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Organization of War Economies

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Organization of War Economies

By [Matthias Blum](#), [Jari Eloranta](#) and [Pavel Osinsky](#)

The First World War was a global conflict that caught most of the participants ill-prepared for the demands of total war. Economic mobilization beyond the initial needs of the troops involved increasing arms and munitions production, expanding the push for raw materials, mobilizing industrial and agricultural workers for the war economy, and allocating food and other resources based on the needs of the warfare-state. We discuss the role of organization and ability to deal with shortages of resources and production potentials. We also illustrate war-induced shortages and their consequences by using Germany as a case study of these processes.

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Introduction

With the outbreak of war in 1914 global economic development and integration were interrupted and set back, and regional patterns were severely distorted by combat, migrations, and the redrawing of borders. The global economy became fragmented and its national units began their drift towards self-reliance and autarky. The European nations, the primary belligerents in the conflict, underwent massive transformations involving extensive state regulation, the substitution of market mechanisms by an administration of state officials, and growth of the technocracy. These changes anticipated the emergence of the state-directed economies of the communist and fascist types, as well as plenty of new democracies, in the interwar period. When the war ended in 1918, the institutional design of the most European economies was drastically different in comparison to what had existed before the war.

Initially, however, the outbreak of hostilities did not have an immediate impact on the structures of the European economies. Despite the mobilization of large contingents of recruits and cessation of foreign trade among the belligerent nations, most European economies continued to operate as before, adjusting to the realities of wartime. The governments had extended their statutory powers; but except for a few emergency measures,

most state authorities indicated no intentions of disrupting the daily economic routines. Many Europeans (but not all), the statesmen and the common people alike, thought that the war could be over in two or three months, or by Christmas the latest. Few individuals foresaw the massive changes in the economy and society the war would eventually bring about, although the people in the inner circles of power may have been better informed.

In the run up to the centenary, there have been many new economic history studies analyzing the war, in particular *The Economics of World War I*, edited by Stephen Broadberry and Mark Harrison.^[1] Here we will incorporate many of the findings in the recent literature, and introduce our own scholarly work into the narrative of the Great War. Moreover, in this article we will first discuss the mobilization for the war by the various nations. We then discuss the German case as a way to analyze the specifics and limitations of mobilization. We chose the German experience as a case study since relevant economic mechanisms are easily recognizable here; mobilization withdrew a considerable share of the labor force and armament industries required the substantial productive capacities of the capital and consumer goods sector. In contrast to its enemies, Germany and its allies were almost seamlessly surrounded by their enemies, with the Royal Navy blocking maritime trade routes, making compensation for the losses in production impossible. The analysis concludes by discussing the role economic resources played in the outcome and the cost of this conflict.

Mobilization for War

Mobilization for the First World War in the initial phase involved mobilizing the troops and core institutions for warfare. For Germany, perceived to be the primary instigator of the conflict, the successive campaigns against France and Russia represented the only strategy which could bring a victory in the situation of geopolitical encirclement by the hostile powers. The possibility that the conflict would prolong and Germany and its ally Austria-Hungary would have to fight a war of attrition on two fronts was not taken into serious consideration. Wilhelm II, German Emperor (1859-1941) and his entourage believed that such outcome could be avoided.^[2]

From the very beginning, however, things went wrong for the Central Powers. The first political setback was Great Britain's entry into war on the side of the Allies on 4 August. Although it was known that Britain would not accept the Germans' violation of Belgian neutrality in the case of war, the German rulers did not believe that the British would fight against them. Britain's intervention into the war on the Allied side seriously obstructed the German plans. It had two major implications for the subsequent economic transformations.

First, a swift deployment of the British Expeditionary Force on the continent helped the French army resist the German offensive. In the Battle of Marne in September 1914, the Allies stopped the advance of the German troops, forcing them to retreat. After a few weeks of the "race to the sea" in which both sides attempted to outflank each other, the troops ensconced themselves in the trenches and the Western Front stabilized. The expected short war had not materialized; the conflict turned from a war of maneuver to a war of position.

Second, already in August of 1914 the British government announced a naval blockade of the German ports. Whereas in the first stage of war the blockade was restricted to search and confiscations of the "absolute contraband" (arms and munitions), in the beginning of the next year the Allies decided to stop all shipments to and from the ports of the Central Powers including "conditional contraband" (food, forage, fuel, clothing) and even goods from the so-called "free list" (raw materials such as ores, cotton and fertilizers). The broad range of measures was introduced to minimize German supply through the neutral countries (Netherlands, Sweden, Norway, Denmark, and Switzerland). In response the German government resorted to unrestricted submarine warfare against Allied commercial vessels. These developments placed severe constraints on the supply of

resources available to the belligerent nations.^[3]

The most extraordinary change, however, occurred in the demands of **modern warfare**. By 1914, the military technology available to the armies had made great advances. Introduction of the quick-firing **artillery** and the **machine guns** in the late 19th century resulted in a revolutionary change in logistics. A single Vickers machine gun shot bullets at a rate of 600 per minute, the number of ammunition that had previously been fired by half a battalion of troops. The total amount of necessary daily supplies increased by a factor of twelve.^[4] The stockpiles of munitions accumulated before the war were depleted in a matter of months. One after another, the European nations confronted the task of massive economic reorganization of their economies for war production. The demands could only be met by producing more, by importing more, and by consuming less.^[5]

The economic mobilization of the European nations unfolded in four main arenas. The first and most immediate economic challenge was the production of arms and munitions. In the early period of the war, all major European armies experienced a catastrophic shortage of munitions, or a "shell crisis." In the following months, the demand for munitions continued to increase. The authorities had to undertake extraordinary measures for organizing large-scale munitions production. The second task was obtaining necessary raw materials for manufacturing the munitions. An exponential growth in the production of munitions and supplies had proportionally increased the demand for raw materials. In some countries manufacturers relied on domestic resources, whereas in other nations producers drew a large proportion of resources from the international markets. In either case, the manufacturers and the authorities had to ensure an uninterrupted supply of war-related raw materials, which was not an easy task to accomplish. The third task was to mobilize the industrial workforce. With the outbreak of the war, most workers were drafted to the army. The war caused major dislocations in labor resources and placed an additional strain on labor relations. As the market mechanisms became ineffective, the authorities had to resort to administrative methods of workforce allocation, including (in some cases) the industrial draft. The fourth task was the allocation of food. The task of procuring for the army and the **urban population** turned out to be the most serious challenge for state managers in most countries. The continuing hostilities resulted in diminishing amounts of foods in the markets. As the war progressed, the state authorities had to use centralized methods of mobilization and distribution of provision, such as requisitioning of provision and rationing of basic foods.

By the end of the war, most economic institutions of the European nations obtained a statist and collectivist design. The **total war** established a modern nation state central in the stage of economic, social, ideological and other relations. The notions of the state, economy, and society as separate and independent institutions became obsolete. The regulatory state came to encompass almost everything in the social life of many European nations. If there was a variation in the state-economy-society integration across nations, then it was a variation at the high end of the scale.^[6]

Great Britain has demonstrated a good example of a state-directed industrial mobilization. Here state control transformed the economic order from a liberal, free-trade economy into a regulated welfare state. Nonetheless, in Britain, massive state intervention was not able, nor was it intended, to undermine a predominantly market-based governance structure. The bureaucrats in the Ministry of Munitions, which became a central agency directing economic mobilization, generated mountains of regulations but they did not control the daily operations of private firms. The primary forms of state involvement were co-optation and coordination, not command and compulsion. By bringing in new manufacturers to war production, building new public factories, and buying munitions abroad, the government inadvertently promoted decentralization in the industry and sponsored competition among manufacturers. In a similar fashion, the market-based mechanism of transactions with raw

materials had not disappeared; the governmental control in this sphere was accepted as a forced and a temporary measure. Whenever possible the government avoided outright compulsion in employment relations. It did not introduce anything similar to the Austrian or German system of compulsory state service. During the first two years of the war the government essentially refrained from intervening in food matters. Unlike all major continental countries, Britain never established a full monopoly on grain. The rationing of some other foods was introduced only five months before the end of war. To sum up, the British industry operated as a capitalist market economy, not an administered economy.^[7]

Many of these residual capitalist features fully applied to the wartime French economy. More than any other economic system, the French economy demonstrated an example of self-mobilization and self-organization of the capitalist class. Although industrial mobilization was sponsored by the government, industrialists themselves came to play a primary role in organizing mass production of arms and munitions. French resource-allocation institutions, the consortia, represented a weak and temporary version of corporate organization. Being instigated by foreign agencies (British and American exporters), the consortia existed only for a very short period of time. The French labor market retained "freedom of contract," (except for the recalled workers and the [prisoners of war](#)). The workers could leave an enterprise as they wished. They also could demand higher remuneration and better conditions of work (albeit individually but not collectively). For about three years in the war the French authorities limited themselves to very few measures of food regulation, mostly price control of some foods. Because of large imports of food from overseas, more dramatic measures of food control did not seem necessary. Only in late 1917 did the government introduce a grain monopoly and the rationing of bread.^[8]

If France and Britain remained largely liberal states despite the war, the institutions of such states as Germany, Austria-Hungary and Russia adopted a far more distinct statist design. In production and distribution of food, Germany was transformed into a *Zwangswirtschaft* (a compulsory economy), in which market forces completely yielded to the rule of the managers. Overall, in 1916-1918, German industrial economy operated more as a command system than a market economy.^[9] In Austria-Hungary, all major munitions workshops and mining establishments were supervised by military directors. These directors in turn were supervised by the inspectors of the War Ministry. Prompted by the German authorities, the Austro-Hungarian government developed a centralized system of raw material allocation, although in contrast to the German raw materials corporations, the Austrians did not have legal and financial guarantees from the state. The Austro-Hungarian government instituted an industrial draft of the male population (albeit with numerous exemptions) in the first days of the war. Compared to Germany, the Austrian action took place much earlier and, according to James R. Wegs, it was a more effective arrangement.^[10] The market mechanism in the allocation of food was also to a large extent replaced by the administrative system. The government introduced a monopoly on grain as well as establishing rationing on bread and other staple foodstuffs. In the last two years of the war, the army itself began requisitioning food from the countryside. Nonetheless, widespread starvation was a reality by 1918.^[11]

In Russia the process of the institutional merger of monopolies and the state reached its ultimate phase: in some sectors not only the state took over the allocation of material, but by being the sole buyer of produce, the state began to manage the entire process of production. On the other hand, the Russian system of state-corporate regulation was less developed organizationally and was less comprehensive than the German model. As managers of industrial mobilization, the Russian military-bureaucratic state and the national capitalist class turned out to be both weak and ineffective. Due to the weakness of the state and the broad opposition of society, the militarization of the workforce was completely out of the question. Despite earnest efforts to institute a state-controlled economy in food supply, these efforts, as compared to analogous measures introduced in Germany

and Austria-Hungary, came too late, were poorly implemented, and proved completely ineffective. Eventually these regulatory efforts resulted in an institutional stupor. The war strengthened the existing tendencies towards a command economy but did produce a commander.^[12] In the end, the Russian system functioned as a command economy, but with an ill-functioning and disintegrating structure.^[13]

The economic system of the United States, a nation which remained neutral throughout most of the fighting, represented an interesting contrasting case. Although America served an “arsenal of democracy”, it did not undergo as drastic changes in its economic design as the European nations. Due to its remoteness from the battlefield and the brief duration of the military involvement (from April of 1917 to November of 1918), its economic mobilization lacked a sense of urgency and proper organization. Most wartime organizational innovations brought about by the federal government (such as nationalization of railroads) were politically controversial and clearly meant to be temporary. Nonetheless, attempts to regulate the economy using centralized price and production controls, undertaken by the War Industries Board and the Food Administration, marked a significant shift towards corporatism in America’s economic relations. Due to a torrent of federal spending financed by the floating of “liberty bonds,” raising taxes and printing money, the nation’s entry into the war created a boom in the American economy. Big business and a large number of small entrepreneurs profited from the conflict. The war placed the United States in position as the leading economic nation of the world. As a result, the United States also became a creditor nation, financing some of the Allied war effort through loans and material assistance.^[14]

Mobilization of Agriculture and Industry in Wartime Germany

In order to investigate the results of resource reallocation and the general shortage of resources more closely, we will take a closer look at the German case, which perhaps most clearly displays these characteristics. During the decade preceding the First World War, Germany experienced a rapid transformation of its economy. German per-capita income rose by more than 70 percent between 1871 and 1913, and the urban population increased from 11.8 to 35.9 percent.^[15] To keep pace with the increasing demand for food, especially high-quality items such as meat and dairy products, German agriculture subsequently turned away from being a producer of food and developed towards a refiner of foodstuffs. More and more animal feed, fertilizer, and other intermediate products as well as human foodstuffs were imported to meet the increasing demands. The major imported commodities were Russian barley, U.S. grains and Norwegian fish meal. In addition, raw materials like Chilean saltpeter were important inputs for both the armaments industry and the agriculture.^[16] However, despite all the technical and technological improvements – the share of employment in German agriculture was 56 and 47 percent in 1849 and 1890, respectively, and it declined to approximately 35 percent in 1913^[17] – on the eve of the First World War, German agriculture was still dependent on a vast labor force compared with more modern economies. Corresponding British figures indicate that only 8.1 percent of the labor force was active in agriculture, suggesting that other more advanced economies had substituted labor force with machinery and other capital inputs.^[18]

The British naval blockade did not prevent German external trade completely, but the import of foodstuffs, fertilizer, seasonal workers, and animal feeds over the North and Baltic Seas was restricted as many neighboring European countries became enemies. In addition to the blockade, important trading partners ceased or reduced their supply as they faced similar problems like Germany or became opponents.^[19] Table 1 illustrates commodity imports from 1916 to 1918. German imports of dairy products declined by approximately

80 percent, meat imports dropped by 87 to 96 percent, and flour imports by 95 and 80 percent, respectively.^[20]

	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	1,848	557	244	450	260	6
Butter	7,978	158	3,513	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	115	2,278	192	2,229	99

Table 1: German Imports and Exports of Agricultural Products, 1916-1918^[21]

Germany's large peasant population turned out to be an obstacle for food production in the war economy. Mobilization efforts redirected resources from agriculture and the farmers preferred to hoard food rather than sell it for low prices and postpone important investments into their capital stock given increasing prices for capital goods and uncertainty about the expected revenues.^[22] Remaining resources were subsequently reallocated according to changes in the demand of the war economy. For example, general mobilization drew an estimated 40 percent of the male labor force away from the German agricultural sector. Also, the number of seasonal workers dropped from approximately 0.44 million in 1913 to approximately 0.15 million in 1918. Authorities tried to top-up the remaining labor force with females, children, prisoners of war, and workers from other industries. The number of prisoners of war rose from 0.7 million in 1916 to 0.9 million in 1918, but due to organizational problems and the necessity to supervise prisoners these labor inputs contributed very little to overcoming the labor shortage. Moreover, prisoners of war, women, adolescents, and children had received little or no training, and the Prisoners of war especially lacked motivation. The situation became so difficult that German authorities had to send agricultural workers and landowners on home leave to enable them to help with the harvest. One strategy provided that industrial labor from urban areas was to be reallocated towards the agricultural sector. However, agriculturalists hesitated to take advantage of this opportunity as urban dwellers generally lacked the skills necessary in agriculture and feared the encroachment of the trade unions.^[23] The number of unemployed workers delineates the labor shortages in the war economy: after an initial increase of the unemployment rate after the outbreak of war, unemployment decreased to 3.2 percent in 1915, 2.2 in 1916, 1.0 in 1917, and 0.8 percent during January and October 1918.^[24] In addition to labor shortages, large numbers of working animals such as cattle and horses were channeled towards military supplies and could not be used for production or consumption.^[25]

Aside from labor shortages, there were several sectors competing for one of the most important war resources: **nitrogen**. Nitrogen was used both as a fertilizer in agriculture and as the basis for explosives in the armaments

industries. When the war broke out, German authorities obviously expected the conflict to endure only for weeks or a few months. Once the authorities realized their own inability to achieve this goal, they were forced to reallocate nitrogen supplies towards the production of explosives. This discrimination against agriculture was one of the crucial factors explaining the deep slump in German agricultural production.^[26]

Graph 1: Estimations of Economic Activity (GDP, GNP) in Germany, 1913 to 1918^[27]

Graph 1 provides an overview of a set of GDP estimations for Germany during the period from 1913 to 1918. On average, GDP seems to have declined by approximately 20 to 30 percent, with the most favorable estimation indicating a 12 percent decline between 1913 and 1918. The less favorable estimation suggests that the German GDP dropped by 43 percent during the war. During the same period the share of government spending relative to GDP rose from 10 to 59 percent, leaving a smaller share of total GDP for non-governmental consumption.^[28]

The shortages of resources in general and the losses of war resources during the materiel battles in 1916 led to the development of the *Hindenburg-Programm*. In August 1916 the new Supreme High Command under Paul von Hindenburg (1847-1934) and Erich Ludendorff (1865-1937) launched a massive campaign for war production known as a program of “total mobilization.” The new commanders came to power determined to match the Entente “man for man and gun for gun”.^[29] Using August 1916 level as a base, Hindenburg demanded that by May 1917 industry double the monthly output of powder to 12,000 tons and of light artillery to 3,000 pieces, and triple that of machine guns to 7,000. Targets for aircraft production, in which Germany lagged far behind Britain and France, were later set at 1,000 engines and 1,000 planes per month.^[30] The Auxiliary Service Law of 5 December, instituted the conscription of all men between the ages of seventeen and sixty for civilian war service. The newly created Supreme War Office, charged with implementing the program, was instructed to push it with the understanding that “financial and other reservations can no longer considered”.^[31] The government would cover the costs of production and pay a fixed rate of profit to the industrialists. This arrangement, known as the cost-plus-profit system, signaled a remarkable departure from the operational schemes adopted in market-based industrial relations. Such arrangements are usually associated with ongoing bargaining and economies of soft-budget constraints characteristic to state-socialist nations. Although the German economy was still far from these transformations, instituting a cost-plus-profit system and universal labor conscription represented decisive steps towards a state-controlled command economy.

As for the allocation of these dwindling resources, several indicators confirm that production resources were reallocated towards war-related industries at the expense of civilian industries. If sectors are investigated by their importance for the war effort, it becomes clear that production in war-related industries declined only temporarily until 1916. In 1917 and 1918, production in war-related industries exceeded pre-war production levels; mining, iron and steel, and non-ferrous metal production declined only modestly or even increased production. Less viable industries to boost Germany’s war effort shrank dramatically: Production of cereals and construction materials fell to 57 and 35 percent of pre-war levels, while textile production shrunk to only 17 percent of pre-war levels. The number of employees by sector, and the corresponding wage levels also suggest a rapidly changing demand for labor. Total employment in industry declined by approximately 10 percent; from 7.4 to 6.6 million from 1913 to 1918. Male labor supply experienced the most severe decline (minus 25.8 percent), while female employment increased by 45.6 percent. Civilian industries lost approximately 40 percent of their labor, intermediate industries lost approximately 21 percent, while war-related industries increased their labor force by an estimated 44.1 percent during the war.^[32]

In view of these shortages, the demand for additional labor was high, which is reflected in the wages paid in the relevant industries. Wages, reflecting the marginal productivity of labor, may help obtain an overview of the well-being of workers in select industries. Employers were willing to increase wages, not only to outweigh inflation but mainly to overcome labor shortages. Absolute wages increased throughout the industries listed in Graph 2, which means that to interpret the rising wage as an indicator for resource reallocation would be too simple. A more suitable metric to obtain an overview about the differences between industries would be relative wage developments, namely wages paid by a certain industry relative to wage developments in general. Wages in industries producing goods mainly for civilian consumption, such as textiles, leather, rubber, beverages, food, and tobacco grew proportionally less, while wages in war-related industries grew at a disproportionate pace.^[33]

Graph 2: Relative Wages in Germany by Industry, Compared with the National Average, 1914-1918^[34]

Similar information has been obtained by Jorg Baten and Rainer Schulz^[35], who trace corporate real profits between 1913 and 1917. Their results suggest that compared with pre-war levels, profits in war-relevant industries increased by 27 percent until 1916 and 14 percent until 1917. In contrast to Albrecht Ritschl's^[36] findings, these authors find that that medium war-relevant industries declined by 59 percent while "civilian" industries' profits declined by only 49 percent.^[37] War-related industries, such as chemicals, metals, and machinery experienced significant increases in profits, while the profits in food (including tobacco) and textile industries fell by almost half compared to 1913. In turn, inflation was rampant (see Graph 3).

Graph 3: Estimations of (Official) Food Inflation in Germany, 1914 to 1918^[38]

On 25 January 1915, Germany instituted a comprehensive state-directed system of supply and distribution of food. The *Bundesrat* declared a state monopoly on all grains in the country. It ordered all existing stores of wheat, rye and other cereals to be managed by the Imperial Grain Corporation. Only small amounts of grain less than 100 kilograms and seed grain could remain in private possession. By 5 February 1915, all owners of grain were obligated to declare and surrender their stocks to the local authorities. Anyone who declined or was found guilty of making false and incomplete declarations would be punished by six month imprisonment or a fine of 1,500 marks.

The government promised to pay a fixed price for all expropriated grain. All mills were required to grind the grain which the corporation would send to them. The flour, which was property of the corporation, would be delivered to municipal authorities, army administrations and navy administration and to them only. The delivery price of flour was fixed by the administrative authority in the district in which the mill was located with consideration for the original price plus the price for grinding. The mill was obligated to deliver the flour to the destinations determined by the authorities. The regulation of the allocation of grain was invested to the Imperial Distribution Center (*Reichsverteilungsstelle*), which was authorized to distribute grain to local municipalities according to their population until the next harvest. The free trade of grain and flour was prohibited. Bread rationing was introduced in Berlin in January 1915 and extended to the rest of the country in June.^[39] A ration card for bread allowed two kilograms of bread per person per week.^[40] Subsequently rationing schemes were introduced for most foods. In 1916 the weekly entitlement per person was approximately as follows: 3.5 kilograms of potatoes, 160-220 grams of flour, 100-250 grams of meat, sixty to seventy-five grams of fats, seven liters of milk, 200 grams of sugar, 270 grams of spread containing sugar, one egg, and 120 grams of fish.^[41]

Several pieces of evidence suggest that rations only accounted for a share of the food consumed during the period the rationing system was implemented. First, depending on individual characteristics and work load, calories provided via the rationing system provided approximately 49 to 74 percent of the energy requirements.^[42] Black markets were an important source for additional foodstuffs and the remaining area where market mechanisms were able to coordinate demand and supply. Table 2 provides evidence from the city of Essen. Price developments for a set of commodities suggest that both the official and unofficial food prices increased significantly from 1916 to 1918. Also, for each year the ratio of unofficial to official food prices is provided. This ratio suggests that generally unofficial prices increased more than the official prices limited by price ceilings, creating incentives for farmers to market their products illegally via black markets instead of providing them through the official channels. Rural areas within proximity of farms were better off as consumers in rural areas had better and cheaper access to food. Regions along major waterways had to cope with restricted importation possibilities.^[43]

Product	Unit	1916			1917			1918		
		official	unofficial	ratio	official	unofficial	ratio	official	unofficial	ratio
Wheat flour	kg	0.57	5.35	9.38	0.58	8.02	13.82	0.65	11.76	18.09
Potatoes	kg	0.14	0.64	4.58	0.22	0.96	4.37	0.28	1.82	6.49
Beef	kg	5.12	10.69	2.09	4.75	17.10	3.60	4.67	21.38	4.58
Margarine	kg	4.03	10.69	2.65	4.00	27.79	6.95	4.00	27.79	6.95
Sugar	kg	0.64	2.67	4.18	0.68	9.62	14.15	0.90	16.04	17.82
Eggs	apiece	0.30	0.96	3.21	0.36	3.74	10.39	0.42	5.35	12.73
Milk	Liter	0.31	1.07	3.45	0.41	2.14	5.21	0.53	5.35	10.09

Table 2: Development of Official and Unofficial Food Prices in the City of Essen, 1916-18 (in Mark)^[44]

Graph 4 shows real wages in Germany during the period 1900-1918. Nominal wages and costs of living in Germany developed in parallel prior to 1914, resulting in a lateral real wage trend over this period. As a result of the labor shortages and the need to compensate laborers for food inflation, nominal wages increased during the course of the war. Gross salaries increased for several sectors, with transport, metal and chemical industries being the most lucrative for laborers.^[45] However, despite the general upward trend in nominal wages, purchasing power, measured by real wages, did not increase but rather decreased constantly due to disproportional food inflation.

Graph 4: Real Wages in Germany, 1900-1918^[46]

Economic Resources and the Outcome of the War

Ultimately, the First World War was determined by economic resources. As Niall Ferguson has pointed out, Germany did not necessarily mismanage all of its resources and thus lose the war.^[47] On the contrary; the Allies had a massive advantage in terms of total GDP, population, military personnel, armaments production, and food supply throughout the conflict; a situation that became even more pronounced when the United States finally entered the war on their side. In November 1914, the Allies had 793 million people under their control

compared to 151 million for the Central Powers. By the end of the war, the Allies had a total population of 1.272 billion (70 percent of world total), whereas the Central Powers' total was still under 200 million. Moreover, in terms of aggregate GDP, the Allies possessed a combined GDP of 1.761 billion at the end of the war, which was far superior to the less than 400 billion the Central Powers had in 1915.^[48] This advantage became even more disproportionate as the war went on.^[49]

The Allied great powers were ultimately able to mobilize their resources more effectively during the war. Even though the Central Powers initially did quite well with the limited resources they had, the Allies were able to mobilize their far superior resources better both on the home front and at the front lines. Their more democratic institutions supported the demands of the total war effort better than their authoritarian counterparts. Therefore, the richer countries mobilized more men and materiel for the war, and their war industries proved capable of adapting to the needs of the war machine. Moreover, having a large peasant population turned out to be a hindrance for the production of food under wartime constraints. As we have shown, in poorer countries, and even in affluent Germany, mobilization efforts siphoned off resources from agriculture and the farmers preferred to hoard food rather than sell it for low prices. As Avner Offer has argued, food (or the lack of it) played a crucial part in Germany's collapse.^[50] As seen in Table 3, Germany's problem was not so much that it was unable to mobilize resources for the war, but the fact that its main ally, Austria-Hungary, was a poor nation with limited resources and was plagued by the inability to mobilize effectively. The collective mobilization of resources by the Allies was too big an obstacle for Germany to overcome.

Year and Variable	Germany	UK	France	Austria-Hungary	Russia	USA
GDP per Capita						
1914	3,059	4.927	3,236	2,876	1.488*	4,799
1918	2,983	5.459	2,396	2,555	..	5,659
Military Burden						
1914	14.90	14.15	10.36	30.2	..	0.90
1918	38.80	27.00	59.39	17.2*	..	8.05
Defense Share						
1914	54.86	64.62	60.10	47.97
1918	51.61	54.89	77.65	48.50
Military Personnel (% of Population)						
1914	1.30	1.16	1.99	1.60	0.78	0.17
1918	13.70	9.10	13.59	1.54	6.12*	2.81

Table 3: Economic Capabilities and Military Mobilization of the Great Powers, in 1914 and 1918^[51]

* In the absences of data, prior year's figure used to illustrate level of mobilization. Military burden = military expenditures of GDP, percentage. Defense share = military expenditures of central/federal government budget, percentage

One dimension that illustrates the importance of resources in the war concerns the overall magnitude of the conflict. It has been estimated that about 9 million combatants and 12 million civilians died during the so-called Great War, with substantial property damage especially in France, Belgium, and Poland. On the low end, based on estimates by Rondo Cameron and Larry Neal, the direct financial losses arising from the Great War were

180-230 billion (1914 U.S. dollars), whereas the indirect losses of property and capital rose to over 150 billion dollars.^[52] According to some more recent estimates, the total economic losses arising from the war may have been as high as 525 billion 1914 US dollars.^[53] Countries that lost the most lives were those most directly involved in the fighting. For example, smaller nations like Serbia-Montenegro and Romania lost 5.7 and 3.3 percent of their overall population in the conflict. Turkey, France, and Germany also lost more than three percent of their population. The most battle deaths in absolute numbers were incurred by Russia, 1.8 million in total. Allied losses were more substantial than those by the Central Powers, 5.4 million compared to four million.

Therefore, economic processes, ability to sustain losses, and mobilization had a decisive effect on the war outcomes. It was the economic disorganization in Russia, Austria-Hungary, and Germany that ultimately brought these states down. The war-induced economic disorganization manifested itself in major disruptions of provision supply and subsistence crises. In the "interior" nations that were placed under conditions of economic blockade (i.e., Russia, Austria-Hungary and Germany) living conditions were worse than in "exterior" nations that maintained free access to the world economy and imports from overseas (Britain and France). In these countries economic protests turned at the final stage of the war into the mass movements against the war and the existing political regimes. Under the impact of worsening economic and social conditions large segments of the ruling classes and the army had withdrawn their support from the rulers and had taken the side of the opposition.

Russia was the first European power to collapse during the war. Yet, there was little specifically Russian in the process of socio-economic disintegration that caused this breakdown. For two years of the war, Russia's economic system was able to cope relatively well with the numerous problems and bottlenecks in economic mobilization.^[54] During the winter 1916-1917, however, the provision supply system fell apart. It broke down because the government failed to institute an effective mechanism of mobilization and allocation of agricultural resources. In Petrograd, like in other big cities, the dismal situation with bread could perhaps have been alleviated temporarily had the authorities established the system of rationing of food. However, the supply of bread diminished so rapidly that the authorities did not have enough time to take necessary measures. The dire social conditions fueled strikes, food riots, and protests in Petrograd and other big cities. At the end of February in 1917, mass demonstrations flooded the capital. Soldiers of the Petrograd garrison joined the insurgents. When the regular army had refused to suppress the rebellion, the Tsarist autocracy collapsed. The [Provisional Government](#) made of the members of the State [Duma](#) proved unable to stop the war because of Russia's obligations before the Allies. Nor could it resolve the complex economic problems of the country. Eventually, in [October 1917 it was overthrown by the Bolsheviks](#), a radical socialist party which just a year before was virtually unknown to most Russians. The Bolshevik dictatorship had to pass a critical test of survival in the devastated country amidst civil war, foreign isolation, and a permanent fear of aggression and restoration of the old regime.^[55]

Like its major protagonist, Russia, Germany was placed under conditions of economic blockade which severely constrained its capacity of drawing resources, including provisions, from overseas.^[56] Domestic opportunities for increasing production and compensating for the loss of imports were limited. Like other nations under blockade, a massive subsistence crisis struck German cities during the winter 1916-17. By that time bread was already in short supply. The food crisis was exacerbated by a very poor harvest of potatoes which traditionally made up a large portion of the German diet, particularly among working class population. The quality of most food was extremely poor. Various *Ersatzprodukte* (substitute products) replaced the habitual diet. *Ersatz* bread (*K-brot*) made with large addition of potato flour became a staple food. Coffee was made of tree bark; pepper

contained 85 percent ash; milk and beer were diluted by water. By the end of the war there were about 11,000 ersatz foods.^[57]

The key difference separating the German *Kaiserreich* from Russia was that the German military-bureaucratic state was more administratively effective than the corrupt and inactive Russian autocracy. By the end of the war, the military-bureaucratic dictatorship of Hindenburg and Ludendorff succeeded in suppressing and subjugating the working class and marginalizing political opposition. Therefore, the breakdown of the state could only be possible with a breakup of the military institution. German military defeats in the Western front in the summer and autumn of 1918 were the crucial events that triggered the processes of disintegration. Once the authority of the [Supreme High Command](#) was undermined, social protests became uncontrollable. The anti-war uprising began in the Navy, but soon it was supported by workers and the impoverished, war-weary civilian population. Given the scale of the [November uprising](#) and the predicament of the army, military suppression was ruled out. Once the monarch lost support of the army, he was forced to resign. The provisional government, like that in Russia of 1917, confronted the formidable political challenge from the radical left. However, the total collapse of the state, like one in Russia, was prevented by an agreement between the new government and the military command. In the early 1919, by relying on the assistance of [paramilitary formations](#) (the *Freikorps*), [Friedrich Ebert's \(1871-1925\)](#) government was able to suppress the radical revolutionary forces, recentralize the German state, adopt a new Constitution, and lay the institutional foundations for a new economic and political system.^[58]

Conclusion

The ability to mobilize effectively for prolonged conflict and being able to command substantial resources were the key factors in winning the war. Thus, the Allies had the edge that ultimately gave them the victory. In terms of the aftermath, the individual participants of the First World War devised different solutions to pay for the enormous burden of war. Germany and France were less willing to tax their populations to pay for the war effort. Britain, however, funded the conflict by using a variety of different taxes, in addition to other means (namely, borrowing). The war was a huge shock to the Western economies in particular, since it shattered the international trading system and the Gold Standard. Inflation was also a big problem, and most of the participants imposed price and wage controls, as well as rationing systems.^[59]

In order to maximize war production, once it became apparent that the war would last a lot longer than the generals had initially assumed, most nations brought businessmen into government service, usually to oversee supply chains and mobilization plans. The kind of corporatism that saw its inception in the 1920s with [Benito Mussolini's \(1883-1945\)](#) Italy was introduced already during the war, although in a more limited form, and big business gained a foothold in government acquisitions for some time to come. Therefore this was the beginning of the so-called Military-Industrial Complex in its modern form.^[60] The First World War formed a watershed for European societies and military establishments, in more ways than one, at least until the Second World War.

Matthias Blum, Queen's University Belfast

Jari Eloranta, Appalachian State University and University of Jyväskylä

Pavel Osinsky, Appalachian State University

Notes

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