rubles on 1 January 1914 (USSR territory) (Vainshtein, 1960: 370–1). This includes 'individual consumption property'. Exclusive of this item, national wealth totalled 44,586 million rubles. Figures for the Russian Empire are 69,193 million rubles and 55,608 million rubles respectively. Shipping losses were probably not significant, given the blockade and consequent immobilisation of Russian vessels in home waters (Bogart puts them at a mere 2 per cent of British losses). I presently have no information on total external disinvestment – the realisation of external assets, the increase in external liabilities, and the decrease in foreign and gold reserves. Vainshtein calculated that Russia held external assets worth 1,068 million rubles on the eve of war; its external liabilities were eight times greater (Vainshtein, 1960: 444–5). This proportion undoubtedly grew as a result of increased government indebtedness.

An estimate of tangible human capital losses means having some indication of the costs of rearing a child to working age. I have not been able to establish these costs with any confidence. At a rough approximation I put the annual cost at around 65 rubles in 1913, based on the cost of maintaining a child in the 1880s, as from Ransel (1988: 203), adding 25 per cent for non-food costs, giving a total of 48 rubles in current prices. This implies that it cost around 780 rubles to bring up a child to a working age of 12 years.

So far as intangible human capital is concerned, the annual cost of elementary education amounted to around 21 rubles per student in 1913. With around three years' schooling (sic), this gives a figure of 63 rubles for the average Russian adult. This is derived from Strumilin (1964: 112); see also Kahan, (1989: 175). Eklof (1986: 293) reports the average length of attendance in the early twentieth century as two and a half years.

Given total casualties of 1.811 million, the tangible and intangible losses of human capital can be put at 1,416 million rubles and 114 million rubles respectively. With a prewar adult population of approximately 118 million (USSR territory), the stock of tangible and intangible human capital was 92,040 million rubles and 7,434 million rubles respectively. This yields total losses of 1.5 per cent, or around half the losses suffered by the UK during the war (table 7.15). Note that as early as 1920 the indefatigable Strumilin had also attempted to compute war losses (Strumilin, 1958: 293–9).

Assessments and aftermath

One interpretation attributes Russia's shortcomings during the First World War to policy makers' neglect of economic organisation and their mishandling of conversion to a war economy:

The mobilization took from the factories those who were essentially needed for the conduct of the war. The only ports left . . . were inadequately equipped for the indispensable imports. The railway system broke down by the end of the first year, and railway repair shops were converted into munition factories. All output being diverted for the needs of the army, the open market was short of everything . . . The removal of Germans from business concerns in Russia led to the employment of a personnel unaccustomed to their task. Non-bureaucratic organisations . . . though in favour of state control, were hampered in their activities by the central government (Kohn and Meyendorff, 1932: 158).

To these difficulties we must add the consequences of civilian population displacement, which imposed a significant cost upon the Treasury and helped to transform the inter-regional food balance.

Yet these difficulties obscured the problems brought about by deep-seated social attitudes, which Meyendorff summarised as Russia's 'structural diversity'. Even after the old regime gave way to a democratic state,

good resolutions could not bring 15 millions of peasant households to throw all their energy into the fight with the external enemy. War lords, whether Emperor or Provisional Government, could not break the temper of the people, the temper of their bureaucracy, nor even secure the loyalty of all sections of the educated classes to help the realisation of the nation's whole strength (Kohn and Meyendorff, 1932: 159).

The population was collectively disengaged from the war effort. Belated attempts to use methods of compulsion by the tsarist regime, and (in 1917) by the Provisional Government, only generated further antagonisms. Russia's dispossessed – workers, peasants, soldiers and sailors – threw their lot in with a dedicated revolutionary elite that was dedicated to withdrawal from the Allied war effort and to restructuring the social and economic fabric.

Meyendorff's use of the term peasant 'energy' directs our attention to deeply embedded economic structures, and thus to the attributes of economic backwardness. Trotsky, representing the most radical force in Russian society, argued that these attributes lay at the core of Russia's misfortunes during the war:

In the matter of military supplies and finances, Russia at war suddenly found itself in slavish dependence on her allies . . . The lack of munitions, the small number of factories for their production, the sparseness of railway lines for their

transportation, soon translated the backwardness of Russia into the familiar language of defeat (Trotsky, 1934: 40).

In his desire to pour scorn on the old regime Trotsky exaggerated the speed of the Russian collapse and passed over the behaviour of the peasantry during the war. But he was right to draw attention to backwardness, which the Bolsheviks resolved to overcome (Bailes, 1978).

Finally, it is difficult to disentangle the consequences of war from those of revolution in 1917. The resurgent struggles between peasants and landlords, on the one hand, and workers and employers, on the other, are well established in the literature (Smith, 2002). In agriculture, the conscription of the peasant population broadened their outlook and confirmed their hatred of the propertied elite. By mobilising some two-fifths of all adult males between the ages of 15 and 49, tsarism paid for the education of an overwhelming revolutionary force. In the urban and rural economy alike, shortages of basic goods translated into hatred of merchants and moneylenders. These conflicts had a devastating impact on the course of economic activity in 1917. In industry established economic links were being ruptured. Grinevetskii spoke of 'industrial separatism', by which he meant the growing tendency of enterprises to enter into direct barter with their suppliers, to renege on existing contracts, and to use a variety of informal methods to secure supplies of fuel and raw materials. Carefully cultivated relationships, not least inter-regional economic links, were being torn asunder. Without social and political stability, sustained investment – including new foreign investment – was a pipe dream, and without investment the prospect of a revival in trade between town and country remained bleak (Grinevetskii, 1919: 199; Maslov, 1918).

Russia's postwar leaders embarked on a revolutionary path of economic development. Whereas many policy makers in western Europe hoped to restore prewar economic arrangements and structures, the Bolsheviks deliberately sought to rupture them. They immediately took a decision to nationalise financial and industrial assets, to redistribute privately owned land, and to institute a monopoly of foreign trade – this in the context of collapsing trade volumes. Not all of these policy decisions were without precedent: the tsarist regime engineered the seizure of privately owned assets on a large scale when it expropriated the businesses and farmsteads owned by German and Jewish subjects of the tsar (Lohr, 2003). But expropriation in 1917–18 was on a quite different scale.

The shock of war lasted until the winter of 1920–1. The Bolsheviks' adversaries – the 'White' armies and armed peasant bands (the 'Greens') – eventually succumbed to a combination of Red Army supremacy and

astute Bolshevik conciliation. In March 1921 the New Economic Policy replaced forced grain requisitioning with freedom of internal trade. As a precondition, the new regime embarked on budgetary stabilisation, currency reform (completed in 1924), and partial de-nationalisation. External economic relations were normalised, at least to the extent of forging foreign trade agreements and encouraging limited foreign concessions. In general, the terms on which the postwar economy was structured owed everything to a commitment to radical economic and social change. On these new foundations, economic growth revived during the 1920s, but the prewar level of national income was not restored until at least 1928 (Harrison, 1994: 41–2).

Appendix 8.1. Russian national income estimates

Introduction

Estimates of Russian national income in 1913 derive from two main sources. The first estimate was made by S. N. Prokopovich in 1918. Prokopovich derived ‘net material product’ by calculating volumes of output for agriculture, forestry, fishing, and hunting, large-scale and small-scale industry, construction, transport, communications, and trade. In a subsequent study, Falkus revised Prokopovich’s estimates upwards, partly to take account of the actual grain harvest and of prices prevailing in 1913 (Prokopovich had averaged these for 1909–13), and partly because Prokopovich relied upon Soviet estimates of Russian national income in 1913 for the interwar territory of the USSR that were inconsistent with his earlier estimates of national income for the Russian Empire and for the fifty provinces of European Russia (Falkus, 1968). Falkus’s recalculation yielded a total of 18,475 million rubles for the net material product of the Russian Empire and 14,987 million rubles for the USSR interwar territory.

The second estimate originates with Paul Gregory’s study of Russian national product between 1885 and 1913, which employed end-use categories of consumption, investment, and government expenditures. Gregory’s own comparison of his estimate of national income with those of Prokopovich and Falkus indicated a broad measure of agreement. National income at 1913 market prices reached 18.7 billion rubles in 1913 (in the Russian Empire), equivalent to 16.1 billion rubles for the Soviet Union in its pre-1939 boundaries (Gregory, 1982: 66). In order to facilitate comparisons with Prokopovich and Falkus, Gregory adjusted his estimates of NNP by omitting indirect taxes and surpluses of government enterprises. He adjusted the Prokopovich/Falkus estimate of net

Table A8.1. *Russia: output per person in large-scale industry, 1913–1917 (percentage of 1913)*

	Prokopovich, estimate	Prokopovich method, revised	Alternative estimate
1914	100.0	98.8	100.9
1915	92.6	98.3	110.5
1916	70.9	80.4	104.1
1917	50.0	58.7	76.0

Source: Column 1 derived from Prokopovich (1918: 173). Column 2 derived from Sheliakin (1930: 39). Column 3 derived from Kafengauz (1994: 211).

material product by incorporating an allowance for services and for net product originating in the rest of the world. Gregory's adjustment of the Prokopovich/Falkus estimates to make them comparable with his definition of national income revealed a close correspondence in terms of the interwar territory of the USSR.

The war years

Large-scale industry I begin with Prokopovich's methodology for identifying trends in industrial production. As explained in the text, Prokopovich derived his estimate of labour productivity in industry from data on coalmining in the Donbass. The trend is shown in table A8.1. I have modified his original index to take account of revised data on labour productivity in the Donbass that were not available to Prokopovich (see column 2). The Donbass suffered from a severe shortage of qualified manpower in 1915 and 1916. During 1917, experienced technical personnel and supervisors quit the mines, whilst some POWs 'sabotaged' production (Prokopovich, 1918: 170–1). There does not appear to be any justification for assuming that this sector was representative of all large-scale industry, particularly before 1917. I have provided an additional estimate, derived from the 1918 industrial census, which covered more than 2,300 enterprises in thirty-one provinces (Vorob'ev, 1923; 1961: 64–5). Owing to military activity, the territorial coverage of the census was confined to the north-west, the west, the central industrial region, the north, the Urals, the central Volga region, the lower Volga region, and the central black earth region. Ukraine, the Caucasus, Siberia, central Asia, and the Far East were excluded. This yields an index of gross output divided by average number of days worked (column 3).

Table A8.2. *Russia: cereal production, rival index numbers*

Prokopovich		Wheatcroft		
Year	Production	Year	Sown area	Production
		1909–13	100	100
1913/14	100.0	1913	104	118
1914/15	100.5	1914	105	100
1915/16	98.5	1915	103	110
1916/17	90.7	1916	95	90
1917/18	93.2	1917	95	87

Sources and notes: Index in column 2 from Prokopovich (1918: 173). Indexes in columns 4 and 6 from Wheatcroft (n.d.: 5, 7). Wheatcroft carefully examined the data on sown area and yield, noting the importance that attaches to the break in methodology in 1916, when the data from the Central Statistical Committee (whose final report covered the 1915 harvest) were succeeded by the results from the agricultural censuses (1916 and 1917), on sown area, and from local reports on the grain yields.

These revised estimates challenge Prokopovich's finding of a collapse in industrial production in 1916. They also suggest that Prokopovich exaggerated the extent of industrial collapse in 1917.

Agriculture I turn next to agriculture. Prokopovich computed an index of agricultural production derived from estimates of the sown area. I offer alternatives, based upon Wheatcroft's estimates of sown area and of output (table A8.2).

Since the 1913 harvest was a record crop, I have taken the prewar average (1909–13) as the basis for comparisons with the wartime harvest. Wheatcroft's estimates suggest that Prokopovich underestimated sown area (and by implication, output) in 1915. Prokopovich's index (sown area) and Wheatcroft's index for output are more or less in agreement in 1916. Wheatcroft's calculations suggest that Prokopovich underestimated the extent of the decline in 1917.

Other agriculture: forestry For forestry my index is derived from published receipts from state forests. The Carnegie series authors state that gross receipts amounted to 96.1 million rubles in 1913, falling to 78.0 million rubles in 1914 under the impact of labour mobilisation. No figures are given for 1915, but receipts in 1916 (gross annual receipts derived from the monthly average for the first seven months) may have amounted to 66.8 million rubles. In 1917 the corresponding figure was 89.1 million

Table A8.3. *Russia: index of government receipts from forestry, 1914–1917 (percentage of 1913 at 1913 prices)*

	Percentage of 1913
1914	79.0
1915	58.9
1916	31.3
1917	18.4

Source: Michelson et al. (1928: 54, 112, 188); Antsiferov et al. (1930: 238). The price index is that cited in the 1918 industrial census, *Trudy TsSU* (1926: 116–17).

Table A8.4. *Russia: net income from railways, 1913–1916 (million rubles)*

	1913	1914	1915	1916	1917
Military lines	83.3	32.9	– 28.3	– 97.8	–
Lines in rear	173.8	138.9	189.6	164.4	–
Total	257.1	171.8	161.3	66.6	–
Percentage of 1913	100	66.8	62.7	25.9	–
Total	100	66.8	62.7	25.9	–
Rear lines only, 1913 prices	100	73	71	43	(29)

Source: Bukin (1926: 104). Lines under military control totalled 23,185 km in 1914. Lines under civilian administration totalled 46,273 km. I have adjusted net income in line with the price index in table A8.6 (column 2, right).

rubles. Antsiferov comments that ‘so considerable an increase in the gross revenue seems perfectly natural if we consider the activities of the Forestry Department during the war and the increased demand for growing timber on the part of traders’ (Antsiferov et al., 1930: 238). I have interpolated a figure for 1915 and adjusted for price changes to derive an index in 1913 prices (table A8.3).

Small-scale industry I have simply relied here on Gukhman’s estimate of the trend in output from small-scale enterprise, expressed in 1913 prices. See table 8.12 above.

Rail transport One source puts net income from railways as shown in Table A8.4. The 1913 figures are difficult to relate to those quoted by Prokopovich and Falkus. Other data, such as the volume of passengers and freight, give a very different picture.

Table A8.5. *Russia: an index of railway traffic, 1914–1917*
(percentage of 1913)

	1914	1915	1916	1917
Passenger traffic	112.6	125.2	148.2	–
Alternative estimate	129.6	179.1	–	74.0
Freight traffic	99.3	105.7	124.6	–
Alternative estimate	97.3	108.1	–	82.0

Source: Derived from Sidorov (1973: 601). Alternative estimates are derived from Westwood (1994: 305–6), who notes that ‘fluid frontiers compromise these figures’.

I have decided to base my index on net income from railway receipts on those lines under civilian administration, and to adjust them for price changes. My figure for 1917 is a very rough approximation. The index of income (receipts) shows a sharp drop in 1916, although it is clear from table A8.5 that the volume of traffic was greater in that year than in 1913.

Construction Prokopovich and Falkus derived an estimate for income from construction in 1913 from the numbers employed in construction, and from an estimate of labour productivity in construction as per Gosplan’s figure for 1925–6. I have found no data on employment in construction during the war. One source suggests that the workforce in the Siberian construction industry fell by 17 per cent between 1913 and 1917 (Zol’nikov, 1969: 53).

I have decided to employ an unweighted average of output per person in two branches of industry producing construction materials, namely brickmaking and cut timber and veneer products (*lesopil’naia i fanernaia promyshlennost’*). The results are reported in table A8.6.

Trade One option is to compute an index based upon government revenue from trade establishments during the war. Unfortunately it has proved impossible to locate the data. Nor have I located any information on the number of trading licences issued during the war, upon which Strumilin relied for his work on internal trade before and after the war. Dikhtiar gives some indication of the value of trade turnover at the main annual fairs at Nizhnii Novgorod and Irbit (Perm province). I have constructed two indexes on the basis of reported transactions and trade licences issued. Since transactions at Nizhnii Novgorod were so much greater than at Irbit, by a factor of around ten, I have used the former in

Table A8.6. *Russia: output per person in branches supplying construction materials, 1913–1917 (rubles per worker and 1913 prices)*

	Rubles per worker	Percentage of 1913
1913	2,245	100.0
1914	2,147	95.5
1915	2,238	99.7
1916	1,815	80.8
1917	1,524	67.9

Source: Derived from Kafengauz (1994: 390–1, 432).

Table A8.7. *Russia: volume of trade at Irbit and Nizhnii Novgorod fairs, 1913–1917*

	Irbit		Nizhnii Novgorod	
	Million rubles and 1913 prices	Percentage of 1913	Licences issued	Percentage of 1913
1913	25.8	100	2,676	100
1914	21.5	83	(2,246)	84
1915	11.5	46	1,815	68
1916	6.8	26	1,336	50
1917	(3.9)	15	(989)	37

Source: Derived from Dikhtiar (1960: 206), Raffalovich (1918: 280), and recalculated in 1913 prices. Figures in brackets are approximations only. Nizhnii Novgorod licences are those issued as ‘categories 1 and 2’.

my calculations of national income. However, this index has a highly tentative status (see table A8.7).

Price index The behaviour of wholesale and retail prices is shown in table A8.8.

Appendix 8.2: Russian agricultural statistics, 1909/13–1917

No analysis of Russian food production can be undertaken without understanding the conditions under which data were obtained. Prior to the war, the Central Statistical Committee (TsSK) of the Ministry of the Interior

Table A8.8: *Russia: wholesale and retail price indexes, 1913/1914–1918*

Series	Wholesale prices					Retail prices	
	1	2	3	Exports only 4	Foodstuffs only 5	USSR territory 6	Moscow 7
1913	–	100	100	100	100	100	100
1914	Jan.–June	100	106	110		101	101
	July–Dec.	101		108	106	102	
1915	Jan.–June	115	117	153	138	120	130
	July–Dec.	141		155	145	140	
1916	Jan.–June	238	208	219	196	166	206
	July–Dec.	398		216	178	240	
1917	Jan.–June	702	327	434	311	365	775
	July–Dec.	1171				982	
1918		–	639	953			

Sources and notes: Series 1, unknown commodity sample from Sidorov (1960: 147). Series 2 and 3 from *Trudy TsSU* (1926), vypusk 3: 6–49); series 2 raw material inputs to timber, foodstuffs, mineral, leather, and textiles branches of industry, series 3 raw material inputs to other branches of industry, from 1918 industrial census. Series 4 from Kokhn (1926: 20) (thirteen export items listed by Prokopovich). Series 5 Gosplan figures from Kokhn (1926: 20) thirteen food items, quoted on exchanges, 1924–5 wholesale trade weights. Series 6 from Kokhn (1926: 160–1), basket of sixteen food items, nine items of clothing and footwear, four miscellaneous, including soap, fuel, and housing costs, weighted according to working-class household budget in 1918. Series 7, Gosplan index for Moscow city, from *Trudy TsSU* (1926, vypusk 1: 11).

obtained details of the area under crops and sample estimates of the grain yield. Multiplying the sown area by yield gave a total figure for the harvest. Clearly, the results were sensitive to the quality of the raw data on sown area and grain yields. One authority believed that the TsSK underestimated peasant grain sowings but heavily exaggerated the area sown on private estates. The official figures were also thought to have underestimated grain yields (Ivantsov, 1915: 125–30). Ivantsov added that the *zemstvo* estimates might themselves err on the side of caution, given what he took to be a tendency of *volost* scribes to underestimate cereal yields. The TsSK continued to collect such data for the 1914 and the 1915 harvests. In 1916, however, statisticians employed by the *zemstvos* and the municipalities demanded to participate in a fuller all-Russian agricultural census, as part of a strategy to seize control from the tsarist bureaucracy over the collection and processing of economic data. The result was a nationwide census in 1916, repeated again in the following year as part of a process to

establish the conditions for land reform. As a result, the published data for 1916 cannot be compared directly with the TsSK data for 1915 and earlier years. In fact the results of the agricultural census diverged quite sharply from those of the TsSK. *Zemstvo* statisticians claimed that their results gave a more accurate indication of the sown area and concluded that the TsSK data had understated sowings by around 9 per cent. On the other hand, the 1916 and 1917 figures may themselves be distorted by the reluctance of peasant informants to give accurate data, lest they invite official intervention to take grain (Wheatcroft, 1980).

Notes

- 1 Thanks are due to Theo Balderston, Bob Millward, Ruggero Ranieri, and especially Mark Harrison for advice and comments on an earlier version of this chapter.
- 2 The tsarist regime collapsed in February 1917 and was replaced by a Provisional Government, which was in turn overthrown by the Bolsheviks. The Bolsheviks and the German high command agreed an armistice at Brest-Litovsk on 2 December (old style; 15 December according to the western calendar). Following protracted negotiations, interrupted by renewed military action, a peace treaty was signed on 3 March 1918 (new style).

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Francesco Galassi and Mark Harrison

Introduction

Italy had long nursed the ambition to complete its national unification by annexing the territories held by Austria around Trento and Trieste before the Great War.¹ Yet Italy's diplomacy and armed forces reached war unprepared. It will be argued in this chapter that this reflected international constraints as well as domestic political and social forces before 1914, and it will be shown how these influenced the Italian war effort.

As an economic power Italy is most easily compared with the Habsburg Empire, her chief adversary in World War I. These two powers were both economically of middle size and development level, but the Italian economy was a little smaller and also somewhat more developed than the Austro-Hungarian economy. Thus Italy's prewar population numbered 36 million compared with Austria-Hungary's 51 million, while Italy's real GDP was roughly 90 per cent of Austria-Hungary's. Thus the average citizen of the Austro-Hungarian Empire was roughly 25 per cent poorer than the average Italian (see Tables 1.1 and 1.2). In turn, Italians were substantially poorer than the Germans, French, or British. In a war fought only between Italy and Austria-Hungary it is not clear which would have had the greater military potential, since Italy's demographic disadvantage was offset by a higher development level. But in World War I Italy held a clear strategic advantage since Austria-Hungary fought on several fronts and Italy only on one.

Italy, we are frequently told, was a divided country. More accurately, it had never been united. By the outbreak of war the Kingdom of Italy was only just over fifty years old, and the loyalties to the old ruling families were far from forgotten. The constitutional monarchy enjoyed the support of a minority, mostly the professional classes, the military, and part of the aristocracy. The powerful Catholic Church remained in open opposition to a liberal, secular state; as late as 1910 Catholics were still under an interdict if they voted, and this caused many from the lower-middle classes to remain outside the political arena. On the left, a growing Socialist

movement denounced king, country, church, and private property, while struggling within itself between reformist and revolutionary tendencies. Socialists gained support among the better-off peasants of the centre-north, hard-hit by the low farm prices of the late nineteenth century, and the urban workers of the ‘industrial triangle’, the area of north-western Italy between the cities of Turin, Milan and Genoa. Rapid manufacturing growth from the mid-1890s had swollen the workers’ ranks, and periods of high urban food prices led to strikes, riots, and bloody confrontations with the army. In July 1900 the king was assassinated by an anarchist.

War objectives evoked no wide popular support in Italy, unlike in a number of other countries that joined the war with enthusiasm. Thus Italian domestic differences were not papered over at the outbreak of hostilities. On the right, the church was firmly against war, especially against another Catholic power, Austria. On the left, the nationalist aims of the war were derided as hollow, or as a prize to be paid for by the proletariat. Though some Socialists saw the war as ushering in the long-awaited final crisis of capitalism, their opposition to the war effort was mostly uncompromising. One notable exception was the editor of the socialist daily who declared in favour and was promptly expelled from the party. Widespread, murderous street clashes between interventionists and neutralists preceded the decision to enter the fray.

Throughout the war political rifts divided the country ever more bitterly. In itself this was not unusual; the stresses of total war led eventually to increased social conflict in every European power that took part. What is unusual is that final victory was followed by revolution: within four years the equilibrium of Liberal Italy was finally swept aside by a *coup d'état* led by that same erstwhile socialist editor: Benito Mussolini.

The other great divide was the north–south gap: in 1911 in the south, value added per worker was barely two-thirds of the national average, and personal income only half (Toniolo, 1990: 122; Zamagni, 1993: 39; Cohen and Federico, 2001: 15). Literacy, infant mortality, life expectancy, or any other index told the same story of divergence. The rapid growth of GDP per head from the mid-1890s to the 1907 crisis, between 3 and 4 per cent per year, was almost exclusively a northern phenomenon, except for small concentrations of industry attracted by the political and administrative centres that recycled rents and taxes in the south (Fenoaltea, 2001). The growth was fuelled by an investment boom: gross fixed capital formation ran at almost 14 per cent of GDP per year (Toniolo, 1990: 101; Rossi et al., 1993: table 2B). Virtually all this investment took place in the north-west, however, in the area between Milan, Turin, and Genoa (Fenoaltea, 2001).

Italy's industrial concentration had important implications for the war. The machinery, equipment, and skill pool necessary for mass production of modern war *matériel* was found almost exclusively in a few hundred square kilometres in the north-west: 72 per cent of plants working for the war effort in 1916 were in Milan, Turin, or Genoa, and only 8 per cent in the south (Caracciolo, 1969: 201). Thus the war reinforced the north-south gap, giving it a particularly bitter twist: many northern men of military age were assigned to the more technical and 'safer' corps of artillery and engineers, or exempted from service altogether to engage in essential production. On the other hand, southern peasants were assigned to infantry regiments and went to fight over foreign territory for incomprehensible reasons (Clark, 1984: 186-7).

Internationally, Italy's prewar alliance with Austria-Hungary and Germany was motivated mostly by long-running commercial and colonial disputes with France and by the desire to limit Russia's influence in the Balkans and the Mediterranean. The alliance was weakened, however, by Italy's claim to substantial territory held by one of its strategic allies. Mistrust between Italy and Austria ran deep after almost a century of nationalist unification wars against Habsburg opposition. At the same time Italy's relations with its strategic adversaries were far from unfriendly, although formal rapprochement to France was ruled out while Italy belonged to the Central Powers. Franco-Italian relations improved steadily in the early twentieth century. As for Britain, the one firm point in Italian diplomacy was the need to cosy up to a country that supplied 90 per cent of Italy's coal (Forsyth, 1993: 165) and whose navy could choke off access to the Mediterranean and threaten Italy's long, exposed coastline. Needless to say good Anglo-Italian relations were resented in Berlin and Vienna. When Austria refused Serbia's reply to its ultimatum and precipitated the war, Italy was not consulted, as required by the alliance treaty. This gave Prime Minister Salandra the chance to heave a sigh of relief, declare neutrality, and ponder which way to jump.

The Italian military reached the beginning of war in Europe while still engaged in mopping-up operations in Libya, seized from Turkey in the war of 1911/12. As the lights went out in the summer of 1914 and the government dithered over which side could offer the best guarantees of allowing Italy to annex the territories it sought, the general staff were equally uncertain whom they would march against. Its ambiguous position with the Central Powers meant that Italy had no grand plan such as Joffre's or Schlieffen's. As the fronts settled into trench warfare after the battles of the Marne in the west and Tannenberg in the east, Italy's top brass began to think that the war might be a long one (Pantaleoni, 1917),

but did not use the opportunity to study how problems of provisioning and supply were being solved by the belligerents.

Probably the Italian military did not watch military-industrial mobilisation in other countries in 1914 because they shared a common belief that there was nothing to watch. If they had been watching, that would have been surprising. In Britain it took months, and longer in Germany, to come to terms with the changed nature of war. Thus, a head-in-the-sand attitude was not peculiar to Italy's officer corps; it reflected a purely 'military' conception of warfare that was widespread in Europe, supported by the belief that mass armies and industrial economies could not co-exist for long. In Italy, therefore, there was no attempt to gear the armed forces up for modern warfare, even when the economic dimension of the war, with its massive hunger for industrial goods, was becoming clear. As late as May 1915, when its neutrality ended, Italy's entire stock of machine guns was 618 (including those in use in Libya and not all in working order) compared with 1,500 for Austria-Hungary, 2,000 for France, and 3,000 for Germany when these countries had started to fight some ten months previously (Ministero di Guerra, 1927: 193 ff.).

Not all Italian political actors were so blinkered, however. We will see below that in Italy the declaration of war was followed swiftly by the appointment of a munitions and supply *generalissimo*, indicating that at least someone in the government *was* thinking about the productive implications of conflict. In Italy as elsewhere, however, it was not easy to translate these auspicious beginnings into a coherent plan. Even after years of conflict, bureaucratic duplication and ad hoc solutions remained.

In the Treaty of London (26 April 1915) the Entente powers agreed to all Italy's territorial claims against Austria in return for its entry into the war within a month. On 24 May Italy declared war on Austria-Hungary; war with Germany did not follow until 29 August 1916. Being a latecomer to the war should have given the government an advantage in preparing for an industrialised conflict. The secret negotiations that led to the end of Italian neutrality were conducted with only minimal involvement of the general staff, and the army was barely ready to begin operations.

Within three weeks, however, on 9 June, an under-secretariat was created within the War Ministry to deal with 'Arms and Munitions'. Endowed with wide powers and headed by the energetic and authoritarian General Alfredo Dallolio, the under-secretariat became a ministry two years later. It employed almost 6,000 people in May 1918 when Dallolio was forced out by a financial scandal. This massive apparatus was not responsible to parliament, operated in arbitrary and mysterious ways, and apparently kept few accounts. General Dallolio's approach to provisioning, supply, credit, and allocation had a profound impact on the

structure of Italian industry. Among its postwar consequences were vast industrial conglomerates that struggled to survive in the less forgiving postwar atmosphere (Minniti, 1984). Their weakness marked the entire interwar period, pushing the Fascist regime into rescues and nationalisations and creating a large Italian state sector, much of which has survived into the twenty-first century.

As far as wartime is concerned, however, the difficulty of translating authority into a plan is shown by the fact that General Dallolio never managed to bring the whole of Italy's industrial war effort under his control. A surprising number of under-secretariats, committees, working groups and task forces functioned separately, without co-ordination and often at cross purposes, during the whole of the war. An inquiry after the end of hostilities revealed that no fewer than 297 governmental bodies, staffed by different people and reporting to different under-secretaries in six different ministries, had enjoyed the power to allocate resources for the war effort (Caracciolo, 1969: 197).

The management of Italy's war effort had an important foreign dimension. As a middle-income country, richer than Austria but substantially poorer than Britain, Germany, or France, Italy imported capital and exported labour throughout the nineteenth century. Borrowing on the capital account, combined with emigrants' regular remittances and earnings from tourism on the current account, enabled Italy to run a substantial deficit in merchandise trade. In the five years preceding the war, Italian exports covered less than two-thirds of imports (Forsyth, 1993: 321), most important among which were foodstuffs, fuels, and virtually every mineral used in industry other than mercury and sulphur. This was not a problem in peacetime, but war created a substantial problem of economic adjustment because the inflows that covered this deficit dried up; remittances, which covered about 40 per cent of it, fell by three-quarters in real terms from 1913 to 1918 (Jannacone, 1951: 319).

A parallel with other powers brings out the point. Britain was also unable to feed itself and had to import essential industrial raw materials. However, the British balance of payments included important inflows from large foreign assets accumulated over the previous century. The war made a big dent into these assets, but the point is that at the outbreak of war Britain was the world's largest capital exporter precisely because its trade deficit was more than covered by invisibles and investment income. In contrast, Italy was a net capital importer before a single shot was fired, and the problem of financing Italy's wartime imports eventually tied the Italian government's hands. But it was in Italy's favour to have chosen her allies from among the richer powers that could help her most easily.

Because Italy had been a net borrower for years, part of the Treaty of London involved opening a line of credit with the Bank of England in Italy's favour for £60,000,000 (Toniolo, 1989: 221–4). The demands of the war meant that the original credit had to be extended over and over again, and eventually Italy, like other Allied powers, entered the US market. The use of external finance was dictated in part by the Italian dependence on imported raw materials, but it also reflected a political awareness that standards of living could not be compressed without breaking the fragile political equilibrium that allowed the war to go on at all (Stringher, 1920: 92). The war was thus financed only in small proportion (16 per cent) by increased taxation; this proportion is comparable with France's 14 per cent and Germany's 13 per cent, though far below Britain's 50 per cent (Kindleberger, 1984: 292). As a result, at the Treaty of Versailles Italy had a public debt equal to 119 per cent of its GDP, of which almost three-quarters was domestically held. This may seem to put Italy in a better position than Britain with 140 per cent, but the real problem was the debt held abroad, which at the average exchange rates prevailing in May 1919 was equal to five times the value of Italy's annual export trade (Toniolo, 1989: 14). Not surprisingly, the lira weakened steadily throughout the war, losing over 40 per cent of its value relative to the pound until it was rescued by joint intervention of Allied central banks in early 1918.

External weakness and political constraints on taxation meant that war finance was also found in monetary expansion. Of the same importance as increased taxation (16 per cent) in paying for the war, most of the monetary expansion took place in two episodes: the early months of the war, when opposition had not yet been silenced by censorship, and after the dramatic collapse in morale following military defeat at Caporetto in October 1917. Together with strained distribution channels and spreading shortages of labour and goods, this contributed to sharp bouts of inflation at politically delicate moments. Coupled with the arbitrary management of procurement contracts under General Dallolio, inflation fed resentment against the government figures and army brass believed to be lining the pockets of a few industrialists. The results included mutinies, strikes, rioting, and a political polarisation between those who praised the war and the war leaders, and those who accused them of using the workers as cannon fodder. Especially after November 1917, revolution lurked just around the corner.

Three main themes of the Italian war experience emerge from this overview. The first is the management of domestic supply, and the creation of industrial giants such as FIAT, ILVA, Ansaldo, and Breda. The second is the problem of war finance, both public and private, the choice between monetisation, taxation and debt, and the role of the Bank of Italy

in directing public policy. The third is the external balance, exchange, debt, and imports, again a set of issues where the Bank played a leading role. The approach to each of these shaped the possible solutions to the others, and the economic history of World War I for Italy is largely the story of how Dallolio's approach was mediated by the Treasury and the Bank. Improvisation is an overarching theme that unites the history of Italy's impromptu war effort with that of others. These themes will be pursued in the rest of the chapter, but first an outline of events on the Italian front may help those readers who are unfamiliar with this side of the Great War.

Italy's war

The Italian–Austrian war was fought on land, since the Italian navy sealed the port of Trieste which provided Vienna with its only access to the sea. Naval battles took place towards the end of the war, when the Imperial navy tried to break through the blockade, but was easily pushed back into harbour by a vastly superior Italian force that lay in wait.

For most people the image of the Great War on land is the mud of Flanders, but on the Italian front nothing could be farther from reality. The territory over which Italy and Austria fought is a range of mountains, the eastern end of the Alps, where trenches had to be blasted in the rock with dynamite or cut into the side of glaciers tens of metres deep, and where avalanches, frost, and lack of oxygen were as deadly as enemy fire.

The border between Italy and Austria, from Switzerland to the Adriatic Sea, 600 kilometres long, was shaped like an S on its back. The mountains above the S were Austrian and the plain below the S was Italian. Thus if the Austrians could break through the Italian lines at their southernmost point, they could envelope the Italian army in the upward-pointing portion of the S. And since Italy's main industrial centre, Milan, was only just over 120 kilometres away from the front, the Austrian high command hoped quickly to knock Italy out of the war.

The war proceeded in two phases. In the first phase, from the summer of 1915 to the summer of 1917, the two sides hammered away at each other for no substantial or lasting gain. The summer of 1915 was marked by initial Italian successes. Already stretched on the Russian front, the Austrians had trouble holding their defensive positions, and the Italian army made some inroads, though without actually breaking through the front at any point, until winter stopped operations. In the spring of 1916 the Austrian general staff launched a massive offensive on the southernmost curve of the front trying to punch through the Italian lines and drive east to the sea, trapping the Italian army against the Austrian-held mountains. In spite of the vast resources used, desperate Italian resistance

stopped the offensive. By the end of 1916 the front line remained what it had been in late summer. Military activity resumed in 1917 once mountain passes had opened up, and this time it was the Italians who launched two serious assaults in late spring. The gains were, however, minor, and a new offensive duly followed in August. Again the lines remained broadly unchanged until the autumn.

In the second phase, from the autumn of 1917 to the autumn of 1918, the front became more fluid. At the end of October 1917 the Austrians, with significant German reinforcements, managed to break through at Caporetto (now Kobarid in Slovenia). In a few days the Italian army was pushed back some 70 kilometres with the loss of 350,000 troops (killed, wounded, and captured). While the blow was serious, the defeat brought compensations. First, once the Italians regrouped and stopped the Austrians on the river Piave, the fight was for the first time on level ground rather than uphill. Second, the Austrian envelopment had not worked, so that while casualties were serious the Italian army remained operational with a new chief of staff, General Armando Diaz. Third, Austrian supply lines had lengthened, and now had to cross difficult terrain with damaged transportation links. The Piave proved easy to defend throughout the 1917/18 winter. When military operations resumed in the spring, neither side managed to cross the river. The summer passed in a series of costly but ineffective attacks and counter-attacks until, on the anniversary of Caporetto, General Diaz launched an offensive in which Italian forces simultaneously crossed on two points of the river and caught the Austrian troops, massing for an offensive of their own, in a pincer movement. The Austrian army collapsed, and in less than a week, on 4 November, Vienna signed an armistice.

The final tally for the Italian front was: killed, 620,000 Italians and 410,000 Austrians; wounded, 947,000 Italians and 1,220,000 Austrians; captured and missing, 600,000 Italians and 700,000 Austrians. Among the more than 1 million dead, 120,000 froze to death or were buried alive by avalanches (von Lichem, 1925; Meregalli, 1928).

Supplying the front

The general and the industrialists

Italy's position as a latecomer to industrial development meant that the state always played a considerable role in the economy (Zamagni, 1993: 157–82): Europe's first railway nationalisation took place in Italy in 1905 (Maggi, 2001). Aside from agriculture, the most sheltered sectors were steel, cotton, and food processing. Thus, considerable administrative

expertise existed within the government bureaucracy on the management and direction of complex industrial concerns. The political climate at the beginning of the war favoured the creation of some form of centralised governance structure that would manage war production, a ‘war dictator’ as it was called at the time. Royal Decree 993 formed a Supreme Committee of Ministers to oversee war production, the daily decisions being made by the Under-Secretariat for Arms and Munitions (AM). The decree gave the government, in effect the AM, ample powers: to force private firms to produce and supply materials and goods and invest in increased productive capacity, to take over private plant and equipment and manage it directly, and to requisition energy resources regardless of existing contractual agreements (De’ Stefani, 1926: 416–17). In practice extreme measures were never taken because, as General Dallolio himself explained to the Parliamentary Inquiry Commission after the war, ‘the government is inevitably . . . slower . . . than private individuals, so that in its hands production would have declined . . . [which was] exactly the opposite of the desired effect. For this reason, and also because I trusted the patriotism of industrialists and workers, I did not order requisitions or government take-overs’ (Forsyth, 1993: 81).

The AM was organised in separate branches for ‘general tasks’, ‘industrial mobilisation’, and ‘technical services’. The General Tasks Bureau involved research and development, contact with foreign ordnance services, transport services, and a statistical office; what statistics this office collected, if any, and where they might now be is not known. The Bureau of Industrial Mobilisation, UMI (*Ufficio mobilitazione industriale*) ran the industrial side of the war effort. The Technical Services Bureau set technical standards and quality tests for all procurement contracts affecting raw materials and industrial goods. Alongside these bureaux worked separate directorates for Artillery, the Engineering Corps, and the Air Force.

Two Royal Decrees (26 June and 22 August 1915) gave UMI vast powers in dealing with war production. Besides being in charge of all existing ordnance works in the country, UMI had the right to classify private establishments and even whole firms as ‘auxiliary’ to the war effort, which meant that UMI thereby assumed significant aspects of the owners’ right to manage these establishments for an indefinite period. But firms often welcomed auxiliary status because it eased restrictions on their access to energy, labour, and raw materials.

Running the activities of UMI was the Central Mobilisation Committee, in charge of procurement contracts, the allocation of non-military personnel and exemption from military service, the coordination of transport and the allocation of fuel, the import and export of war *matériel*, and also, strangely, propaganda and ‘patriotic action’. The Central Mobilisation Committee

comprised an inner sanctum of ‘technicians’ appointed by General Dallolio alongside industrial managers’ and workers’ representatives. The latter do not appear to have been from trade unions, most of which were against the war, but were chosen by management on the grounds of experience and technical competence.

This structure covered the country by dividing it into seven (later eleven) regions, each with a Regional Mobilisation Committee handpicked by General Dallolio. Each regional committee, chaired by a general or admiral, was made up by a few civilian ‘technicians’, industrialists, and workers, plus representatives of the Central Committee. Alongside each Regional Committee, often working at cross-purposes with them, were other public bodies, some with provisioning functions such as the agricultural requisitioning consortia and the civil mobilisation committees (De’ Stefani, 1926; Einaudi, 1933; Mascolini, 1980).

Alongside their other powers, the Regional Committees could compel the productive integration of smaller firms into nearby military ordnance plants or even into larger private firms, creating a form of compulsory outsourcing that involved dozens of small firms at times (Caracciolo, 1969: 200). This policy was fostered without cabinet approval, as the Royal Decrees permitted, by General Dallolio who, as chief of staff for the Engineering and Artillery Corps since 1911, had direct knowledge of the fragmented nature of Italy’s mechanical industry (Minniti, 1984).

As the war continued, UMI gave auxiliary status to growing numbers of firms: 1,976 by the end of the war, employing over 580,000 workers. Adding to this the 322,000 workers in the ordnance plants, virtually one industrial worker in three worked directly under UMI’s control in 1918 (Caracciolo, 1969: 202; Rossi et al., 1993: table 6).

The industrial capacity controlled in this way was highly concentrated: three-quarters of workers in auxiliary firms were in northern Italy, with over 70 per cent in the Industrial Triangle alone: 32.2 per cent in Milan, 22.3 per cent in Turin, 16.2 per cent in Genoa (Caracciolo, 1969: 202). Even more indicative of the nature of the war effort is the sectoral distribution of auxiliary firms. Between 80 and 86 per cent of auxiliary smelting and metal-working plants were in the Industrial Triangle, as were 80 to 82 per cent of mechanical plants. Even in sectors where productive capacity was somewhat more dispersed across the country, the north-west still accounted for the lion’s share: 51 per cent of auxiliary chemical plants and 62.7 per cent of textile plants were located here (Caracciolo, 1969: 202; Ferrari, 1991).

One aspect of this concentration was that AM staffed the Central and the Regional Mobilisation Committees and their bureaucracies by recruiting mainly from the limited population of managers, engineers, and

industrialists of the Triangle. As a result Leopoldo Pirelli, of the tyre firm, took charge of the production of rubber goods for the Regional Committee of Milan which included firms that were Pirelli's own competitors as well as Pirelli SpA itself. Dante Ferraris, FIAT's general manager, ran a group of twenty-five mechanical firms, some of which were FIAT's rivals. The same went for electrical goods, steel, hydroelectric energy, and several other sectors (Caracciolo, 1969: 207–12). However steely their moral fibre (and for some it certainly was), these industrialists-turned-regulators could avoid favouritism, cronyism, and corruption only with difficulty, and to avoid the popular perception of corruption was impossible. The resulting resentment against war profiteers fed political radicalism on both the left and right. In the event, the evidence suggests that after the war the concentration indices of Italian industry had risen significantly (Cohen and Federico, 2001, 50).

This was reinforced by the administrative confusion of AM. The postwar inquest into war procurement discovered that the 2,865 contracts signed by the Central Mobilisation Committee and the additional 24,516 signed by the different regional committees were scattered in 10,500 files held in different parts of the country without a central index or cross-referencing system. In several cases, multiple copies of the same contract existed with vastly differing prices (Inchiesta, 1923: 67–77). Several large contracts were awarded orally. In the end it proved impossible to audit the orders placed by AM because a Royal Decree of 4 August 1915 had suspended normal public accounting procedures and nothing had been put in their place.

In this financial chaos regional committees regularly authorised massive advances to industrial concerns, and the government approved equally enormous tax exemptions for auxiliary firms, including vastly accelerated depreciation allowances on new investments and complete tax exemption on all new machinery, plant, and equipment. Higher corporate tax rates on wartime profits were not introduced until after the war, and the proportion of retained earnings exempt from tax was repeatedly raised. In this hothouse atmosphere, providing an 'expert' to one of the regional committees (or even better to the Central Committee in Rome) was a sure-fire way of ensuring preferential treatment that ranged from permissive budget constraints to privileged access to rationed inputs and the ability to affect competitors' supplies. Over the whole edifice hung General Dallolio's injunction issued in a memo on 27 June 1915: 'in the end', he had written, 'the time element *must* come before any other consideration' (Caracciolo, 1969: 208). Unknowingly Dallolio echoed the German general staff's motto in those years, '*Gelde spielt keine Rolle*' ('money plays no role', or 'costs don't matter', cited by Kindleberger, 1984: 291).

War production

From the few hard figures that we have, the results of industrial mobilisation were mixed; they were possibly better than the performance of Italian industry in 1940–45 (Zamagni, 1998). Table 9.1 reports indices of the volume of industrial output for selected industries, while military supplies are reported in table 9.2. Allowing for the very low starting points in some industries in May 1915, the greatest gains were made in the mechanical and engineering industries as well as in hydroelectricity. The automobile industry was particularly successful at increasing output; it is important to note that this success was largely that of one firm, FIAT, which went from producing about one-half of all Italian vehicles in 1913/14 to 75 per cent in 1917. In fact, 90 per cent of the increase in automobile output from 1913/14 to 1917, when production peaked, was attributable exclusively to FIAT (Zamagni, 1993: 224).

Aside from electricity and aeroplanes, early 1917 appears to have marked the peak of Italian war production. Certainly the output of the secondary sector grew rapidly early in the war (between 25 and 30 per cent by 1916), then stagnated or fell later on. At the armistice, manufacturing output was 5 to 6 per cent above where it had been in 1914, and about 8 per cent higher than the mean for 1908/13 (Toniolo, 1989: 126; Caracciolo, 1969: 215; Rossi et al., 1993: tables 1A and 1B). In short, therefore, the output increases in war-related sectors were obtained largely at the cost of running down stock elsewhere.

If war production was relatively successful up to 1917, the fact that it peaked before the end of the war and began to decline while the intensity of fighting was still rising requires explanation. At this time the economy was fairly fully employed, but we shall see that in principle there was room to put pressure on consumption and shift resources to the war effort. The military setback of Caporetto occurred at the end of October 1917, and in response to this crisis the Bank of Italy further eased its already liberal credit policies. Given these, 1918 should have marked the high point of economic mobilisation with every available resource thrown into the fray. The fact that the war economy had already encountered its limits may be explained in terms of co-ordination problems that increasingly impeded Italy's economic mobilisation at the end of the war.

Limits on economic mobilisation

The ultimate limit on the resources available for wartime mobilisation is fixed by a country's gross domestic product and the import surplus that it

Table 9.1. *Italy: indices of industrial production, selected branches (percentage of 1913/14)*

	Pig iron	Steel	Cars	Aeroplanes	Aeroplane engines	Locomotives	Railway coaches	Ships	Sulphuric acid	Nitric acid	Electricity (kWh)
1913/14	100.0	100.0	100.0	—	—	100.0	100.0	100.0	100.0	100.0	100.0
1915	93.1	109.4	194.2	100.0	100.0	84.3	62.8	45.7	98.2	121.1	122.5
1916	115.0	137.6	218.8	328.5	371.0	24.8	39.7	146.7	—	—	143.5
1917	116.0	144.4	318.4	1,013.4	1,109.9	88.2	40.6	70.5	—	—	167.5
1918	77.3	101.1	280.0	17,075.9	24,455.4	16.5	48.7	114.3	97.9	46.7	180.1
1919	59.1	79.3	225.4	—	—	147.7	156.2	177.1	91.6	52.1	167.5
1920/21	36.7	79.9	199.1	—	—	140.5	115.2	211.4	90.0	45.6	193.3

Sources: Zamagni (1993: 224).

Table 9.2. *Italy: weapons, war matériel and equipment for use by the military: domestic stocks and output (units and per cent)*

	Recorded domestic output, 1915–18 (units)	Stock at Armistice (percentage of stock at declaration of war)
Light and field guns	–	382
Shells (thousand)	69,835	–
Rifles (thousand)	2,598	127
Machine guns	–	32,207
Small arms ammunition (million)	3,616	–
Seaplanes	–	256
Aeroplanes	12,021	23,322
Aeroplane engines	24,400	–
Automobiles	–	628
Lorries and trucks	–	806
Motor cycles	–	546
Tractors	–	800
Naval ships	572	–
Submarines	71	–

Sources: Caracciolo (1969); Curami (1998); Zamagni (1993; 222); Segreto (1982); Romeo (1972: 118). Curami provides detailed lists classifying weapons by type and model.

can extract from its trading partners and allies. In Italy's case the wartime trend in GDP is something of a puzzle that Stephen Broadberry has laid out in more detail in the appendix to this chapter. In Italy as elsewhere, no one was counting at the time; the trend in Italian GDP during World War I has been painstakingly reconstructed by Italian economic historians long after the event. The puzzle is that, according to the most authoritative estimates, Italy's wartime performance was so good. By the end of the war all other economies with similar levels of development and similar agrarian structures were collapsing. Just to keep the Italian economy intact would have been a notable achievement. On the one hand, the figures suggest that by 1918 Italy's real GDP was at least one-third higher than in 1913; if this is so, this performance outshines that of every other country in World War I, and matches the astonishing achievement of the US economy in World War II. Yet, on the other hand, the general tone of historical commentary on the Italian war economy is unenthusiastic, even gloomy. The literature has clearly missed something. Either Italy's

Table 9.3. *Italy: Private consumption per head (percentage of 1913 and constant prices)*

	Total private consumption per head	Food consumption per head
1913	100.0	100.0
1914	99.0	101.8
1915	100.2	104.5
1916	102.6	106.7
1917	100.2	107.0
1918	106.2	116.1
1919	103.3	109.3
1920	111.0	111.2

Sources: Rossi et al. (1993: table 3A); Maddison (1995: table A-3a).

statisticians have overstated the Italian wartime performance by a considerable margin, or the historians of Italy's war have missed an economic miracle. On the whole the former seems more likely, but there is no certainty either way. Since we cannot resolve the puzzle here, our discussion from this point must be to some extent provisional.

It appears, first, that average consumption levels were maintained throughout the war and per capita food consumption even improved somewhat (table 9.3). Despite this, distribution difficulties led to localised shortages (Toniolo, 1989: 11); some were so severe that they led to riots like the ones in Milan and Turin in the spring and summer of 1917.

Before the war, Italy imported a shade under 20 per cent of its wheat consumption, largely from Russia and the lands around the Black Sea. As Turkey joined the Central Powers, this route was choked off. By the end of 1914, before Italy had declared war, shortages were looming and the government set up an emergency office for the provision of grains and flour as a part of the Ministry of Agriculture. When the harvest of 1915 turned out badly, the situation suddenly became critical. Private stocks were being run down and some municipal councils organised their own requisitioning and distribution networks, but nationally nothing much was done.

Another six months passed before the government legislated in early 1916 to requisition grains and other foodstuffs at fixed prices. Had price fixing been effective it would have had predictably negative effects on domestic supply, though it is difficult to separate the disincentives thereby created from the consequences of the massive withdrawal of manpower from agriculture for the front. But there was no purchasing, collecting,

shipping, and distribution system to give effect to requisitioning. In any event, the requisitioning of domestic supplies failed to address the problem of Italy's dependence on imported food.

Amidst a flourishing black market, official price lists for food were published in March 1916 and later for other items. These lists discouraged exchange while giving the impression that the situation was in hand, which was not the case. The government had no policy on what to buy, where to buy it, or, in the case of foreign supplies, how to allocate shipping for transport back to Italy.

Falling exchange rates and foreign reserves meant seeking ever more credit from the Allies, which was given increasingly on condition that Italian purchases went through a centralised Allied control system. Once the foodstuffs were brought home, disarray in the railway system, corruption, and bureaucratic inertia meant shortages, and popular resentment rose both among consumers who could not find food and among farmers who viewed the prices paid by requisitioning agencies as confiscatory.

Ration cards were introduced in September 1917, though only after more bloody confrontations over food between workers and police in several cities, especially Milan and Turin, had left scores killed and wounded. The murky workings of Italy's bureaucracy lent credence to rumours that food was being deliberately withheld from stores by 'profiteers', and workers clashing with the police asked for free distribution of food to compensate 'past injustices'. The food distribution system was not sorted out until virtually the end of the war, when the organisation of deliveries was separated from the Ministry of Agriculture (Dentoni, 1987). By then, the US Federal Reserve System had agreed to support the lira and guarantee Italian purchases in the American market (see pp. 298–303 below).

Despite the confused and haphazard provisioning and distribution of food, or perhaps *because* it was so poorly run that food leaked from all sides, food consumption remained at prewar levels on average, apart from localised shortages. On the reckoning of table 9.3 average food consumption actually rose, though no one has attempted to separate consumption by the military from that of the civilian population. Southern peasants in uniform possibly ate better than they did at home; what that meant for their families is not clear. In the absence of a modern study of the problem it seems likely that, where the public authorities foundered, a lively though largely illegal private sector picked up the slack and supplied Italian households with a steady diet.

Since the economy's consumption resources were resistant to mobilisation, the main burden of the war fell on investment. According to recent estimates, gross fixed capital formation fell from one-seventh of GDP in

Table 9.4. *Italy: investment (percentage of GDP at current prices)*

	Gross capital formation		
	Fixed	Inventories	Total
1913	13.8	3.2	17.0
1914	13.2	-2.1	11.1
1915	8.9	-4.7	4.2
1916	6.3	-7.4	-1.1
1917	7.4	-8.3	-0.9
1918	6.4	-8.2	-1.8
1919	10.8	-6.3	4.5
1920	12.9	-1.2	11.7

Source: Rossi et al. (1993: table 2B).

1913 to one-fifteenth by the end of the war. At the same time, inventories were being run down so that *total* investment became negative (table 9.4).

The reduction in inventories is not surprising in a raw-material-poor economy like Italy's, given the difficulty in obtaining reliable supplies by sea as Germany increased its submarine warfare in the Atlantic. Italian supplies were constrained by the growing pressures on British shipping even before Germany's declaration of unrestricted submarine warfare (Forsyth, 1993: 165–9). Total imports declined between 1916 and 1917, when industrial production peaked, by 3 per cent at constant prices. A significant part of this decline was accounted for by a decline of 33.9 per cent in imports of fossil fuels at constant prices (Rossi et al., 1993: table 8). In May 1917, the Italian mission to Washington was arguing that without increases in coal deliveries from the Allies 'Italy would soon be out of the war' (Monticone, 1961). Thus Italian industry was increasingly short of inputs, especially coal which was almost entirely imported. Lack of coal led to several steel furnaces being shut down during the last twelve months of the war (Caracciolo, 1969: 203).

Moreover, before the war almost 30 per cent of Italian imports had come from Germany or Austria-Hungary (Forsyth, 1993: 321), with German chemical and engineering products providing essential supplies to the chemical and mechanical industries whose output was most needed in the war effort. Although the interruption in German supplies appears to have stimulated some import substitution (Zamagni, 1993: 227–9), the short-term difficulties were considerable.

The shortages of fuels and other inputs bore heavily on railway transport. Table 9.1 shows that the supply of railway rolling stock fell markedly

from its 1914 levels for the duration of the war. More generally, infrastructure investment declined by 56 per cent in real terms between 1914 and 1917 (Rossi et al., 1993: table 4). Coal shortages presumably also played a role. Congestion on the overstretched transportation system was a likely result, especially in northern Italy. There is an echo of this in the ton-kilometres of freight that Italian railways carried; these rose from an annual average of about 7 billion in 1910/14 to 8.9 in 1915 and over 11 billion in 1916, only to fall back to 10.6 in 1917 and 10.3 in 1918 (Mitchell, 1975: 593).

Postwar consequences

In the course of industrial mobilisation the structure of Italy's manufacturing sector was transformed. The contracts awarded by AM through UMI lacked audit or budgetary control, were not open to tender, and were more often than not awarded by a closed circle of people whose financial interests were closely aligned with the contractors'. To be elevated to one of the committees that made these crucial decisions one had to be known, or be introduced, to one man only: General Dallolio. The rewards of such a contact were significant, and it does not take advanced training in economics to realise that only large and well-connected firms could hope to place their experts on the several committees that comprised AM. The unpreparedness of the public sector for a war that had been going on for ten months by the time Italy entered it, meant that massive rent-seeking opportunities were created in the rush to put 'the time element' above 'any other consideration'.

Under the circumstances it would have been surprising if these rents had not been seized, and rising net corporate profit rates bear witness to this capture. In steel, declared profits after tax went from 6.3 per cent of invested capital in 1910/14 to over 16.5 per cent during the war; in chemicals and rubber, from 8 per cent to 15 per cent, in woollens from 5 per cent to 18 per cent; in automobiles (as we saw, this meant in effect FIAT), from 8 per cent to 30 per cent, in all these cases despite a massive expansion of capacity (Caracciolo, 1969: 217). Capacity increased because the high returns stimulated investment in those firms that were able to benefit from the situation. Generous tax exemptions further helped well-connected industrial firms to increase their capital dramatically throughout the war. The net value of physical capital (net of assets written off during the year) in publicly listed companies rose by 200 million gold lire in 1915 over 1913/14, the same in 1916, 800 million in 1917, 1.9 billion in 1918, and 1.4 billion in 1919 (Caracciolo, 1969: 216).

Two giants created by the war were the steel and engineering Ansaldo Group, led by the Perrone brothers, both of whom were members of UMI, and the engineering Breda Group, led by V. S. Breda, a member of a regional committee; both required massive state intervention in the 1920s and 1930s. Another smelting giant, ILVA, headed by A. Luzzatto, and the aeronautics and engineering firm Caproni, led by G. Caproni, both members of UMI, also required state support. Of the firms that expanded during the war, the most successful in consolidating their gains in peacetime were FIAT and Pirelli, headed respectively by G. Agnelli and L. Pirelli, the former a member of UMI, the latter a member of one of the regional committees. During the war these two firms concentrated on what today would be called their 'core competence', while in most other cases cheap credit sent managers into uninhibited acquisition sprees. ILVA, Ansaldo, and Breda integrated upstream and downstream with the aim to achieve a 'complete cycle' in which they would control everything from energy sources and suppliers of intermediate products to transport systems and even banks. The intended conglomerates may have been manageable as loose consortia, but by all accounts they lacked internal logic and did not even have compatible accounting procedures, so that it was difficult for top managers to know how the whole concern was faring. Thanks to the peculiar conditions of Italian war finance, massive amounts of financial and physical capital became locked up in these conglomerates.

Other consequences were more helpful to the long-term growth of Italy's industrial sector. Perhaps the chemical and hydroelectric industries were the most evident success stories. The former increased the output of dyes, fertilisers, and sulphates and learned how to produce a vast range of synthetic chemicals from pigments to refractory tiles and to synthesise atmospheric nitrate. The growth in electricity generation for the first time supplied Italian industry with cheap energy not subject to interruption in case of war. It made cheap, flexible mechanical power available to small firms, a development that some economists have argued was in the long run extremely important in supporting small-scale industry which, then as now, employed the bulk of the Italian manufacturing labour force (Cohen and Federico, 2001).

Less tangible improvements were also derived from the war effort. Growing plant size and the exposure of rising numbers of unskilled or semi-skilled workers to complex industrial processes probably increased the know-how and human capital of the workforce. The experience accumulated during the war years may have helped managers in the industrial restructuring of the 1920s. Other sectors posted purely artificial gains that dissolved as soon as war conditions ceased: such was the case

of mining, where low-grade coal was extracted at uneconomic prices to replace dwindling foreign supplies.

Taken as a whole, Italy's war illustrates the limits to a sudden extension of state power in a market economy. Although the government took powers that were dictatorial in principle, in practice the government could not use them to the full. In the food market, peasant agriculture and small-scale trade resisted regulation; requisitioning and price fixing seem to have been largely evaded. Regulation was more effective in the market for military equipment, and there was a great increase in war production, but this came at a price. The state had to rely on private interests to supply the executive personnel, and then found itself to some extent held at ransom by these same interests. Emergency laws allowed agents to become regulators who, not surprisingly, then gave themselves every possible break. Rather than the state dictating to industry the quality and prices of weapons, it was the industrial firms that set the quality standards of the products they sold (Ferrari, 1991: 673).

Thus the wide power granted to the state apparatus ended up in a sort of regulatory capture where large firms dictated prices and quality, while nobody was at the helm to oversee the consequences of their actions. The resulting soft budget constraints for the firms that kept the Italian front going imposed substantial costs on the Italian economy in the long run. To that soft budget constraint we now turn.

War finance

Domestic borrowing

Italy was a young state, but the Bank of Italy was even younger: by the outbreak of war, it had been in existence for just over twenty years. It was only one of three banks of issue; the other two were the Bank of Naples and the Bank of Sicily both of which, in practice, followed the lead of the Bank of Italy (Galassi, 1992). The war reduced the Bank's freedom of action in some ways, but enhanced other functions, first by expanding its technical competence and supervisory role, and secondly by giving it an intermediary role between the Treasury, private banks and the large industrial groups. The war gave the Bank a prominence it had not enjoyed beforehand, placing it firmly at the centre of that web of relations between public power, finance, and industry that came to characterise Italy's economic development over the next decades (Toniolo, 1989; Zamagni, 1993: 243–303).

As befell other central banks, the Bank of Italy passed through three stages during the war: from managing the crisis of the summer of 1914 which continued, in Italy's case, through the subsequent ten months of

neutrality, to financing a 'short war' until early 1916, and eventually playing a leading role in reallocating resources to the public sector as the war proved neither short nor cheap.

The news that Russia was mobilising to support Serbia, arriving on Thursday, 30 July 1914, triggered a systemic loss of confidence. The Bank responded to the beginning of a run on Friday by suspending convertibility, by successive increases of spot discount rates, and by restrictions on credit advances. The measures culminated on 4 August in a moratorium for commercial banks (though not for banks of issue, which also accepted private deposits) and a compulsory extension of the maturity on all outstanding commercial paper. Despite opposing pressures, the governor of the Bank, Bonaldo Stringher, maintained the moratorium throughout the period of neutrality as a form of protection for the Bank's freedom of manoeuvre at a moment when it found foreseeing how events would develop pretty well impossible.

The economy was already in a cyclical downturn and the threat to financial intermediation and a turn to cash had the potential to push it into recession; however, a significant fiscal stimulus kept it buoyant, with a 70 per cent increase in defence expenditure from August to December 1914, but only very marginal increases in taxation (Toniolo 1989, 27). In January 1915 the Finance Ministry sought to cover the widening deficit by issuing a bond known as the First National Loan and the Bank agreed to underwrite it. When the markets failed to take up the entire issue, the Bank duly purchased the remainder. The resulting monetary expansion covered 42 per cent of the public deficit for the fiscal year 1914/15, and almost doubled the bank's liabilities (Bachi, 1916: 194; Toniolo, 1989: 13, table 1).

Since 1907 the Bank had accepted de facto responsibility for the stability of credit provision in Italy (Bonelli, 1971). Now, while it maintained the banking moratorium, it also worked to set up a new source of credit to industry without exposing the banking system to a higher volume of potentially bad debts. A Royal Decree established the Consortium for Industrial Security Finance (Consorzio per Sovvenzioni sui Valori Industriali, CSVI), backed by private capital but headed by the Bank; it had the power to lend on less stringent security than commercial banks. The activity of CSVI during the war turned out to be modest *ex post*, since other, richer sources of credit were made available, but the creation of the Consortium may have poured oil over the troubled waters of Italian banking *ex ante*. The CSVI later played a primary role in supporting Italian industry in the interwar years and financing World War II (Zamagni, 1993: 226–36; Zamagni, 1998).

By the outbreak of war in May 1915 the multiplier effects of defence spending and the assurance from the Bank of a liberal approach to

rediscounting had restored financial confidence. Bank deposits started to rise after the declaration of war, and the generous attitude of AM to procurement financing meant that industrial financial needs were being met by public advances granted by Dallolio's open-handedness. Despite Stringher's misgivings (Toniolo, 1989: 35, 88–91), the clear backing of the Bank of Italy for easy credit and high bond prices, coupled with the continuing expectation of a short war, enabled the mushrooming public deficits of 1915/16 to be financed successfully by the Second and Third National Loans.

In this period high-powered money did not increase in real terms. Its nominal value rose by 27.5 per cent from mid-1915 to mid-1916 with a 27.3 per cent increase in wholesale prices (Toniolo, 1989: 45, 77; Ercolani, 1969: 458). The economy was fully employed, output was flat, and money was neutral.

During 1916 the expected real requirements of the war rose and its time horizon lengthened. Despite this the policy of financing the war by issuing public debt remained effective as the government effectively recycled its borrowing into procurement contracts. The pattern was broken in the days between the collapse of Italy's army at Caporetto and the creation of a new front on the Piave in the autumn of 1917, when the Bank issued money equal to 11 per cent of existing circulation in ten days to forestall a run on the banking system. Otherwise the policy of relying on debt finance rather than taxation or the printing press remained firmly in place.

In a way, the financial problem of funding the war effort solved itself. The economy was flush with liquidity at the same time as consumer goods were disappearing from shop shelves following the mandatory reallocation of resources to military needs. Employment and personal income were high but, with little available to buy, a significant monetary overhang was developing. Commercial bank deposits rose by a third in real terms between December 1914 and December 1916; private lending was quieter because government procurements and the willingness of AM to carry the burden of financing offered large rents to firms which could therefore self-finance to a degree hitherto unknown. As a result, the commercial banks had no difficulty funding new public debt issues.

The Fourth National Loan in February 1917 encountered no particular obstacle, and financial markets continued to trade freely in short- and medium-term public debt (Toniolo, 1989: 51). After the monetary surge that followed Caporetto, the following year debt returned on its more customary values of around three-quarters of public expenditures. The Fifth National Loan issued in January–February 1918 also reached its target subscription, although perhaps only thanks to a massive

Table 9.5. *Italy: private and public consumption (percentage of GDP at current prices)*

	Private consumption	Public consumption
1913	78.3	9.3
1914	77.3	14.1
1915	69.8	31.9
1916	71.7	40.8
1917	73.9	44.1
1918	74.0	42.8
1919	74.8	32.5
1920	84.5	18.2

Source: Rossi et al. (1993: table 2B).

propaganda effort mounted by the new Minister of the Treasury, F. S. Nitti, who saw it as a way both of establishing the credibility of the new cabinet after the defeat at Caporetto and of reasserting the national will to continue fighting to the bitter end.

The Fifth was the last loan undertaken to finance the war effort. Before the year was out Stringher and the Bank became involved in the difficult negotiations over inter-Allied war debts that were to cast such a long shadow over the following decade. The Bank's main worry ceased to be finding domestic finance for the war effort and became managing a weakening external position. Early debt issues had reassured the Bank of the ability of the domestic market to absorb large loans without unsettling the financial system. As public consumption climbed from around 10 per cent of GDP in 1913 to more than 40 per cent in 1917 (table 9.5), and as Italy's weak endowment of raw materials bit deeper into its payments balance, the Bank focused increasingly on the problem of the exchange rate.

The exchange rate and Allied credits

The problem of Italy's external balance during the war years was simple: how could an economy lacking raw materials, and especially fossil fuels, fight an extended modern war? Italy's balance of payments credits were under attack on all sides: her domestic resources were being reallocated away from exports to military goods, the substantial emigrants' remittances and tourist revenues were shrinking, and the foreign private capital market was no longer there. Thus Italy's foreign constraint bit deep.

Having suspended convertibility, two options remained. The first was to let the currency depreciate and compress domestic living standards, the second, to borrow abroad. Squeezing consumption quickly encountered the limits already described, which were political, social, and economic. Depreciation did occur but it is not clear that any resources were freed for the war as a result. Instead, Italy had to borrow from its Allies, not knowing whether its postwar export prospects would earn the foreign exchange necessary to repay the debts.

Financial matters did not feature much in the secret negotiations of early 1915 that led to the Treaty of London. Article 14 stated rather airily that the British government would ‘assist’ Italy in raising a loan of ‘no less than’ £50 million on the London market ‘at equitable terms’. Turning these fine words into reality proved difficult. The Bank of England was reluctant to ‘assist’ a loan of that size without guarantees from Rome, and the British Treasury was keen to tie the funds to the purchase of British goods. The British were concerned about the weakness of the pound relative to the dollar that was already visible. The Italians for their part were reluctant to export much gold just as they were entering the war, and did not want to have the funds thus secured tied to British products. Under a subsequent agreement of June 1915 Italy agreed to deposit one-sixth of the sum in gold with the Bank of England and secure the rest with a bond swap, pegging the lira at 28 to the pound (up 2.20 lire from the prewar rate, but down 3 lire from the average 1915 exchange rate of 31.00 lire) and agreeing to do ‘everything possible’ to avoid encouraging gold flows from Britain.

The Italians remained worried throughout the summer that the credit obtained would run out too quickly, and in October they sought to negotiate further loans. Once again the sticking point proved to be the ‘buy British’ clause. London would not yield, because it wished to avoid further pressures on the pound. As the war went on these concerns only grew, so that London increasingly insisted that Italian purchases involving US raw materials or component parts, i.e. virtually all of them, had to be paid for in dollars. In 1915, however, Italy still retained some room for manoeuvre because the full extent of its external weakness had not yet become apparent (table 9.6). After the October agreement there was resentment in the Italian delegation at the ‘buy British’ clause. Even though Italy never called upon the full credit of £122 million, delays and less than full co-operation on the part of Britain’s already hard-pressed war industries in delivering the Italian contracts caused further grumbling in Rome throughout the early months of 1916. Equally resented was the condition imposed by Britain that Italian purchases abroad should be handled exclusively through Allied supply organisations.

Table 9.6. *Italy: net imports (percentage of GDP)*

	Imports	Exports	Net imports
1913	16.0	11.4	4.6
1914	12.9	10.4	2.5
1915	15.3	9.3	6.0
1916	19.4	8.0	11.4
1917	23.2	6.2	17.0
1918	19.7	4.8	14.9
1919	19.2	7.4	11.8
1920	24.5	10.2	14.3

Source: Rossi et al. (1993: table 2B).

In effect, Italy's external weakness made her a junior partner in the Allied coalition.

Even before the spring of 1916, Stringher was being advised that future borrowing would inevitably have to be raised on the US market (Toniolo, 1989: 39, n. 2). The Bank did not yet have an office anywhere in the USA, though the Bank of Naples and at least two private Italian banks were present in the New York market. It was not until late summer 1917 that the Bank secured an agreement with the US Federal Reserve and opened an office in New York (Toniolo, 1989: 50).

By then the Bank's attention was focused on the steady decline in the exchange rate. Among the currencies of the main Allied powers the lira was falling fastest and farthest (annual exchange rate indices are reported in table 9.7). Foreign debt was little more than one-sixth of total indebtedness at the time (Zamagni, 1993: 211) so there was not much concern for the real burden of the debt. Rather, the problem with the depreciation was its inflationary impact, which was limited on the retail market but caused high rates of price increases for producer goods: from 1914 to 1917, retail prices rose 89 per cent, but wholesale prices went up by 186 per cent (Zamagni, 1993: 213). The Bank realised that this was storing up problems for the future as financial intermediaries would have trouble adjusting to a return to normality at the end of the war. Thus, while inflation would eventually reduce the real value of domestically held public debt, in the short run it would render further borrowing necessary.

Traders were probably hedging against the lira precisely because its ongoing slide made it undesirable as an international asset. Stringher took a relatively complacent view. He may have underestimated the size of the capital outflow, and in any event he believed the depreciation 'would automatically bring about a healthy slowdown in imports and stimulate

Table 9.7. *Italy: indices of average annual exchange rates (unit prices in lire, arithmetic means, percentage of 1914)*

	Lire per \$US	Lire per £	Lire per French franc	Fine gold, lire per ounce
1914	100.0	100.0	100.0	105.8
1915	126.9	119.9	108.8	113.7
1916	130.0	126.1	113.7	121.8
1917	140.3	136.4	124.3	126.7
1918	148.7	145.4	136.8	141.3
1919	183.7	160.6	117.4	155.7
1920	401.3	299.6	141.2	290.0

Sources: ASI, several years; ISTAT (1958); Ercolani (1969).

exports' (Toniolo, 1989: 48). Action was limited to the issuing of export permits conditionally upon producers' giving the Treasury the right of first refusal on foreign currency earnings. When the directors of the other banks of issue advised Stringher to intervene more forcefully, and even to set up a foreign exchange monopoly, he cited 'conflicting interests [that] . . . do not allow hurried or simple solutions' (Toniolo, 1989: 49). In short, little was done to prop up the lira until a change in government brought Nitti to the Treasury in mid-autumn 1917.

Nitti had a political view of the exchange rate problem, believing that it could be solved by energetic public action. Underlying the depreciation he saw a lack of confidence in Italy's ability to win the war and the defeatism of Italian bankers and financiers themselves who, it was well known, were avoiding the repatriation of foreign revenues (Toniolo, 1989: 46–7). Within days of taking office, Nitti communicated to the heads of the main banks, including Stringher, that he intended to set up a clearing office, the INC (Istituto Nazionale Cambio), with a monopoly of foreign currency trading. The Bank bowed to pressure. The only concession Nitti made to Stringher's concerns was to lift a requirement on all Italian citizens and companies to hand over all existing foreign balances to INC.

Underlying the difference between Stringher and Nitti was the latter's conviction that the war effort was being mismanaged, allowing massive profits to be accumulated in a few hands and permitting significant speculative flows that were, in his view, the real reason for the decline of the lira. Stringher saw the problem as Italy's weak trade balance and the disappearance of the prewar invisibles surplus. When his objections to INC were overridden he worked to reconcile the dissatisfied banking

interests with the Treasury. As the exchange rate fell farther in the winter of 1917/18, in part certainly because operators were anticipating less attractive rates once the monopoly was set up, the Bank was drawn into taking a considerably more active role in the exchange markets, a role that Stringher had hitherto seen as unnecessary if not harmful. Nitti, meanwhile, attributed the teething troubles that the INC encountered to the greed of particular banks some of which, e.g. Banca Commerciale Italiana, were perceived erroneously as tied to German interests. The minister became ever more convinced of the need for compulsion, while the governor maintained that heavy-handed intervention was the problem (Toniolo, 1989: 56–9).

The INC lacked resources to sway the markets simply because Italy had small foreign reserves in the first place. Seeing the solution in further foreign loans, Nitti aimed straight at the American market. While the lira fell throughout the spring of 1918, Nitti negotiated a loan from the US Treasury and outlawed the exporting of currency or credit instruments from Italy. Once again, the minister saw his role as remedying the harm done by the permissive approach taken by previous war cabinets, which had allowed the accumulation of extraordinary profits and their secreting abroad.

Under the American agreement a joint INC–Fed committee would examine Italian credit needs in the US market and provide support on the spot market for the lira, while the US Treasury would finance dollar-denominated Italian import bills. In return, all Italian-owned dollar balances would be earmarked for settlement of Italy's debts with the US Treasury. Similar agreements with Britain and France followed. This brought all Italian purchases abroad under the control of Allied authorities and ended Italy's independence in the allocation of foreign balances. Since dollars were becoming the main means of international settlement, and pounds and francs took up any slack, the agreement with the US Treasury also terminated Italy's ability to run its own monetary policy.

Access to the American market did not end Italy's problems. The financing so expensively bought proved, however, inadequate. Britain insisted increasingly on being paid in dollars for purchases that involved American raw materials and components. In September 1918, Italian dollar-denominated purchases in third countries caused resistance in London once the original line of credit granted by the US treasury came to an end. British shipping firms were abruptly ordered to halt operations, pending renegotiations of the financial agreements with Italy. Italy's position in inter-Allied diplomacy has been described as that of 'a beggar' (Forsyth, 1993: 165), and Italian financial weakness gave British and American diplomats room to obtain important trade concessions

(Forsyth, 1993: 149–92). By the end of the war, Italy had run up a foreign debt virtually identical to Britain's on a GDP that was less than half the UK's; 56 per cent was owed to the UK, 40 per cent to the US, and the rest to France (Kindleberger, 1984: 307).

The foreign dimension of Italy's war effort is a story of growing weakness over the years of conflict. While Italian industry was able to provide synthetic replacements for many inputs, such categories as food, fuel, and minerals were not among them. Italy had no revenue to pay for an increased gap between imports and exports.

Fighting a war with one hand while holding out a hat with the other is a difficult act to carry through. Italy's weak position, economic and financial as well as military, cast it as a junior partner at Versailles. Italian gains at the peace table were limited; not all the territories promised in the Treaty of London were in fact handed over, and no part of Germany's colonies. This was a consequence of Italy's own weaknesses, but domestic opinion did not see it that way. Italians had endured suffering and sacrifices during the war as heavy as those undergone by other nations, but the results led to disappointment, and the myth of Italy's 'stolen victory' added fuel to the increasingly nationalistic extremism of Mussolini's Black Shirts.

Conclusion

The economic history of Italy's participation in World War I shows successes and failures. On the positive side, Italy ended the war with a military victory and an economy that was largely intact: the economic mobilisation did not bring about economic collapse and that alone, for a country of Italy's developmental level, was a substantial achievement. It is also possible that Italy did rather better than this, but for reasons that are explained in more detail in the appendix we cannot be sure.

Italy's struggle for economic mobilisation is exposed in three aspects of the achievement. First, Italian industry was not ready for a sustained war effort. This resulted partly from the lack of war preparations, despite having had the opportunity to observe what had to be done elsewhere, but the more important reason was Italy's 'latecomer' status among industrial powers. Dallolio could overcome this weakness only by creating a hothouse for industrial expansion through generous procurement contracts. Additional output was achieved, though at the cost of significant disinvestment, notably in infrastructure and transport, and the increase could barely be sustained through 1917.

For the postwar period this expansion left a long hangover in the form of conglomerates that were assembled in a hurry under extreme

conditions, heavily leveraged, and uncompetitive internationally. They were subsequently unable to generate revenues to match their indebtedness, but immobilised much capital in a relatively poor economy and survived on periodic transfusions of public cash. The eventual creation of state holding companies in the early 1930s was an attempt to restructure the Italian industrial sector more from the ravages of wartime finance than from the disaster of the postwar depression.

A second aspect of Italy's mobilisation struggle is war finance. In spite of early fears, massive military expenditures were funded with relative ease, partly because there was little to buy during the war years and liquidity was easily tied up in national loans on attractive terms. This stored up inflation for the future, but from the perspective of the public purse rising prices could be just an efficient way of taxing by stealth. Other governments also became heavily indebted during the war, but what matters in the Italian case is that the high debt was superimposed on a divided country where the taxation required to balance the books eventually fuelled longstanding grievances. The fiscal manoeuvres of the postwar years increased the polarisation and violence that helped Mussolini to power as the defender of law and order.

Third, a poor economy specialising in price-inelastic primary products and dependent on imports for food and fuel, Italy could not finance the imports necessary to mobilise her economy from her own resources. A capital importer even before the war, by 1918 Italy's external indebtedness was proportionally much higher than that of the UK. The industrial mobilisation of the war years did not allow Italy to build up an external surplus afterwards. Given that richer, more developed economies had trouble disentangling themselves from postwar indebtedness, Italy was bound to struggle all the more.

Italy's wartime economic mobilisation was successful in that it provided a sufficient basis for Italy to win its war. There were also some long-term benefits, including electrification and the accumulation of technical knowledge and experience, for example in the chemical industry. But the overall picture of long-term consequences is rather grim. With its internal divisions, Italy had barely emerged from one war before hurtling into a quarter-century of dictatorship that ended in another.

Note

- 1 We thank Alessandro Massignani and Lieutenant Vettannio of the Historical Archive of the Army General Staff, Rome, for assistance with bibliographic information and research. The usual disclaimers apply.

Appendix 9.1. Italian GDP during World War I

Stephen Broadberry

One problem which confronts anyone attempting to write an economic history of Italy during World War I is the state of the Italian historical national accounts.² The original estimates were produced by the official Istituto Centrale di Statistica in the 1950s (ISTAT, 1957), and although clearly a major scientific achievement, they also have a number of major shortcomings. As Cohen and Federico (2001: 8) note, the accounts lack key series such as constant price estimates of sectoral output, give insufficient details on sources and methods, and seem too unwilling to challenge published official data. Although there have been a number of attempts to improve upon the original ISTAT series, by reweighting the component series and introducing some new data, they remain very similar in terms of both long-run trends and short-run fluctuations. In international comparative studies, the most widely used series for Italian GDP is from the study by Maddison (1991), which is included in the major international collection of historical national accounts data, also published by Maddison (1995; 2003). Amongst Italian economic historians, the study by Rossi et al. (1993) appears to be the most widely used.

The problem for our purposes is that these series all show an extremely large increase in Italian GDP during World War I, which is hard to square with both the experience of other countries during World War I and the generally pessimistic tone of the literature on the Italian war economy. The problem of international comparisons can be seen clearly in table A9.1 and figure A9.1, where the path of GDP is taken from Maddison (1995) for all countries except Russia, and hence relies on Maddison's (1991) estimates for Italy. If the Maddison (1991) data are correct, then Italian GDP in 1918 was 33.3 per cent above its 1913 level, a dramatically better performance than either the United States or the United Kingdom, where 1918 GDP was just 14.4 per cent and 13.2 per cent higher, respectively, than in 1913. In countries which were more comparable to Italy in terms of per capita income level, such as Austria, Germany, France, and Russia, GDP collapsed. Just avoiding economic collapse during total war should be seen as a tremendous achievement for a country at Italy's level of development in 1913. An increase of one-third in the level of GDP puts the performance of Italy during World War I in the same stellar league as the US economy during World War II (Harrison, 1998: 10–11). However, even this is modest by comparison with the increase in Italian GDP suggested by the Rossi et al. (1993) series, which is compared with the Maddison (1991) series in table

Table A9.1. *Italy in comparison: wartime change in real GDP, by country, 1914–1918*

	Italy	UK	USA	Germany	Austria	France	Russia
1913	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1914	99.9	92.3	101.0	85.2	83.5	92.9	94.5
1915	111.8	94.9	109.1	80.9	77.4	91.0	95.5
1916	125.4	108.0	111.5	81.7	76.5	95.6	79.8
1917	131.3	105.3	112.5	81.8	74.8	81.0	67.7
1918	133.3	114.8	113.2	81.8	73.3	63.9	–

Sources: Maddison (1995: 148–51), except Russia from table 8.2.

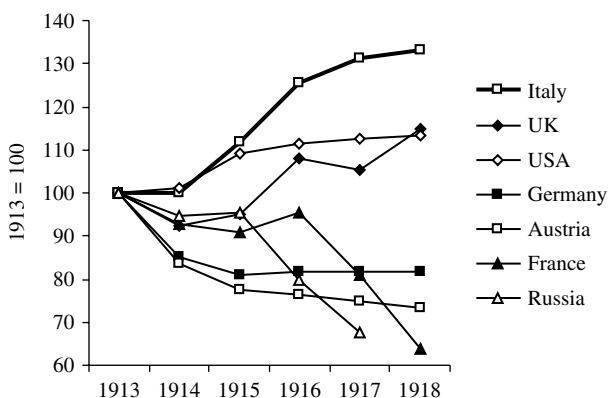


Figure A9.1. Italy in comparison: wartime change in real GDP, by country, 1914–1918.

Source: table A9.1.

A9.2 and figure A9.2. Whereas the Maddison GDP series peaks at 33.3 per cent above its 1913 level in 1918, before falling back to its prewar level, the Rossi et al. series grows by 45.4 per cent during the war and remains above its prewar level during the postwar slump.

A project to produce a new set of Italian historical national accounts, independent of the old ISTAT estimates that underpin all existing studies, is currently under way at the Banca d'Italia. Although this has so far produced new benchmark estimates of value added at current prices for 1891, 1911, 1938, and 1951, the full results are not yet available (Rey, 1992; 2000; 2002).

Table A9.2. *Italy: alternative GDP series (1913 = 100)*

	Maddison	Rossi et al.
1913	100.0	100.0
1914	99.9	109.9
1915	111.8	112.0
1916	125.4	125.3
1917	131.3	133.3
1918	133.3	145.4
1919	111.0	125.3
1920	101.3	112.9
1921	99.8	115.1
1922	104.9	121.7
1923	111.3	123.5
1924	112.4	123.6
1925	119.8	130.4
1926	121.1	131.4
1927	118.4	133.2
1928	126.9	141.9
1929	131.1	146.6

Sources: Maddison (1991), Rossi et al. (1993).

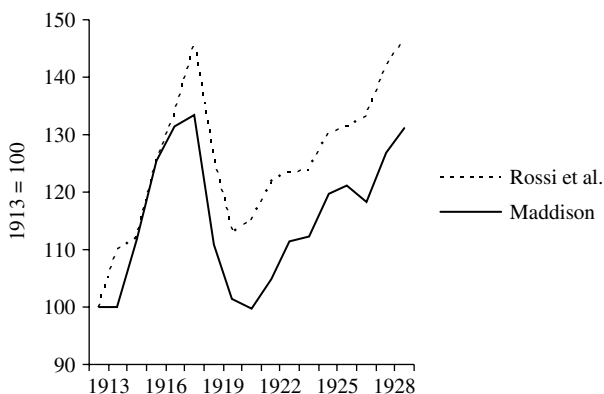


Figure A9.2. Italy: alternative GDP series, 1914–1929.

Source: table A9.2.

Note

2 I am grateful to Federico Barbiellini, Giovanni Federico, Mark Harrison, Angus Maddison and Cristiano Ristuccia for helpful advice. Remaining errors are my responsibility alone.

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10 Until it's over, over there: the US economy in World War I

Hugh Rockoff

Introduction

This chapter re-examines the financial and economic history of the United States during World War I.¹ It focuses on economic policy: on what policy makers did, and equally important on what conclusions they drew from the short and confused experience of America's involvement in World War I. The first section, on the war boom, presents the chronology of American involvement, and contrasts the World War I expansion with previous expansions. (A list of key dates is contained in the appendix to this chapter.) The second section describes how resources were mobilised and allocated to the war sector. The third section on the financing of the war, is divided into three parts: monetary policy, fiscal policy (taxes), and debt policy. The fourth section discusses the War Industries Board and other government agencies that were charged with regulating prices and production. The fifth section discusses the production of munitions. The concluding section, on the legacies of the war for the United States is divided into three parts: the costs of the war in terms of resources, the impact of the war on the role of the United States in international capital markets, and the institutional and ideological legacies of the war.

The war boom in historical perspective

The outbreak of the war in Europe in 1914 touched off a severe financial disturbance in the United States. The New York Stock Exchange was closed – because the market might be demoralised when European holders of US securities dumped them – and a run on the banks began, manifested at this stage mainly by precautionary withdrawals of cash by Midwestern banks from their eastern correspondents. These events might have produced a full-fledged financial panic. But the issue of emergency currency under the Aldrich-Vreeland Act calmed things down and there was no suspension of convertibility of deposits into gold as had occurred in earlier panics, such as that of 1907 (Friedman and Schwartz, 1963: 172).²

When the war began the United States was in a recession. European purchases of goods for the war, mainly food and munitions, soon turned things around and created a long economic boom. This story was to be repeated after the outbreak of the Second World War, although the US economy was considerably further from full employment in 1939 than it was in 1914. The National Bureau of Economic Research, the private organisation that chronicles the US business cycle, records an economic expansion beginning in December 1914 and ending in August 1918, a period of forty-four months. The Civil War expansion, perhaps the most obvious comparison for contemporaries once the US entered the war, was almost the same length, forty-six months, from June 1861 to April 1865. Any comparison of the magnitude of the expansion, however, would be speculative. The South obviously was decimated, and considerable controversy exists over the impact of the war on the Northern economy. All of the Civil War expansion, moreover, took place during the period of active warfare.³ Nearly two-thirds of the World War I expansion took place during the period of US neutrality. It might make sense, therefore, to look to a peacetime expansion for a basis of comparison.

As we look backwards in time, the first peacetime expansion to match or exceed the length of the World War I expansion was the gold-rush expansion from 1848 to 1853.⁴ Table 10.1 provides a comparison between the three expansions. Although estimates vary, it is possible, moreover, as shown in the second line of table 10.1, that the magnitudes of the expansions were also similar. The similarity between the booms was more than accidental. Both the gold-rush expansion and the expansion during the period of US neutrality in World War I were propelled by a rapid gold-backed expansion of the stock of money. In one case the gold was being panned from the streams and dug from the mountains of California; in the other the gold was coming from Europeans to pay for food and arms. But in both cases the result was inflation, real income growth, and a long boom.⁵ Once the United States entered World War I, the basis of monetary expansion shifted from gold to fiat money, as the newly created Federal Reserve monetised a significant portion of the debt being issued. In this respect the inflationary pressures were similar to those generated during the Civil War by the issue of greenbacks. Perhaps the best way to regard the World War I expansion, then, is as a combination of the two previous long expansions: as a gold-backed peacetime expansion from 1914 to 1917 similar to the gold-backed peacetime expansion of the early 1850s, and as a 'paper'-backed wartime expansion from 1917 to 1918 similar to the paper-backed expansion of the Civil War.

The long period of US neutrality made the ultimate conversion of the economy to a wartime basis easier than it otherwise would have been. Real

Table 10.1. *United States of America: three long economic expansions*

	The California gold rush, 1848–53	The American Civil War, 1861–5	World War I, 1914–18
<i>Percentage change in:</i>			
Money	66.8	95.9	48.6
Real GNP	25.6 [37.6]	20.2?	26.1 [18.4]
The GNP deflator	9.8	57.1	45 [51.3]

Sources: Money: 1848–53, Friedman and Schwartz (1970: table 14, column 3, 232); 1861–5, my estimates, based mainly on Mitchell (1903: table V, 179); 1914–18, Friedman and Schwartz (1970: table 1, column 9, 14–16). Real GNP and GNP deflator, 1848–53, 1861–5: Berry (1988: table 3, 19; table 5, 21); [real GNP, 1848–53], Rhode [Gallman] (2002: table 1, p. 28). The increase shown for the Civil War years is highly controversial. It probably applies, if at all, to those regions that avoided actual fighting. 1914–18, Balke and Gordon (1989: table 10, 84); [1914–18], Romer (1989: table 2, 22–3).

plant and equipment were added, and because they were added in response to demands from countries already at war, they were added in precisely those sectors where they would be needed once the US entered the war. Bethlehem Steel, for example, was expanded by adding facilities and through acquisitions into a major integrated steel maker during the period of neutrality in response to demands for steel coming mainly from Europe.

America's own efforts to arm – 'preparedness' as it was known at the time – also contributed to the expansion of the war sector, but only to a small extent until the final months before US entry into the war. Large sectors of the public were opposed to any involvement in the war. The anti-war sentiments of Wilson's still charismatic Secretary of State William Jennings Bryan were widely shared within the Democratic Party, especially in the Mid west. When the war in Europe began in August 1914, Federal spending was running at about \$65 million per month (about 2.28 per cent of GDP on an annual basis); by January 1917, three months before US entry, spending was running at \$85 million per month, but at a higher price level (about 2.22 per cent of GDP on an annual basis) (Firestone, 1960: table A-3, 111–13).

Why America eventually entered the war is a complex question, and a thorough discussion is far beyond the scope of this chapter. America's cultural and emotional ties to the Allies and the opposition stirred by Germany's use of submarine warfare, the factors usually cited, were undoubtedly important. Economic factors, of course, were not absent from American motives. Their opposition to submarine warfare was based partly on their insistence on their rights as neutrals to carry on a

profitable trade with the Allies. And some cynical and conspiracy-minded historians have seen the growing indebtedness of the Allies to the US as another reason why an Allied victory became important to the United States. In any case, America's entry into the war in April 1917 unleashed a torrent of Federal spending. Spending rose from month to month, reaching a peak of \$2,087 million in January 1919, about 32.43 per cent of GDP on an annual basis (Firestone, 1960: table A-3, 111–13).

The reallocation of resources

The surge in Federal spending produced a rapid and massive shift in production from civilian to military goods. Of the available data, the data on persons engaged by sector provides the most direct way to form a picture of the extent to which resources had to be reallocated to meet the demand for munitions. In addition to being of interest in their own right, the data on persons engaged are less synthetic and more reliable than the data on hours worked or on capital employed. As it turns out, moreover, the broad-brush picture formed by looking at data on persons engaged does not change very much when one turns to the data on the allocation and utilisation of capital. Table 10.2 shows estimates of persons engaged and annual hours per person engaged from 1914 to 1920.

The rapid expansion of the military and the civilian government are immediately evident. Between 1914 and 1918 the United States added nearly 3 million people to the military and more than half a million to the civilian government. As might be expected, the workforce in the non-farm sector, primarily manufacturing, was also expanded by nearly $3\frac{1}{3}$ million workers, an increase of more than 12 per cent. Agriculture, on the other hand, lost a relatively small number of workers, about 1.4 per cent of the initial agricultural labour force. The timing of expansion was different, however, in the public and private sectors. In the public sector most of the increase in the workforce occurred between 1916 and 1918, the period of active US involvement. In the non-farm private sector, on the other hand, most of the increase occurred between 1914 and 1916, the period of US neutrality, when 2.5 million workers were added. The increase during 1916–18, the period of active US involvement, was considerably smaller: another 790,000 workers, less than 3 per cent of the 1916 labour force. The importance of the period of neutrality in preparing the economy for war is clearly evident in these figures. Once the US entered the war it could concentrate on building up its armed forces, the task of building up its industrial base having been substantially completed.

Table 10.2. *USA: the labour force by sector, 1914–1920*

	Total	Public sector		Private sector	
		Military	Civilian	Farm	Non-farm
<i>A. Persons engaged (thousands)</i>					
1914	37,475	161	1,527	10,456	25,331
1915	37,669	169	1,584	10,466	25,450
1916	40,126	174	1,620	10,497	27,835
1917	41,531	835	1,692	10,447	28,557
1918	43,998	2,968	2,092	10,311	28,627
1919	42,313	1,266	2,057	10,197	28,793
1920	41,497	353	1,961	10,343	28,840
Change 1914–16	2,651	13	93	41	2,504
Change 1916–18	3,872	2,794	472	–186	792
Change 1914–18	6,523	2,807	565	–145	3,296
<i>B. Annual hours per person engaged</i>					
1914	2,688	2,043	2,034	2,496	2,811
1915	2,654	2,036	2,027	2,443	2,784
1916	2,668	2,034	2,033	2,421	2,802
1917	2,665	2,032	2,014	2,501	2,782
1918	2,611	2,009	1,984	2,568	2,735
1919	2,551	2,009	1,931	2,549	2,619
1920	2,584	2,003	1,932	2,552	2,647
Change 1914–16	–20	–9	–1	–75	–9
Change 1916–18	–57	–25	–49	147	–68
Change 1914–18	–77	–34	–50	72	–77

Sources: Kendrick (1961: table A-VI, 306; table A-X, 312).

Overall these were very substantial increases, especially given the disruption in the flow of immigrants to the United States.⁶ As might be expected, the increase in the labour force was matched by a decline in unemployment. Unemployment, according to official figures, declined from 3,120,000 in 1914 (7.9 per cent of the labour force) to 2,043,000 (5.1 per cent of the labour force) in 1916, and to 536,000 (1.4 per cent of the labour force) in 1918 (US Bureau of the Census, 1975: 135.) To be sure, the draft removed many of the young men who would be looking for their first job from the civilian labour force, so the extremely low rate of unemployment in 1918 is not comparable to the peacetime rate. Nevertheless, the figures do show that the US had a large pool of unemployed workers on hand who could be drawn into the labour force, offsetting the slowdown in immigration.

Workers were drawn into the labour force by the availability of jobs in manufacturing. Perhaps there was also an expectation that wages in these jobs would rise higher. But during the first phase of the mobilisation during the period of US neutrality, a rise of wages in manufacturing of 7.61 per cent was more than offset by the increase in the cost of living of 8.34 per cent, so that real wages actually fell about 0.7 per cent. It was not until the second phase of the mobilisation that real wages rose. Nominal wages in manufacturing rose 38.8 per cent between 1916 and 1918, outstripping increases of 32.2 per cent in the cost of living (US Bureau of the Census, 1975: D727, 164 and D740, 166). This pattern is somewhat different from the Civil War, when real wages fell significantly during the period of actual conflict. The greater degree of disruption to the economy (for example, the cut-off in the supply of Southern cotton), the depreciation of the dollar, and perhaps differences in labour organisation may explain the less favourable experience of labour during the Civil War.

Data are also available on hours worked, and thus on hours worked per person. Some key figures are shown in panel B of table 10.2. Questions naturally arise about the reliability of these data. Is it really true, for example, that military personnel were working fewer hours in 1918, when many Americans were engaged in battle, than in the peacetime army of 1914? The decline in hours worked in the non-farm sector, however, was to some extent real, and reflected the long-term downward trend in hours worked, and the vigorous push made by the labour unions, with some help from the Federal government, for the eight-hour day. The increase in hours that one might have expected in this sector in a war economy was concentrated among management and technical personnel. Factories had to be converted from civilian to military production, and that meant long hours for draftsmen, engineers, personnel managers, and so on. Provided there were sufficient workers to cover all the shifts at the factory, however, it was not crucial that the hours of low-skilled workers be extended.

Financing the war

Table 10.3 shows the sources of finance for the war broken into four components: taxation, borrowing from the public, direct money creation, and indirect money creation. Taxation and borrowing are familiar terms. I shall discuss some of the details concerning them below. Direct money creation, as Friedman and Schwartz define it, is the number of deposits and amount of currency created by the Federal Reserve System. This money was used either by the public as currency or by the banks as reserves, and it was matched on the books of the Federal Reserve by holdings of US government bonds. Although the institutional details differed, the effect

Table 10.3. *USA: financing World War I, March 1917 – May 1919*

Source of finance	Billions of dollars	per cent
Taxation and non-tax receipts	7.3	22
Borrowing from the public	24.0	58
Direct money creation	1.6	5
Indirect money creation	4.8	15
Total cost of the war	33.0	100

Note: Direct and indirect money creation are defined in the text. The estimate of indirect money creation is based on the assumption that the total increase in deposits and the circulation (notes) of commercial banks were backed directly or indirectly by government securities. This is partly conjectural because some of the items that appeared on bank balance sheets such as ‘loans to customers’ may or may not have been secured by government bonds. The amount shown may be regarded as an upper bound. The figure is based on the increase in M2, which includes time and demand deposits of commercial banks but excludes deposits in mutual savings banks. If the latter are included (they are included in M3) the maximum percentage financed by money creation rises to 21 per cent. Including savings and loan shares, the distinguishing feature of M4, would change the results only slightly, and would add a more problematic element because it is doubtful that the increase in savings and loan shares was matched completely, directly, or indirectly by government bond holdings.

Sources: Friedman and Schwartz (1963: 221).

was much as if the government had simply printed money and used it to pay soldiers, much as it had done with the ‘greenbacks’ in the early phase of the Civil War. Indirect money creation consists of the additional deposits produced by the commercial banking sector, and not backed one for one by reserves. The exact amount of the additional money funnelled by the banking sector into the war effort is not known for certain. But it is reasonable to argue, as Friedman and Schwartz do (1963: 221), that ‘Since the increase in bank-created money was matched primarily by an increase in government securities held by the banks or their customers, the rise in bank-created money may be regarded as indirectly associated with the financing of war expenditures.’ Thus it appears that the bulk of the war effort (58 per cent) was financed by borrowing from the public; the remainder was about evenly split between taxes (22 per cent) and money creation (20 per cent).

These methods exhaust the means by which the government *financed* the war. But they do not exhaust the means by which the government acquired resources. Perhaps the most important additional means of acquiring resources was through the draft. Millions of young men were drafted into the armed forces. Their salaries as soldiers were in many cases far below what they could have earned in the private sector, and to

an even greater degree below what they would have needed to earn in the military to serve voluntarily. The difference may be regarded as a tax. But it is not the conventional sort of tax shown in table 10.3.⁷

Monetary policy

Monetary creation of this magnitude created inflation as it had in earlier wars and as it would in future wars. Table 10.4 shows the key variables. The lower panel is the same as the upper panel except that all of the variables have been recalculated as index numbers with the value in 1914 set at 100, because this makes comparing rates of change in different series easier. A quantity theorist would not be surprised by the data. High-powered money (also commonly known as the monetary base) almost doubled over the course of the war years. The money supply in the hands of the public, whether measured narrowly as M2 or broadly as M4, also almost doubled during the war, indicating that the money multiplier, a function of the deposit–reserve ratio of the banks and the deposit–currency ratio of the public, was relatively stable. Since real output, column [4], rose about 25 per cent, money per unit of output, column [5], only rose by a factor of 1.7. If velocity were stable, prices would rise by the same ratio. In fact, however, prices rose by more – they also almost doubled, whether measured by the GNP deflator, column [6], or the cost of living index, column [7]. So velocity, the mysterious equaliser in the quantity equation, by definition also rose during the war. One reason may be that inflation itself discouraged the public from holding cash and so added to the pressure on prices.

The general outline of this story – the government prints money to finance a war producing inflation – is common, of course, to other American wars and to the other countries fighting World War I. But Friedman (1952) and Friedman and Schwartz (1963: 567–71) argue that the inflation during the First World War was unusually intense compared with the Civil War and World War II. Overall, the price rise in World War I was about the same as in the Civil War and more than the rise in World War II. If we ordered the wars, for example, by casualties, the Civil War would be the greatest, World War II would be next, and World War I would be last. There seems to be too much inflation in World War I. Friedman and Schwartz attribute the difference between World War I and World War II partly to the lower level of velocity during World War II, which made it easier for the government to acquire real resources by creating money, and partly to the decline in velocity in World War II, perhaps the result of the cut-off in the supply of consumer durables which encouraged saving.

Table 10.4. *USA: money, real GNP, and prices, 1914–1920*

	High-powered money, \$billion [1]	Money supply (M2), \$billion [2]	Money supply (M4), \$billion [3]	GNP, \$billion and 1982 prices [4]	Money per unit of output [5]	GNP deflator, percentage of 1982 [6]	Cost of living, percentage of 1890–9 [7]
1914	3.48	16.67	21.15	402.4	0.041	8.51	139
1915	3.66	17.40	24.02	417.3	0.042	8.71	136
1916	4.13	20.66	27.93	485.0	0.043	9.49	149
1917	5.09	24.30	31.40	484.9	0.050	11.36	179
1918	5.89	26.20	34.87	522.2	0.050	13.35	218
1919	6.52	30.68	40.00	507.1	0.061	15.23	247
1920	7.21	35.06	41.72	496.3	0.071	17.58	286
<i>Percentage of 1914:</i>							
1914	100	100	100	100	100	100	100
1915	105	104	114	104	101	102	98
1916	119	124	132	121	103	112	107
1917	146	146	148	121	121	133	129
1918	169	157	165	130	121	157	157
1919	187	184	189	126	146	179	178
1920	207	210	197	123	171	207	206

Sources: [1]: Friedman and Schwartz (1963: 801–2). [2]: Friedman and Schwartz (1970: 15–19). M2 is the sum of currency held by the public and all deposits, both time and demand deposits, in commercial banks. Values at June dates are shown here. Monthly estimates are available in the source. This is Friedman and Schwartz's preferred monetary aggregate. [3]: Friedman and Schwartz (1970: 15–19). M4 is M2 plus deposits in mutual savings banks, deposits in the postal savings system, and savings and loan shares. December estimates, the only ones available, are shown here. [4]: Balke and Gordon (1989: 84–5). [5]: column [2] divided by column [4]. [6]: Balke and Gordon (1989: 84–5). [7]: US Bureau of the Census (1960: 127, series 159).

A minor monetary mystery concerns the rapid increase in the amount of currency in circulation. All types of monetary assets, of course, rose rapidly during the war, but the amount of currency rose faster. In March 1917, the month before US entry into the war, the deposit–currency ratio was 8.34; in May 1919, the month of the postwar price peak, the ratio was 6.57. These numbers imply about \$834 million of ‘extra currency’ in circulation in May 1919.⁸ The fall in the deposit–currency ratio was significant for the financing of the war because it meant that the government could raise more resources from seignorage for each dollar of new money created.

A number of explanations have been offered, all of which may tell us something about what was happening. Contemporaries pointed to the use of US currency abroad such as in Cuba, Canada, and Europe. Contemporaries also suggested that the founding of the Federal Reserve had led to a greater use of currency because the presence of the Federal Reserve added to the safety and convenience of the currency. Since the Federal Reserve was a relatively new institution when the war began (it only came into being at the end of 1913), this effect may still have been in process during the war. Philip Cagan (1958), however, noted that currency in circulation also rose in World War II, a development that he attributed to the rise in income tax evasion and the greater use of currency by military personnel and by civilian workers moving into areas where they did not have established banking relationships.

Another factor that may have been at work was a change in the structure of payments. At a time when many factory workers were still receiving their pay in a weekly pay envelope, a rapid increase in industrial payrolls, as a result of the shift of resources into the industrial sector and the increase in wages, might have produced an increase in the use of cash. Figure 10.1 shows cash held by the public and an index of manufacturing payrolls. There does appear to be an association, although the index of manufacturing payrolls is more volatile. In particular, it falls dramatically during the postwar slump, while currency in the hands of the public falls more slowly.

Fiscal policy

Over time, the opinion of economists about the best way to finance wars and whether to emphasise taxes or borrowing (few could be found to support money creation) has changed dramatically. Adam Smith argued that taxes were best because they conveyed the real cost of wars to the general public. Deficit finance hid the costs of wars and made them too easy. Later Smith’s argument was combined with the argument that the burden of financing wars should not be passed on to future generations to become part of a balanced budget orthodoxy. John Maynard Keynes

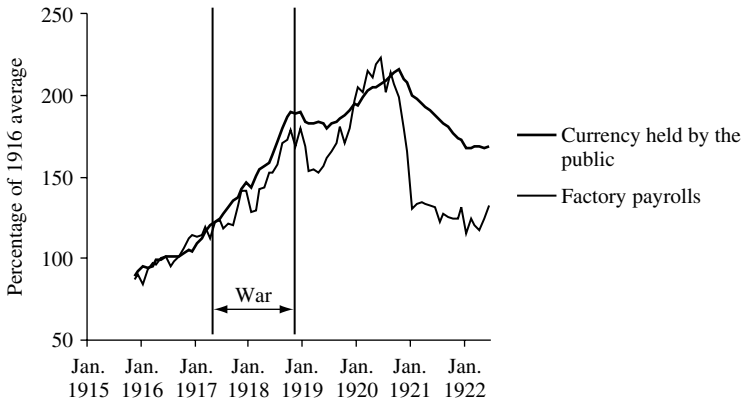


Figure 10.1. United States of America: currency and payrolls, 1915–1922

Source: Currency: Friedman and Schwartz (1970: table 1, column 1). Payrolls: NBER website series m08069a, www.nber.org.

changed that. Deficits would be acceptable until the point of full employment was reached. More recently, neoclassical economists, most prominently Robert J. Barro (1987, 1989), have argued that deficit financing should be used to prevent tax rates from jumping up during wartime and creating counter-productive disincentives. This approach, the ‘tax smoothing’ approach, may well be dominant at the present time.

Although men of affairs at the time of World War I did not hold clear theoretical positions, there was a widespread consensus among politicians and business leaders that a substantial fraction of the war should be financed by taxation. To William Gibbs McAdoo, Wilson’s energetic Secretary of the Treasury, this initially meant 50 per cent, although he later thought 33 per cent would do. J. P. Morgan, the famous and influential investment banker, suggested a lower figure of 20 per cent. There was no precise theory behind these figures, but rather an intuition that too much borrowing or too high a level of taxes would be bad for the economy. McAdoo’s main concern was that excessive issues of debt would be inflationary. This concern was probably not tied closely to the idea that debt would have to be monetised to be inflationary. There is no mention of monetary policy in connection with debt in his *Memoirs*. Rather, McAdoo seems to have believed that government debt was directly inflationary. Added to the fear of inflation from excessive issues of debt was the belief that government at all times should be financed by heavily progressive income and wealth taxes. McAdoo also believed, however,

that too high a level of taxation would discourage business, and perhaps undermine support for the war, hence the balance he sought between taxes and borrowing.

The War Revenue Act of 1917 provided a number of sources of revenue. The most potent moneymaker was an excess profits tax that levied a graduated tax, running from 20 to 60 per cent, on profits that exceeded an amount determined by the rate of return on capital in a base period. Corporate and personal income taxes, moreover, were raised by adding ‘surtaxes’. The effect on personal income taxes of the War Revenue Act, and subsequent legislation, can be seen in table 10.5. For incomes starting at \$50,000 the rate in 1913–15 was a relatively small amount, 1.5 per cent; by 1918 it had climbed to 18.3 per cent. Excise taxes were increased (or in a few cases imposed for the first time) on alcoholic beverages, tobacco, railroad passenger traffic, and luxuries and semi-luxuries including yachts, jewellery, and chewing gum. The War Revenue Act of 1918 (signed on 24 February 1919 – tax law is always a fight) followed the general outline of the Act of 1917 but tinkered with the rates. Wilson and his progressive advisers intended that the rich would bear the main burden of paying for the war (along with the undeserving poor who used alcohol, tobacco, and chewing gum!). There was considerable support for this idea even in the business community because of memories of war profiteering during the Civil War and the Spanish American War. Few businessmen wanted to see war profiteering happen, and even fewer wanted to risk being accused of it.⁹ But, as we will see, much of this effort to make the rich pay was undermined by the way in which the debt was structured.

Table 10.5. *USA: federal individual income tax rates during the war, 1913–1929 (per cent)*

	Income class		
	\$50,000	\$100,000	\$1,000,000
1913–15	1.5	2.5	6.0
1916	2.6	3.9	10.3
1917	10.3	16.2	47.5
1918	22.0	35.0	70.3
1919–20	18.3	31.2	66.3
1929	8.3	14.8	23.1

Note: These are the effective tax rates (percentage of income) with four exemptions. Income subject to tax excludes various allowable expenses and interest on tax-exempt bonds.

Sources: US Bureau of the Census (1975, series Y437, Y438, and Y439, 1112).

Debt policy: capitalising patriotism

When the war began, McAdoo turned to the record of Samuel Chase, Lincoln's energetic Secretary of the Treasury, for lessons on how to finance a war. McAdoo believed that Chase had made a major error in turning the marketing of the government's securities over to a private firm, Jay Cooke and Company. McAdoo would make no such mistake. He expected bankers, insurance executives, and ordinary citizens to donate their services to the government. While he acknowledged that Jay Cooke and Company had succeeded to some degree in marketing bonds to middle-class Americans, McAdoo thought that he could push Cooke's policy much further. McAdoo criss-crossed the country on an exhausting speaking tour, urging the public to express its support for the war by buying war bonds, enlisted leading artists such as Howard Chandler Christy and Charles Dana Gibson to paint posters urging the purchase of bonds, and arranged rallies at which movie stars such as Douglas Fairbanks and Mary Pickford exhorted the crowd to buy bonds (Kennedy, 1980: 105). The Boy Scouts were enlisted under the slogan 'Every Scout to Save a Soldier'. Even the names of the bonds reflected the emphasis on patriotism. While one of the most popular Civil War issues was known prosaically as the 5–20 (callable after five years, redeemed at twenty), the World War I debt consisted of 'Liberty bonds', and a final issue after the armistice consisted of 'Victory bonds'. This campaign, despite detractors such as Senator and future President Warren Harding, who worried about the hysterical nature of it, undoubtedly created enormous social pressures to buy bonds. When, for example, the Comptroller of the Currency learned that a national bank charter had been granted to six applicants from a 'certain western state', who had between them bought only \$200 worth of Liberty bonds, the charter was revoked (Whittlesey, 1950: 175).

But how effective were the campaigns? What price, to put it differently, were investors willing to pay to help make the world safe for democracy? It is difficult to compare the Liberty bonds with other private and public issues: the volume was huge, and the Liberty bonds had numerous special features designed to enhance their appeal. Some issues were exempt from Federal income taxes; some could be used at par to pay Federal inheritance taxes, although income from them was not exempt; and, perhaps most importantly, they enjoyed a privileged position as collateral for bank loans. The key properties of the Liberty Loans are shown in table 10.6.

Despite their complex structure, much could be learned from figure 10.2, which shows the successive coupons on the Liberty bonds, the rates on triple A rated industrial bonds, and the rates on municipal bonds.¹⁰ It is evident at once that the Liberty bonds were priced to sell purely as financial

Table 10.6. USA: the Liberty Loans

	First Liberty Loan	Second Liberty Loan	Third Liberty Loan	Fourth Liberty Loan	Fifth Liberty (Victory) Loan
Issued on	June 15, 1917	Nov. 15, 1917	May 9, 1918	Oct. 24, 1918	April–May 1919
Coupon	3.50%	4.00%	4.25%	4.25%	4.75% } 3.75%
Callable in (years)	15	10	...	15	3
Maturity (years)	30	25	10	20	4
Offered (\$ billion)	2.000	3.000	3.000	6.000	4.500
Subscribed (\$ billion)	3.035	4.618	4.177	6.989	5.250
Rate of over-subscription	52	54	39	16	17
(per cent)					
Subscriptions accepted (\$ billion)	2.000	3.808	4.177	6.989	4.5
Principal exempt from Federal estate and inheritance taxes	No	No	No	No	No
<i>Interest exempt from:</i>					
Federal income tax	Yes	Partly ^a	Partly ^{a,b}	Partly ^a	Yes } No } Yes
Surtax and excess profits tax	Yes	Partly ^a	Partly ^{a,b}	Partly ^a	No } Yes

^a Interest on the first \$30,000 at face value was exempt from personal income and excess profits tax until two years after the close of the war.

^b Extended from the Fourth Liberty Loan.

Sources: Schultz and Caine (1937: 533–41); Dewey (1931: 502–10).

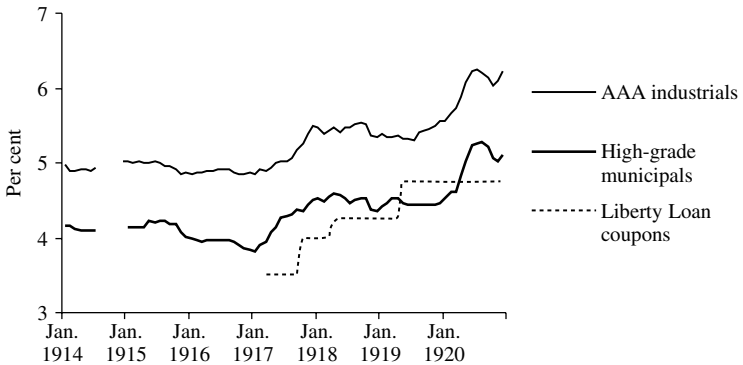


Figure 10.2. USA: coupons on the Liberty Loans, 1914–1920.

Source: Yields: NBER website series m13026 (AAA), m13023 (municipals), www.nber.org. Coupons: table 10.6.

investments. The coupon on the Liberty bonds (which was also the yield to maturity since the bonds were sold at par) came within a few basis points of the yield on municipal bonds when bonds were initially offered. No individual who bought a Liberty bond actually made a personal sacrifice in the sense that they earned a much lower rate of interest than could have been earned on a comparable bond of similar risk.

The First Liberty bonds fell below par, although only a bit, shortly after they were issued. The fall may have been due in part to the inherent limits of social pressure. When bonds are sold people can display their patriotism by announcing their purchase and by pointedly asking others how many Liberty bonds they have bought. After the initial offering, it is hard to prevent people from selling bonds and readjusting their portfolio. And few people are likely to go around asking their neighbours how many bonds they have sold. Mainly, however, the fall in the price of Liberty bonds was due to the rise in interest rates.

Figure 10.3 plots market yields for two federal issues, the First and Fourth Liberty Loans, and the return on municipal bonds during the period 1918 and 1919.¹¹ The First Liberty Loan yielded less than the municipals, as might be expected from their greater security, but the yield of the Fourth Liberty Loan was similar to the yield on municipals.¹² The difference between the Fourth Liberty Loan and the First was due to the limits on the tax exemption on the fourth issue compared with the first. On the Fourth Liberty Loan only the first \$1,275 in interest (the interest on \$30,000 worth of bonds) was exempt, and then only until two years

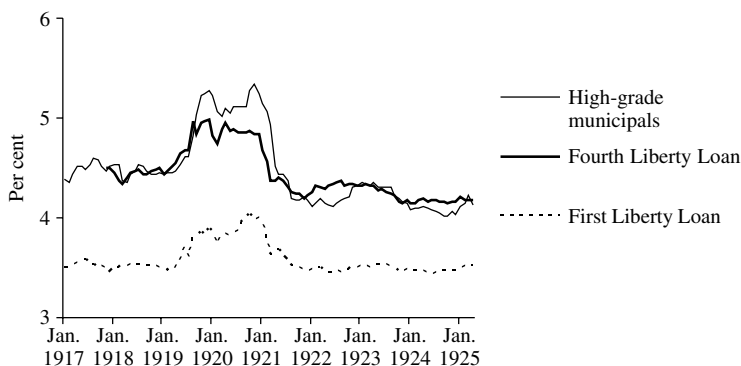


Figure 10.3. USA: yields on the Liberty Loans, 1917–1925.

Source: High-grade municipals: NBER website series m13023, www.nber.org. Liberty Loans: *The Commercial and Financial Chronicle*, various issues.

after the war was over.¹³ The difference that tax exemption for the life of the bond (the exemption in the First loan) could make can be seen from the rates shown in table 10.5.

Since the bonds were sold at a maximum of par, and had coupons set to yield a competitive return, it is doubtful that the huge bond rallies and other efforts to ‘capitalise patriotism’, in McAdoo’s stirring phrase, sharply reduced the future tax burden on middle-income taxpayers of wartime borrowing. McAdoo claimed that he had saved taxpayers millions by holding the maximum coupon to 4.25 per cent (McAdoo, 1931: 381). But, as we have seen, with a coupon of 4.25 per cent and important tax exemptions the loans were competitive with other low-risk securities. The only holders who benefited substantially from owning the Liberty bonds were taxpayers in very high tax brackets, a fact that McAdoo, a dyed-in-the-wool progressive, neglected to mention in his *Memoirs*.

The most telling evidence, in my view, on how much patriotism affected the holding of government assets is the contrast, or rather lack of contrast, between the war and postwar periods in figure 10.3. If people were holding bonds for patriotic reasons then the gap between the return on municipals and on Liberty bonds would be larger than otherwise. Once the war ended, and the patriotic motive for holding Liberty bonds disappeared, the gap should narrow. But we simply do not see this in figure 10.3. True, interest rates do rise during the war and fall afterwards. But the gap between the return on the municipals and either of the Liberty bonds, which would reflect the non-pecuniary returns from investing in a patriotic asset,

remains more or less the same. The armistice seems to have no effect on the difference between the return on municipals and the return on Liberty bonds. The simplest explanation is that patriotic motives were not sufficient to alter market prices of assets during the war.

If lowering the cost of the war to middle-income taxpayers was not the point, what was? Two possibilities seem most likely. (1) By encouraging savings, the bond campaigns may have reduced the tendency of people to dump private securities to buy war bonds. Capital losses on individual private security holdings, even if not widespread, would have created problems for individual investors and for institutional holders such as banks, trust companies, and insurance companies. (2) It may be that the main goal was simply to produce the result that actually occurred: to produce over-subscriptions for the bond issues. Each of the bond issues, as shown in table 10.6, was sold at par and ‘over-subscribed’. In other words, offers to buy exceeded the amount the government put on sale. Over-subscription demonstrated public enthusiasm for the war and the Wilson administration’s policies, and this was clearly on McAdoo’s mind. As he noted in his *Memoirs*, when recalling his thinking prior to the issue of the first Liberty Loan:

Suppose hundreds of millions of the bonds were left on our hands? The moral effect of such a failure would be equal to a crushing military disaster. It would not only dishearten our own people, but also the nations across the sea whose fortunes were joined to ours; and it would give our enemies new confidence and courage (McAdoo, 1931: 380).

Although McAdoo professed to fear a shortfall of hundreds of millions, it is obvious that any shortfall would have produced a public relations problem. The size of the offering, to put it somewhat differently, introduced a discontinuity in the politics of the issues. Suppose 1,000 bonds are offered for sale. From an economic point of view it matters little whether the government receives offers for 999 or 1,001. But, from a political point of view, the first case is a disaster, while the second is a success – the public supports the war effort. Indeed, from a political viewpoint, the rallies themselves may be the point, to show America’s enemies that America supports the war. When viewed from this perspective, the management of Liberty bond issues – the coupons, the tax exemptions, and so on – makes perfect sense.

There was also an attempt (modelled on a similar British plan) to sell war bonds in small denominations to the young and poor. These ‘war savings certificates,’ were first issued in January 1918. They sold for \$4.12 (about \$60 in today’s money using the CPI) and were worth \$5.00 at maturity in January 1923. The price increased 1 cent per month until sales were

stopped in December 1918. The interest works out to about 4.5 per cent. For those who did not have \$4.12 on hand, savings stamps costing \$0.25 each could be purchased. Each stamp was pasted on a special board, and when the buyer had enough they could be exchanged for a war savings certificate. The 'war savings certificate' under various names became a permanent feature of the financial landscape. It was continued after the war, used in World War II, and has continued in various guises since then. After the attack on the Twin Towers in New York, the idea of a new issue of war bonds, presumably in low denominations, was revived for a short time, and generated some interest in Congress.

The purpose of the war savings certificates in World War I, as in its later incarnations, was to provide a vehicle for people of limited means, especially young people, to express their patriotism and at the same time to teach them the value of thrift. In American high schools young women were encouraged to knit for the war effort, and young men to buy savings stamps. The programme contributed a modest amount to the actual financing of the war. At the end of August 1919, the total amount of debt issued to finance the war amounted to \$26.4 billion. Of this amount \$0.93 billion consisted of war savings certificates, about 3.5 per cent of the total (Schultz and Caine, 1937: 540). It could be argued, however, that the war savings certificates represented additional real savings, as opposed to other issues that were partly monetised, and these were real savings that might not otherwise have been available.

The role of the government in managing the war economy

For economic historians perhaps the most interesting aspects of the war economy were the attempts to control the economy through centralised price and production controls. There was a wide array of government agencies charged with influencing or controlling economic activities. The three most important were (1) the War Industries Board and its autonomous Price Fixing Committee, which dealt with industrial production and prices, (2) the Food Administration, which dealt with agricultural prices and production, and (3) the Fuel Administration, which dealt with fuel prices and production. The work of these agencies can be evaluated either at the microeconomic level or the macroeconomic level. In other words, we can ask how the individual policies of these agencies affected individual markets, given overall economic conditions, or we can ask a larger question about the overall impact of regulation on general movements of economic activity, industrial production, and munitions production.

When viewed in terms of macroeconomic impact, it is clear that the overall impact of the programmes on the fundamental economic problem

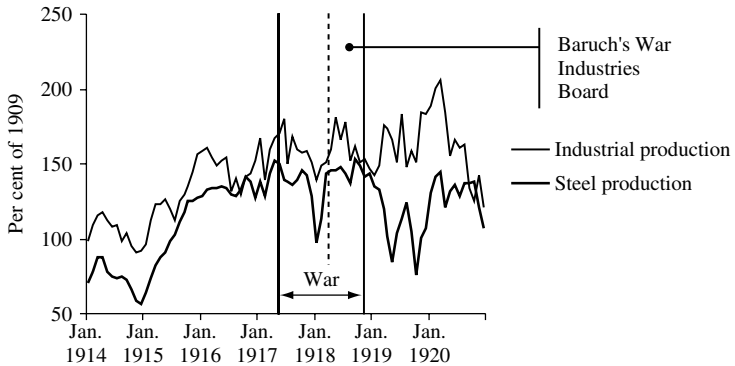


Figure 10.4. USA: steel and total industrial production, 1914–1920.

Source: Industrial production: Miron and Romer (1990: table 2, 336–7).

Steel: NBER website series m01135a, www.nber.org.

of reallocating resources to the war effort, whether positive or negative, was rather small. Many of the regulatory agencies were not put in place until after the US entered the war, and, of course, they could not function effectively until some time after that. Inevitably, there was a period during which people were recruited for the war agencies, and learned by doing, before successful policies could be put in place. Bernard Baruch's tenure at the War Industries Board is often viewed, for example, as a great success. Baruch has been described by his admirers (not the least of whom was Baruch himself!) as a kind of tzar who replaced an inefficient system of *laissez-faire* with an efficient system of central planning. But Baruch was not appointed until February 1918, only nine months before the armistice. The heralded system in which the War Industries Board would take control of the allocation of all steel produced by the US steel industry went into effect in June 1918, only five months before the armistice.

Figure 10.4 plots monthly steel production (steel was probably the single most important industrial material for the war effort) and the Miron–Romer index of industrial production. Vertical lines indicate the relatively short period of US involvement, and the even shorter period of Baruch's legendary term as head of the War Industries Board. Evidently, steel production and industrial production had effectively reached their maximums by the time the US entered the war. Production could only be increased substantially by investing in new plant and equipment – older equipment, and manufacturing facilities had already been brought online. Given the enormous task of equipping the American Expeditionary Force, and the likelihood that the war was entering a decisive phase, it made sense

to allocate resources to current production, rather than building plant and equipment that might come online too late to make a difference. In World War II, the United States followed a different policy – sometimes to the frustration of her Allies – of first building the factories to produce munitions.

There is a sharp dip in industrial production in January 1918. Steel production was especially hard hit. This was probably a result of the congestion on the railroads that brought the shipment of raw materials, particularly coal, almost to a halt. Schools and factories were closed for lack of fuel and, partly as a result of the fuel crisis, the nation's railroads were nationalised.¹⁴ The congestion was caused by a number of factors including an extremely cold winter and the unprecedented demands on the railroad network. The railroads had been built with the idea that goods would be flowing west as well as east, south as well as north, but now the bulk of shipments were heading to a few east-coast ports. Early attempts to create a priority system for war-related shipments had made things worse, as even McAdoo whom Wilson put in charge of the railroads, acknowledged. The natural tendency was to give preference to any railroad car claiming to carry war goods, and to hold up cars containing 'unimportant' civilian goods. The result was long lines of cars loaded with war goods, and no one to unload them. Once the traffic jam on the railroads was untangled, industrial production returned to what it had been before the winter crisis.

There is no evidence, then, that the policies introduced by Baruch as head of the War Industries Board (and the policies being introduced by the Food Administration, Fuel Administration, and other agencies) significantly increased the flow of materials into the war effort.

The focus of Baruch's efforts was in holding down the price of industrial materials and in creating a priorities system for determining the order in which producers would fill contracts for industrial materials. With prices for steel fixed and the order books filled, producers faced intense pressure because each agency booking an order – the most important were the army, the navy, the railroad administration (the railroads had been nationalised), and the War Shipping Board – wanted their order filled first. Funnelling all contracts through the War Industries Board and having the War Industries Board set the priority for each contract solved industry's problem. If someone from one of the major claimant agencies wanted to know why a particular order was not being filled, the answer would be 'go see the War Industries Board'.

Most historians have taken it as self-evident that a system in which authority was concentrated in a single all-powerful government bureau would work better – deliver more and better munitions – than one in

which each agency separately could influence the order in which contracts were filled by bargaining separately with producers and using financial incentives. The navy, under its vigorous chairman Josephus Daniels, did continue to bargain with suppliers and never ceded complete authority to the War Industries Board. The assumption most historians make, despite their affection for Daniels, a vociferous progressive, is that things would have worked better had the navy been brought into the fold, and would have worked less well if the heads of other agencies had followed Daniels' example.

An economist might ask whether allowing some authority to individual agencies, to make their preferences felt by offering financial incentives, might have improved the allocation of resources. One problem with this approach, of course, is that while the budgets of claimant agencies were nominally fixed, the penalties for exceeding an agency's budget in wartime were weak. An agency that went over its budget could always defend itself by claiming that the excess spending was necessary to win the war. And in truth, whatever the nominal budget of an agency, the financial resources to pay for a deficit of any magnitude were always there: if all else failed, the money could be printed. On the other hand, there were problems in delegating all priority making to a central authority. The War Industries Board did not necessarily have the expertise to value the ultimate contribution of a particular project to the war effort. The priority system championed by Baruch, moreover, had its own problems.

In principle the system was simple and this was the source of much of its appeal. Each contract would be given a rating (for example, A, B, C, etc.) by the War Industries Board, and then producers would be required to fill contracts with A priorities before they filled contracts with B priorities, and so on. When this system was tried in World War II, however, it was plagued by 'priorities inflation'. Each decision maker would give each contract crossing his desk an A. When prime contractors were given the authority to pass along priorities to sub-contractors, they also tended to assign an A rating to every contract. When the system became clogged with A ratings, the War Production Board (the World War II counterpart of the War Industries Board) created a new, higher priority, A1. And when the problem recurred, still higher priorities were created, hence 'priorities inflation'. In World War II, when the system was given a longer trial, it was abandoned. Replacing price signals with priorities is not as simple as it sounds.

In any case, the period of time during which Baruch was in charge of the War Production Board and in which his ideas could be tried was too short, as shown in figure 10.4, to test the strengths and weaknesses of the system.

The production of munitions

How well did the American economy perform the ultimate job of supplying the American armed forces and those of America's Allies with the weapons of war? There has been a tendency in the literature to stress the negative side of the picture. Our Allies produced most of the artillery used by American forces in France. Less than a quarter of the aircraft used by American pilots at the front were of American manufacture. It was hard to find an airplane in which to use the much ballyhooed Liberty Engine, and so on. But the basic reason American arms played such a small role was the short period of active American involvement. When one takes a closer look at the production figures one sees, in case after case, a steeply upward-sloping logistic curve.

This point is illustrated in table 10.6, which shows total production of various munitions and production at the monthly peak (usually October 1918). When in May 1940 President Roosevelt called for a production capacity of 50,000 airplanes per year, the number was considered astonishing, a typical example of Rooseveltian bravado. But, as shown in table 10.7,

Table 10.7. USA: production of selected munitions in World War I

	Total to end of the war ^a	Peak monthly rate ^b	Production in the peak month at annual rate
Rifles	3,550,000 ^a	271,000	3,252,000
Machine guns	226,557	35,000	420,000
Artillery units	3,077	410	4,920
Smokeless powder (pounds)	632,504,000	–	–
High explosives (pounds)	375,566,000	–	–
Rounds of artillery ammunition	20,326,000	3,072,000	36,864,000
Toxic gas (tons)	10,817	2,726	32,712
Tanks	799	–	–
Training planes	9,503	–	–
Training engines	17,073	–	–
De Havilland-4 bombers (numbers shipped)	3,227 (1885)	1,100 –	13,200 –
Liberty Airplane Engines (numbers shipped)	13,574 (4,435)	3,850 –	46,200 –

^aTypically, this is the period from April 1917 to March or April 1919. Production after the Armistice was usually limited, reflecting the completion of units in the pipeline.

^bGenerally, October 1919.

production of the (then) high-powered Liberty Airplane Engine had reached an annual rate of 46,000 in October 1919. In a few cases, American production was a factor before the Armistice. The United States, for example, produced the major share of the smokeless powder used by the Allies. And American technological skills were beginning to have an impact. The Liberty Airplane Engine, despite its problems, had great potential. And US aeronautical engineers, including Wilbur Wright, successfully tested a flying bomb, the ‘bug’ bomb as it was known, that foreshadowed the German weapons of World War II. One can see in the production figures for World War I, to put it somewhat differently, the first stage of the ‘production miracle’ of World War II.

The legacies of the war for the US economy

Did World War I produce a major break with the past? Was the American economy fundamentally different after the war than it had been before? To answer these questions, or at least to begin to, I will look first at (1) the cost of the war in terms of resources, a difficult issue in itself; (2) the change in the role of the United States in international capital markets; and finally (3) the long-run changes in ideas about the role of the government in the economy brought about by the war, the least tractable but possibly most important consequence of the war.

The costs of the war

The United States mobilised about 4.8 million men in World War I. About 2.086 million went overseas, and about 1.39 million saw combat. Although it is true that America’s losses paled in comparison with those of the European combatants, and were substantially less than those America experienced during the American Civil War, they were nonetheless substantial. About 204,000 Americans suffered non-mortal wounds, and about 117,000 died. Of those who died, it is estimated that about 50,000 died in battle, and about 67,000 died from disease. The most important disease was pneumonia, which accounted for about 40,000 deaths. Of these, about 25,000 were attributed to the influenza–pneumonia epidemic (Ayres, 1919: *passim*). Compared to the total US population in 1920 of 106,466,000 or the total labour force of 42,434,000, these numbers may look relatively small: deaths were only 0.11 per cent of the population, and only 0.28 per cent of the workforce. But they had a major psychological impact, not only on the families and friends of those killed or wounded, but on the country as a whole, certainly enough to produce strong reservations about any future involvement in a European war.

The most detailed and thoughtful effort to measure the economic costs of the loss of life and other costs of the war is John Maurice Clark's (1931) *The Cost of the World War to the American People*. Indeed, Clark's study seems to stand alone. There has been no similarly exhaustive study of the impact of World War II. In part, the lack of a similar study for World War II reflects the revolution of ideas held by economists. Although Clark believed that increased spending could have a multiplier effect on aggregate demand (Dorfman 1970), his analysis was essentially neoclassical: resources allocated to the war effort had alternative uses. By the end of World War II most US economists were Keynesians. Wartime spending increased total GDP by more than the initial spending: the war had, from an economic point of view, almost no costs. The war paid for itself by increasing total output through the multiplier process. In World War I, moreover, the US economy was already at full employment when active American involvement began. World War II was different. Although the economy was expanding rapidly in 1941, there was still considerable slack when the US entered the war.

To estimate the costs of the war Clark began with the Treasury's estimate of total expenditures by the Federal government to 30 June 1921 (\$27.2 billion) and then made certain additions and subtractions to bring the total closer to one reflecting resource costs.¹⁵ Clark (1970 [1913]: 112, and *passim*) added (1) the worth of foreign obligations, \$7.5 billion, on the grounds that these represented output transferred during the war (and unlikely to be returned later); (2) an adjustment to bring the wages of persons in government service into line with what they could have earned in the civilian sector of \$.2 billion; and (3) miscellaneous additions of another \$.2 billion. Clark then subtracted (1) interest on war debt of \$2.7 billion on the grounds that it was a transfer rather than a use of resources, and (2) part of the deficits of the Federal Railroad Administration of \$1.2 billion on the grounds that these were a transfer from taxpayers to shippers. The net result was \$31.2 billion. Additions of expenditures made by state governments and private organisations brought the total to a round figure of about \$32 billion (Clark, 1970 [1931]: 121, and *passim*).

The upper panel of table 10.8, due to Edelstein (2000), shows this amount in dollars and as a share of GNP. World War II and the wars in Korea and Vietnam are shown by way of comparison. Clark (1970 [1931]: 121) also broke his estimates down by calendar year. These amounts in dollars and as shares of GNP are shown in the lower panel. Overall, the impression that emerges is that the war was well within the capacity of the American economy. The mobilisation obviously went much

Table 10.8. *USA: the costs of World War I*

A. Cost of World War I in comparative perspective			
	Billions of current dollars	Billions of 1982 dollars	Percentage of GNP
World War I (1917–18)	32.4	377.9	52.2
World War II (1941–45)	306.7	2459.7	175.4
Korean War (1950–53)	49.9	206.3	14.8
Vietnam War (1964–73)	108.3–136.3	313.2–392.5	10.6–13.3

B. Cost of World War I by year				
\$ Billions	Percentage of GNP, from:			
	Balke and Gordon	Romer	Kendrick	
1917	6	10.9	9.7	5.0
1918	16	23.0	21.1	17.4
1919	9	11.7	11.5	9.7
1920	1	1.1	1.1	2.4
Total	32	46.6	43.4	34.5

Sources and Notes: A. Costs: Edelstein (2000: 342). For Vietnam the larger amount is the total spent on the war, the smaller amount excludes the normal peacetime costs of maintaining the armed forces. GDP was the average of GDP in the first year of the war and the last year from Johnston and Williamson (2002). (B) Expenditures: Clark (1970 [1931]: 121). GNP: Balke and Gordon (1989) and Romer (1989). The calculation using Balke and Gordon's estimates of GNP are shown first, and the calculation using Romer's estimates follow. The third estimate is from Kendrick (1961: table A1, columns 5 and 6, 291). Kendrick's estimates are somewhat lower during the war years primarily because the loans to the Allies are excluded.

further in World War II. Only in 1918 does the share of military spending in GNP exceed the share regularly maintained during the Cold War.

The role of the United States in international capital markets

When World War I began, the United States, as shown in table 10.9, was a net debtor on international capital markets. Throughout the nineteenth century the United States had received large amounts of foreign capital. The money went into canals, railroads, mines, banks, and other private investments, and into government securities. The war forced Britain and her Allies to liquidate much of this patiently accumulated investment. Between 1914 and 1919 foreign investments in the United States, as shown in table 10.8, fell from \$7.2 billion to \$3.3 billion. After the war, the flow of funds from Europe resumed. In the late 1920s foreign investors,

Table 10.9. *USA: the international investment position, 1914–1929 (selected years, billions of dollars)*

	US investments abroad	Foreign investments in the US	US net indebtedness
1914 (June)	5.0	7.2	–2.2
1919	9.7	3.3	6.4
1924	15.1	3.9	11.2
1927	17.9	6.6	11.3
1929	21.5	8.4	13.1

Sources: US Bureau of the Census (1975: series U26, U33, 869).

like American investors, found the US stock market attractive, and by 1930 the level of foreign investment in the United States exceeded the level of 1914. But the United States did not return to its position as net debtor because Americans began investing large amounts abroad, especially in Latin America, taking on the role traditionally played by Britain and other European capital exporters (Bordo, Edelstein, and Rockoff, 1999). New York's investment bankers were probably not as sophisticated as London's, and there is some evidence that the quality of US placements declined in the late 1920s. But there is no gainsaying that New York could justly claim to have emerged from the war as London's equal, if not her superior, in the contest to be the world's leading financial centre.

The war undoubtedly contributed to the emergence of New York as a centre of capital export. Britain's economic weakness, a direct result of the war, and the difficulties surrounding her return to the gold standard, naturally meant that entrepreneurs and governments would look to the one industrial nation that had remained largely unscathed by the war.

The ideological legacies

One might have expected that a war in which the central government took such an active role, would produce a substantial upward ratchet in the role of government in the peacetime economy. Judged against this standard, the impact of World War I appears to have been relatively limited. Federal government expenditures were higher after the war than before. But the additional spending was for things that most people would view as the immediate and inevitable costs of the war – mainly additional military expenditures, veterans' benefits, and interest on the debt (Clark, 1970 [1931]: 105; Rockoff, 1998a). Although there are sectors, for example

agriculture, where one can draw a connection between government policies during the war and increased postwar spending, for the most part there was little in the way of additional civilian spending that can be said to have 'piggy backed' on the war effort.

The institutional legacies were also limited, although again some exceptions can be found. Most of the wartime regulatory control agencies were terminated as soon as the war ended. The War Industries Board was shut down so abruptly that Baruch had to pay the costs of returning home for some of his employees out of his own pocket. Some attempts were made to keep some of the regulatory experiments going, but these efforts petered out in the 1920s. The railroads, the boldest experiment in nationalisation, were returned to private ownership. The Shipping Board hung on longer, and spawned a programme to loan money for domestic shipbuilding.

Perhaps the most important domestic institutional legacy of the war was prohibition. Prohibition of alcohol had been pushed by reformers for decades prior to the war, and had been adopted in a number of states on a local or statewide basis. But the war changed the balance of power between the 'wets' and the 'dries'. The dries could now argue that prohibition was important to make workers more productive and to conserve valuable resources. Antagonism toward German-Americans, who were prominent in the brewing industry, may also have played a role. The Lever Food and Fuel Control Act, adopted in August 1917, banned the importation of distilled spirits and their production from domestic foodstuffs. In December 1917 Congress passed the Prohibition (eighteenth) Amendment to the constitution prohibiting the manufacture, sale, or transportation of drinkable alcohol in the United States. Prohibition would hang on until 1933. By that time most Americans had become convinced that the 'noble experiment', as Herbert Hoover termed it, had failed because of widespread lawless evasion.

The relatively small increases in spending resulting from the war, and few institutional legacies (with the exception of the shipping administration and prohibition), were the result of determined efforts by conservative Republican administrations in the 1920s to scale back taxes and spending, and to end regulatory experiments. The Republican era was inaugurated with the election of Warren G. Harding in 1920. During the campaign Harding offered what he claimed the public wanted most: 'a return to normalcy'. Harding won by a landslide. Evidently, the war economy had, at least in the short run, soured the public on the Democrats.

Despite the immediate conservative ascendancy there was, however, as Robert Higgs argues persuasively in *Crisis and Leviathan* (1987: 150–6), an important ideological legacy from the war. The perceived success of government intervention in the economy during the war, whether real, or

simply the halo effect of victory around a brief and confused experiment, increased the confidence on the left that central planning was the best way to meet a national crisis, certainly in wartime, and possibly in peacetime as well. Many people who had been sceptical about the advantages of big government – free-market progressive and populist politicians, many labour leaders (particularly in the craft unions), and some business leaders – were persuaded that centralised regulation and control of the economy would be in their interests. This view was far from being dominant during the 1920s, but it made itself felt when the Great Depression brought the Democrats back to power in the 1930s.

One of the lessons progressives drew from the war was in macroeconomics. There was no gainsaying that there had been a mighty expansion between 1914 and 1918, and that it had been accompanied by huge government debts and, in the last years of the boom, by controls on wages and prices. Here was medicine for a depressed economy. Determining the active ingredient – monetary expansion, government deficits, price and wage controls, etc. – was difficult. David Friday, a prominent American economist, for example, argued (Friday, 1921) that the lesson of the war was that production had been maximised because the government was insuring private enterprise against the risk of loss. He proposed that government insurance of private losses be made a permanent feature of the economy. Others saw the balance between prices in the farm and non-farm sectors maintained by the Food Administration as the key. Indeed, it was not until Keynes that economists reached a consensus that it was increased spending in the foreign trade and government sectors that had produced the boom, and that deficit-financed federal spending would always work. But the war experience, nevertheless, increased the confidence of liberals (in the American sense) in the 1930s that they had a medicine that would restore full employment.

Progressives also drew microeconomic lessons from the war. The government ought to intervene, at least at times, because markets simply did not work very well. Frank W. Taussig (1919, 1921), another prominent economist of the day, argued that supply and demand were simply general tendencies, useful as a simplification for teaching to the young, but not something to be relied upon to allocate resources. Taussig had been an advocate of regulation before the war; he was not a born-again regulator. But the war did increase his confidence that government regulation of private markets could work, and arm him with examples. John Maurice Clark in an essay entitled 'The Basis of War-Time Collectivism' (1917: 779) reacted to the announcement that the government would begin producing the Liberty Engine for aircraft by declaring that 'It proves that there are great unused possibilities for immediate

advancement in private industries where patents or secret processes are held' and that 'It gives one a sense of the sudden liberation of pent-up forces'.¹⁶ Clark was not ready to abandon capitalism in its entirety, but he was ready to continue the successes of wartime collectivism in peacetime.

To be sure, Woodrow Wilson and his fellow progressives had been more than willing to expand the role of the central government without the benefit of a previous experiment in government intervention on the scale of World War I.¹⁷ And it is more than likely that Franklin Roosevelt and his advisers would have proposed numerous extensions of Federal authority to meet the Great Depression, even if World War I had never occurred. Many of the reforms advocated by the Roosevelt administration had long been advocated in academia, and it only required the emergency of the Great Depression to bring them into being. Abundant and detailed support for New Deal style reforms, as I have argued elsewhere (Rockoff, 1998b), was to be found from the turn of the century through 1929 even in the writings of professional economists, a group now sometimes thought of as relatively pro-market.

Yet it is also true that almost every government programme undertaken in the 1930s reflected a World War I precedent, and that many of the people brought in to manage New Deal agencies had learned their craft in World War I (Leuchtenburg, 1964). The Reconstruction Finance Corporation (actually set up under Hoover although continued under Roosevelt) was a reincarnation of the War Finance Committee; the Security and Exchange Commission had much in common with the War Issues Committee; and the Civilian Conservation Corps attempted to create the benefits of military service in peacetime. It seems likely, therefore, that the speed and scope of the Federal government's expansion in the 1930s were greater than they otherwise would have been because of the impact of World War I on the ideology of the nation's economic and political leaders. And it was the reforming liberalism of the 1930s that inspired future generations of would-be reformers. For America, to sum up, the most important long-run impact of the war may have been in the realm of ideas.

Notes

- 1 I must thank my colleagues, Michael Bordo, Stephen Broadberry, Mark Harrison and Eugene White, and the participants in the conference on the Economics of World War I held at Warwick University in July 2002, for numerous helpful suggestions. They are not responsible for any remaining errors, confusions or misleading statements.
- 2 The Aldrich-Vreeland Act was intended to be a stopgap measure that would protect against panics until the Federal Reserve System could be established.

It permitted groups of banks to issue currency in an emergency based on the general assets of the banks.

- 3 The war began in April 1861 with the Confederate attack on Fort Sumter and ended in April 1865 with Lee's surrender to Grant.
- 4 Prior to December 1854, only annual cycle dates are available from the NBER.
- 5 The increase in real income for the Civil War shown in the table is an old estimate and is now considered doubtful. But it may represent something closer to how the Civil War was perceived at the time of World War II – as a war that was highly destructive for the South, but highly profitable for the loyal states – than would a smaller estimate.
- 6 Over 1.2 million immigrants arrived in 1914; that fell to 326,000 in 1915 and trended lower until the end of the war (US Bureau of the Census, 1975: 105).
- 7 John Whitclay Chambers II (1987) tells the story of the World War I draft.
- 8 This is the difference between the actual amount of currency circulating in May 1919 and the amount of deposits in May 1919 divided by 8.34.
- 9 World War I, however, was no exception to the rule that wars produce profiteering scandals. See Stuart Brandes (1997: chapter 7) for a thorough account of war profiteering during World War I.
- 10 Municipal bonds were presumed to be exempt from Federal taxes including the income tax under an 1895 Supreme Court ruling. However, the recent passage of the constitutional amendment authorising the income tax meant that the question of tax exemption might be revisited (Bogart et al., 1919: 86–7).
- 11 Prices are end-of-month prices from the *Commercial and Financial Chronicle*, *passim*.
- 12 These rates were computed simply by dividing coupons by market prices. I also tried calculating yields to maturity. This does not noticeably affect the First Liberty bond because it had a long maturity and was close to par. A yield-to-maturity calculation does raise, slightly, the return on the Fourth Liberty Loan.
- 13 This exemption was then extended to the Second and Third Liberty Loans.
- 14 Kerr (1967) shows that nationalisation also reflected the ideological predisposition of Wilson and his progressive advisers. Many private interests, moreover, also favoured nationalisation. Shippers of agricultural products and coal favoured nationalisation because they thought it would prevent increases in freight rates, and the railroad labour unions favoured nationalisation because they thought the government would be more sympathetic to their demands. Some of the railroads favoured nationalisation because they saw it as a way out of the predicament created by rising costs and fixed freight rates. Cunningham (1921) provides a detailed and balanced evaluation of the effects of nationalisation. He concludes that both the decision to nationalise in 1918 and the decision to return the railroads to private ownership in 1920 were correct.
- 15 For a more detailed exposition and evaluation of Clark's methods, see Edelstein (2000).
- 16 On the history of the Liberty Engine see Marcossou (1948).
- 17 Wilson could and did look to Europe for examples of wartime economies. And the progressives looked to Europe, Canada, Australia, and a number of progressive US states for examples of what they regarded as successful social welfare and regulatory programmes.

Appendix 10.1: A chronology of the US economy in World War I

1914

- August Beginning of World War I.
 December Trough of US business cycle.

1915

- May A German submarine sinks the *Lusitania*; 124 Americans are killed and public opinion shifts away from neutrality.

1916

- June The National Defense Act provides for expansion of the army.
 August Council of National Defense established to plan and coordinate defence efforts.
 September US Shipping Board created to build, lease, and requisition ships.
 November Woodrow Wilson is elected President.

1917

- April The United States enters World War I.
 June First Liberty Loan.
 July The War Industries Board succeeds the General Munitions Board, and is given the task of increasing production and coordinating the mobilisation.
 August The Lever Food and Fuel Control Act empowers the President to fix the price and regulate the distribution of food and fuel. Herbert Hoover is appointed Food Administrator and Harry Garfield, Fuel Administrator. The Act also prohibits the importation of distilled liquors or their manufacture from foodstuffs.
 October The War Revenue Act authorises a graduated income tax, corporate profits tax, and sharp increases in postal rates and excise taxes.
 November Second Liberty Loan.
 December The railroads are placed under Federal administration. William Gibbs McAdoo is in charge.
 The Prohibition Amendment to the Constitution (the eighteenth amendment) prohibiting the manufacture, sale, or transportation of drinkable alcohol.

1918

- January An official schedule of maximum prices for steel is established.
 March The War Industries Board is reorganised and Bernard M. Baruch is placed in charge.

- April The War Finance Corporation is created to make loans to financial institutions that had extended credits to war industries. National War Labour Board is created to act as a court of last resort in labour disputes.
- May Third Liberty Loan.
- June New system for allocating steel is introduced, concentrating authority in the hands of the War Industries Board. The National War labour Board is established to standardise labour conditions. Felix Frankfurter is placed in charge.
- August Peak of US business cycle.
- October Fourth Liberty Loan.
- November Armistice.
- 1919**
- January The Prohibition Amendment is declared ratified. It would become effective in January 1920 and would be repealed in 1933.
- February The War Revenue Act of 1918 takes effect.
- April Victory Loan.
- October The Volstead Act, which provides a mechanism for enforcing prohibition, is adopted.
- December President Wilson announces that the railroads will be returned to private ownership in March 1920.

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