Discussion paper

Navigating through torpedo attacks and enemy raiders: Merchant shipping and freight rates during World War I

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Navigating through torpedo attacks and enemy raiders:
Merchant shipping and freight rates during World War I [*]

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Abstract

During World War I ocean freight rates rose to extraordinary levels. Using a new monthly dataset it is shown that freight rates can be well explained by economic activity, commodity prices, war risk and world tonnage in the period 1912 to 1916. In the first two years of the war part of the British merchant fleet was directly controlled by the Government but neutral shipping was basically free to operate as normal. In this period neutral shipping accounted for about one third of British imports. In the final two years of the war a much stricter regime of freight control was introduced that resulted in the withdrawal of a large proportion of neutral shipowners from British and Allied trade. Together with the mounting losses of tonnage due to the German submarine campaign this created an acute shortage of carrying capacity and reduced imports. It is argued that the policy of freight control may have rested on a misconception of the role of freight rates as a source of the high wartime inflation.

1 Introduction

The seaborne trade was of vital importance to Britain during the two world wars of the twentieth century as 'both British stomachs and British factories needed outside supply to keep functioning'.[1] Two main problems facing the British authorities with respect to providing the essential foreign goods to consumers and producers during World War I were, on the one hand, finding the money to buy and, on the other, finding the ships to carry.[2] Prior to America's entry into the war in April 1917 the problem of finance was a major concern, but thereafter it was no longer so acute. In contrast, there was no real shipping problem during the first two years of the war, but this was radically changed in the winter of 1916-1917, when the German submarine campaign was intensified and Allied and neutral tonnage losses mounted.

In the autumn of 1916 the volume of imports was still about the same as in the prewar months of 1914. By September 1916 36 per cent of the ocean-going steamers under the British flag had been requisitioned by the Government. They were used mostly in naval or military employment, but some vessels were carrying goods on Government account, such as sugar and munitions. A system of ship licensing and the power to direct steamers to certain trades ensured the supply of the most basic goods, and the decision to withdraw British ships from the trade between ports abroad increased the tonnage available for British imports to some extent.[3] But the demand for shipping created by the war itself entailed a serious deficiency of carrying capacity of imports in British ships. This made the foreign trade of Britain critically dependent on neutral shipping, and in the first part of the war nearly one third was carried in foreign ships, which was close to the prewar proportion.[4]

Apart from insufficient carrying capacity, the most serious shipping problem, as seen by the public opinion as well as the Government, was the steeply rising freight rates. The surging consumer prices were blamed on the enormous increase in freights, and much public anger was directed at the huge profits of shipowners. In the first two years of the war British ships that were not requisitioned as well as neutral ships were basically allowed to earn market freights. This situation was gradually modified during the course of 1916. In the North Atlantic grain trade the discrepancy between the rate allowed to British ships by the Government and the market rates widened through the year. Limitation rates of freight were introduced in the coal export trade to France in the summer of 1916, with considerably lower rates fixed for British than for foreign vessels. By the end of 1916 the Spanish ore trade has also ceased to operate at market conditions.

The control measures were greatly extended under the new Government led by Lloyd George established in December 1916. The control of freights and shipping with a view to combating inflation and ensuring the supply of goods became the key principle underlying shipping policy. Universal requisitioning of all British ships was soon introduced. Chartering of neutral vessels

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[1] O'Brien (2015, p. 109).

[2] Salter (1921, pp. 2-3).

[3] Fayle (1927, pp. 162-169).

[4] See Fayle (1923, pp. 272-282) for a discussion of the role of neutral shipping in British trade. The tonnage of foreign vessels with cargoes entered inward to the United Kingdom in 1913 was 33.1 per cent of the total according to data in British Parliamentary Papers (1914).

was subject to licensing from the Inter-Allied Chartering Committee, which restricted freight rates in the American and Mediterranean trades.

These measures may have failed to bring about the desired effects for several reasons. First, they rested on the assumption that freight rates were the main driver of the rampant inflation of commodity prices, which is a proposition that needs to be substantially moderated. Furthermore, the control measures may have aggravated the most important source of the shipping problems – the acute shortage of carrying capacity. Whether a centralized management of all ships could ensure a more efficient use of the merchant fleet than private ownership under the circumstances of war is a complex issue which the industry itself would hardly concur with, but we do not endeavour a full assessment of this question here. What is quite certain, however, are the negative consequences of the control measures on the participation of neutral shipping in the British foreign trade. There was a fairly massive withdrawal of neutral shipping in the last two years of the war, which exacerbated the tonnage problem to a considerable extent. By 1918 the volume of imports had fallen to 64 per cent of the 1913 level.[5] The intensified German submarine offensive beginning in early 1917 undoubtedly affected this development, but, as will be argued below, it is probable that the control measures contributed in a significant way too.

A critical reassessment of the World War I shipping markets and shipping policy may be warranted for several reasons. The factual basis of the course of freight rates and its determinants is rather incomplete – we know that freight rates increased very much, but there is little systematic evidence on the timing and the magnitude of the increase and how it affected the various export and import trade routes.[6] With regard to the effects of political measures opinions diverge. Some writers have taken a favourable view of the state control system in general and saw it as a model of economic policy also in peacetime. Tawney (1941, p. 24), for example, warned against the decision to 'consign war-controls wholesale to indiscriminate oblivion.' Others, most comprehensively documented and eloquently phrased by Fayle (1923, 1927) have spelled out the myriad of problems this policy entailed, arguing that other measures would have been more beneficial.[7]

In the prewar years and during the relatively liberal shipping policy through 1916 there was little interference with freight rates paid to neutral shipping, and some British vessels were also allowed to charter freely after the war broke out. In 1917 and 1918 state control of freight rates was pervasive. It is shown here that freight rates in the years 1912 to 1916 were determined by trade flows, prices, risk factors and the supply of tonnage. Using this model to predict the course of freight rates during the final two years of the war it turns out that average freight rates would not have been significantly higher than the actual rates under a less controlled regime. An important consequence of a more liberal shipping policy towards neutral shipping would

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[5]Fayle (1927, p. 477).

[6]The standard freight rate index covering this period is the annual Isserlis (1938) index, which has its obvious shortcomings. See for example Yasuba (1978), Armstrong (1998) and Mohammed and Williamson (2004). The latter source gives some annual regional index figures for various trade routes, but the material is incomplete for the World War I years.

[7]See also Smith (1919), Salter (1921), Hurwitz (1949), Ashworth (1960), Aldcroft (1961-1962) and Hardach (1987) for discussions of various aspects of these matters. The viewpoints of the British shipping industry are well represented in the weekly journal *Fairplay.*

have been to increase the carrying capacity available for British imports. In this regard the control regime must be deemed as a failure. The Lloyd George Government gave in to popular demands to combat 'the prodigious profits made out of freights' but this policy deprived British consumers and producers of imports that would have been highly appreciated at the time.[8]

2   A bird's eye view of freight rates 1912-1920

New monthly freight rate indices have been constructed for 13 outward coal trade routes from Britain and 7 inward trade routes, beginning with January 1912 and ending in December 1920. These are tabulated in the appendix, in which a more detailed description of trade routes and weighting procedures are given. Freight rates pertaining to UK imports and coal exports represent the bulk of the sample underlying these calculations. The United Kingdom was the dominant hub of world shipping in these years, which is reflected in the traditional approach taken by previous studies of freight rates in this period. However, the term 'inward trade routes' should be given a wider interpretation in this context, as our sample does not draw on British trade only but also reflects trade between other countries, including for example grain from North America and River Plate to France, Italy and other European countries, coal from Virginia to South America and Italy, rice and seeds from Asia to the Mediterranean as well as salt from the Red Sea to India. The inclusion of such cross trades should make the indices fairly representative of the course of global freight rates. The freight rate rate indices were computed as a repeat sailings index, which is a type of index extensively applied to price indices in the housing market.[9]

The sample comprises 65,236 freight rate observations, nearly all from reported fixtures (charter parties concluded for a single voyage) in the shipping markets in the years 1912 to 1920.[10] Of these 35,171 are coal freights (including a few shipments of iron and clay) from Britain. With the exception of freights from Australia and the Pacific seaboard of America, the sample is largely dominated by steam ship freights. However, it is a curious fact that sailing ships once again began to play a modest role in the shipment of coal in the final years of WWI and its immediate aftermath, primarily in the trade from North America to River Plate, but also occasionally in the coal trade between Britain and France. This was no doubt due to the extreme deficiency of carrying capacity in these years, but to some extent it may also have been due to the fact that freight rate limitations were less binding for these ships.

The aggregate inward and outward freight rate indices are shown in Figure 1 together with annual values of the Isserlis (1938) index, recalculated to yield a 1913 value of 100. The huge scale of the wartime freight rate increase is easily seen here. At the peaks late in 1917 or early 1918 the inward freight rate level had increased by a factor of 10 and the outward by a factor of 12 relative to the average level in 1913. When the Great War ended, freight rates collapsed

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[8]Lloyd George made this statement when he became prime minister in December 1916. The quotation is taken from Salter (1921, p. 110).

[9]The method was first launched by Bailey et al. (1963). The principles of this index are more fully discussed in Shiller (1993). For applications to ocean freight rates, see Klovland (2009, 2016).

[10]The exception is the North Atlantic liner trade where published market rates have been used.

to a level about one half the peak wartime level, but rose somewhat again during the postwar international restocking boom of 1919-1920.
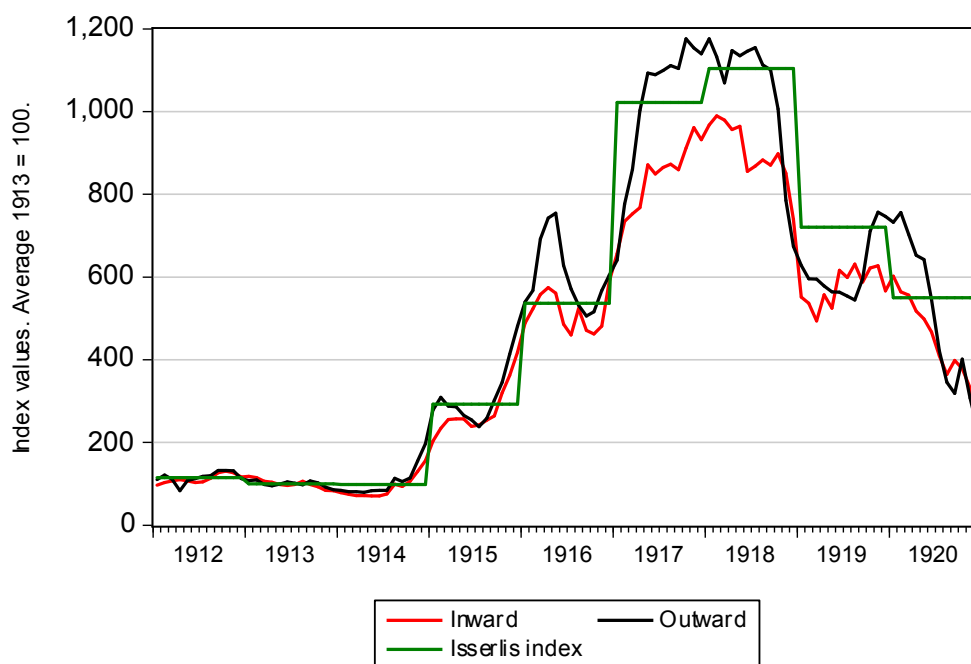

Figure 1: *Aggregate nominal freight rate indices January 1912–December 1920.*

The wartime increase in freights shown here is broadly consistent with the combined inward and outward annual freight rate index presented by Isserlis (1938). The peak of the Isserlis index in 1918 is about 11 times the 1913 figure, which is within the range of the new inward and outward indices shown in Figure 1. However, the new monthly indices give a far more detailed view of the great fluctuations in freights than the annual Isserlis index, in particular in the last two years of the war and in the immediate aftermath of the war. The 20 new subindices derived here also make it possible to trace out in detail the differences between trade routes, which turn out to be substantial. The most extreme cases occurred late in the war; at one stage, in November 1917, coal freights to Scandinavia had increased by a factor of 78 whereas coal freights to French Mediterranean and Italian ports, which were subject to strict direct and indirect control measures, were merely six times the 1913 level. After 1916, when freight rate controls became extensive in most trades, the quotations used here are for neutral ships only in the case of British trade. As discussed in more detail below, British and Allied ships were forced to accept significantly lower rates than neutral ships during the war. In order to fully understand what happened to ocean freight rates during the war it is therefore necessary to go beyond the aggregate figures and look at the various inward and outward trade routes.

It is also essential to have a finer time grid than annual observations in order to analyze the underlying causes of the freight rate movements. As is evident from the new monthly indices

in Figure 1 the rate of increase in freight rates was far from smooth throughout the war, as is inevitably the impression one gets from annual indices. There were periods of steeply rising rates, but also shorter spells of actually falling nominal freight rates, notably in the middle of 1915 and in 1916. These features may be helpful in tracing out the factors that were the most important sources of the wartime freight rate expansion. Before entering into a more detailed review of the various phases of the wartime freight rate narrative we need to review the most likely candidates of these freight rate drivers.

3   The sources of the wartime freight rate fluctuations

As in every other market, prices (freight rates) were of course affected by both ordinary demand and supply factors, such as the pace of international trade and the world tonnage of merchant shipping. But just as important were the factors created by the war. War risk factors fundamentally altered the normal business of ocean shipping, port congestions due to military activity and reduced manning greatly reduced the effectiveness of the merchant fleet and economic blockade changed the direction of trade in many regions. In addition, the various control measures undertaken by the authorities greatly complicate the analysis of freight rate determination. This concerns in particular the years 1917 and 1918, but it should be noted that most of these controls were in force in the UK until the summer of 1919 and were not totally abolished until the middle of 1920. Some of the key factors that are possible to quantify are reviewed below.

3.1   War risks and tonnage lost by enemy action

The transition from peace to a wartime economy was quite different for Britain and Germany with regard to foreign trade. Germany's seaborne trade was severely restricted by the contraband filter applied by the Allied examination service and regulations imposed by neutral countries. Except for the Baltic and the Black Sea the British Navy in general controlled the oceans, but it could not prevent German cruisers from sinking a number of Allied and neutral steamers in the Atlantic as well as in the Indian Ocean and the Pacific. The tonnage lost was not large, about 319,000 gross tons during the 5 months of war in 1914, which was about 0.7 per cent of the world's sea-going merchant fleet in the middle of 1914. A good indicator of the war risk is the insurance premium on cargoes for specific waters charged by *Varekrigsforsikring*, a Norwegian company dealing with marine insurance of goods against war risk. These rates were frequently adjusted in accordance with perceived risks of enemy actions.[11]

Tonnage lost and cargo insurance rates for selected routes are shown in Figure 2. During 1914 the insurance premium was typically 1.5 to 2 per cent for most trade routes, but initially up to 3 per cent for the East Indian Sea, where German commerce raiders were particularly active. By the end of the year the problem of German surface raiders had largely been dealt

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[11]A detailed survey of the war years can be found in Norsk Varekrigsforsikring (1931). The British system of cargo insurance operated with a fixed premium for all waters, see Fayle (1920, pp. 30-45). These rates were kept rather stable for extended periods of time within a band from 1.05 to 5.25 per cent, which does not adequately reflect fluctuations of war risk. There was also a British system for hull insurance, with a fixed insurance premium of 1.25 per cent.
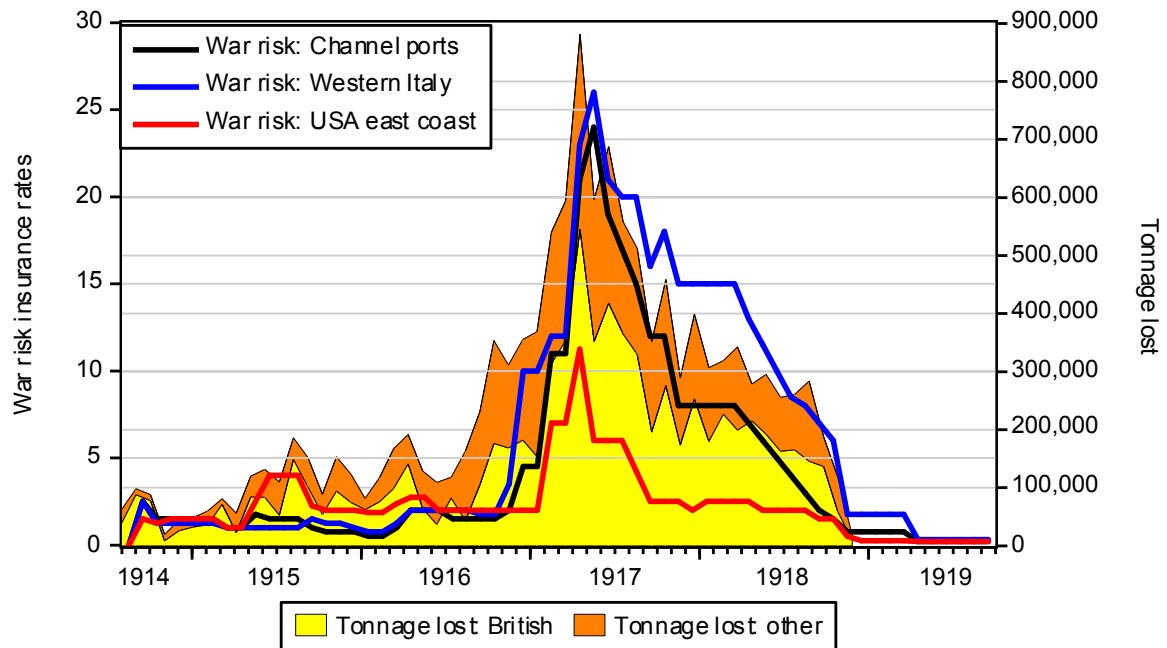
Figure 2: *Tonnage lost and war risk insurance rates, August 1914–September 1919.*

with, but the situation was nevertheless somewhat aggravated in 1915 when the activities of German submarines increased. Homeward bound shipments from the eastern seaboard of North America were hardest hit. The sinking of the large Cunard liner *Lusitania* bound from New York to London off the southern coast of Ireland early in May 1915 marks the beginning of a period of increased losses and somewhat higher insurance rates.[12]

From the middle of 1916, however, losses due to enemy action surged, increasing month by month until an all time peak in April 1917. Germany declared a policy of 'unrestricted submarine warfare' in February 1917, which had a devastating effect on merchant shipping, sinking about 1.5 to 2 per cent of the world's tonnage each month in the winter and spring of that year. As is seen from Figure 2 insurance rates soared. The Mediterranean and the waters around the United Kingdom were particularly affected. Here, the insurance rates increased to about 20 per cent and up to 26 per cent in Italian waters. The introduction and improvements in the convoy system brought some relief during the second half of 1917, but losses were considerable throughout the war until October 1918.

These events may have increased freight rates in at least two ways. The increased war risk increased voyage costs directly and tonnage losses reduced the supply of tonnage.

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[12]These events are reviewed by Fayle (1920, 1923, 1927).

3.2 The merchant tonnage of the world

Figure 3 shows monthly estimates of the world's seagoing steam tonnage 1912-1920.[13] After many meagre years the shipping boom of 1912 had spurred shipbuilding activity. In the years prior to World War I the world's merchant tonnage increased by 5 to 6 per cent per year. When the war broke out German and Austrian vessels in Allied ports were seized, as were Allied vessels in enemy waters, some were taken as prizes, and those lying in neutral ports were in many cases detained. The seaborne trade of Germany was practically wiped out and what remained of her merchant fleet was confined to the Baltic and the Black Sea. The world's effective tonnage, as seen from the Allied countries, was consequently reduced by about 15 per cent, from 43,400 to 37,100 thousand gross tons. On the other hand the smaller merchant fleet was to serve a diminished world market. There thus was a reduction of both demand for and supply of tonnage due to the war, but there was probably some net reduction in the carrying capacity of the world in relation to the demand for sea transport, as suggested by Salter (1921, p. 46).
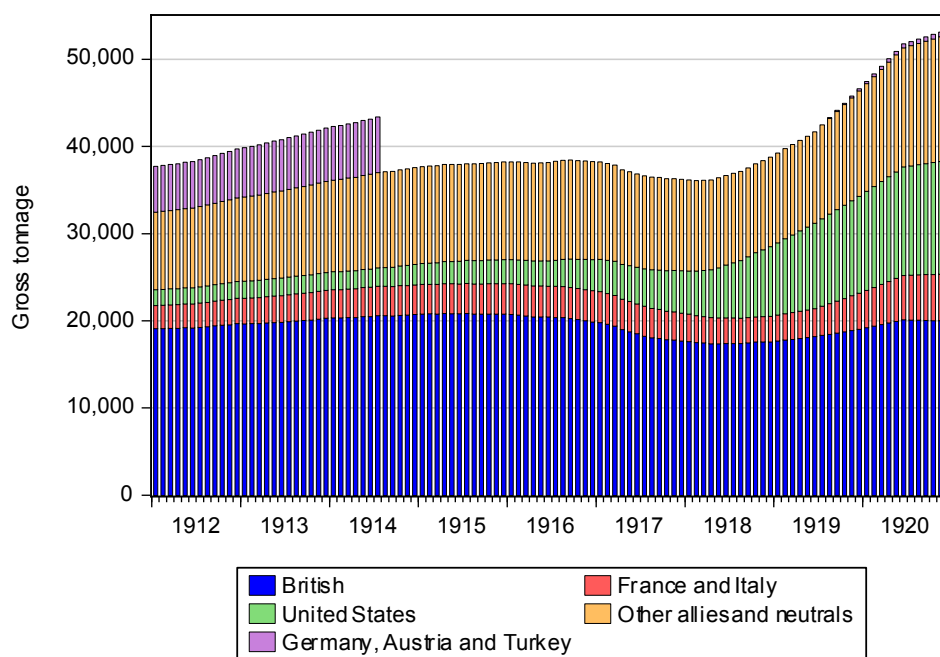
Figure 3: *Gross tonnage of the world's sea-going merchant fleet, January 1912–December 1920, excluding Axis countries during WWI.*

The war losses of merchant tonnage under the Allied and neutral flags increased from a monthly average of 65,00 gross tons in 1914 to 109,000 tons in 1915, and further to 192,000 tons

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[13]The time series on tonnage were constructed by using annual benchmark figures from June each year from Lloyds' Register of Shipping (except 1917 and 1918, which were not published) and some additional data from national ship registers, combined with monthly data on tonnage lost during the war. The data do not include vessels trading on the Great Lakes of North America. See notes to Table A2 in the data appendix for further details.

in 1916 (Figure 2). The launch of new vessels managed to keep pace with the loss rate through 1915, with a small addition to the fleet, and in 1916 the tonnage at the beginning and the end of the year was nearly the same. With the commencement of the escalated submarine campaign in February 1917, however, monthly losses increased to 506,000 tons on average. The tonnage of the world shrank by 5 per cent in 1917, but recovered to a little above the 1916 figure in the following year. In the final phase of the war shipbuilding activity increased, and it gained further momentum after the war, in particular in the United States, which added significantly to the world tonnage as shown in Figure 3. From the end of WWI to December 1920 world tonnage increased by 39 per cent.

3.3 The demand for sea transport

The volume of world trade is conventionally considered as the chief determinant of the demand for sea transport. A satisfactory monthly measure of global economic activity is difficult to obtain for this period, but a proxy may be the industrial production index for the United States, which is shown in Figure 4. This index picks up the business cycle expansion in 1915 and 1916, which was a salient feature of world markets for many commodities. Iron, coal, chemicals, grain and foodstuffs were in great demand and created a strong demand for sea transport.

Our freight rate data are mainly, but not exclusively, derived from the transport of goods to and from Britain; hence, the volume of British foreign trade is of particular importance. The demand effect with regard to shipping capacity is best measured as ton miles (one ton transported one mile).[14] A monthly measure of ton miles relating to 143 British import goods has been derived for this purpose (see appendix). This time series is shown in Figure 4 together with a similar time series of coal exports from the United Kingdom. These indices cover a large part of the actual seaborne transport to and from Britain.[15]

It will appear from Figure 4 that in terms of ton miles there was sufficient carrying capacity to maintain the prewar level of imports during the first two years of war. The number of ton miles required for imports were relatively high around the business cycle peak late in 1912 and early in 1913, but declined somewhat in the second half of 1913 and in the first half of 1914. From the late autumn of 1914 it rose again and stayed well above the 1913 figures until the autumn of 1915, after which it fell back to about the same level as in the first half of 1914.[16] In order to get a correct view of the carrying capacity required it is essential to look at ton miles rather than the number of tons of goods imported, as is conventionally done.[17] This derives from the fact that the war entailed a radical redirection of trade flows for some of the main import goods to the United Kingdom. Grain could no longer be imported from the Baltic and

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[14]Stopford (1997, p. 115).

[15]The sample of import goods comprises nearly all bulky commodities that were imported. Coal was by far the dominant export good in terms of weight. Manufactures of iron were the second most important item but only accounted for about 7 per cent of the weight of coal exports. Most of the light goods, for example textiles, and goods of high value per ton were carried by regular liners. Our freight rate data include liner freights on bulky goods only, chiefly grain and provisions.

[16]Certain items that were imported on Government account, notably munitions and fuel oil, were not recorded in the trade returns between 1915 and the summer of 1917, see Fayle (1924, p. 477). An adjustment to import figures for fuel oil was made here, see data appendix for details.

[17]See for example the data appendix in Fayle (1920).

the Black Sea, implying an increased reliance on supplies from North America, River Plate, India and Australia. Cane sugar from Cuba and Java were substituted for beet sugar from the Continent. The fact that longer voyages required more tonnage is reflected in our estimate of ton miles of imports in 1915, which was 4.2 per cent higher than in 1913. In contrast there is a decrease of 16.7 per cent relative to 1913 when only the weight of cargoes is used to measure the volume of imports.[18] The same discrepancy continued into 1916. This shows the importance of taking into account the increased demand for tonnage due to the redirection of trade flows caused by the war - a factor that has been duly noted in the previous literature but which has not been quantified earlier.
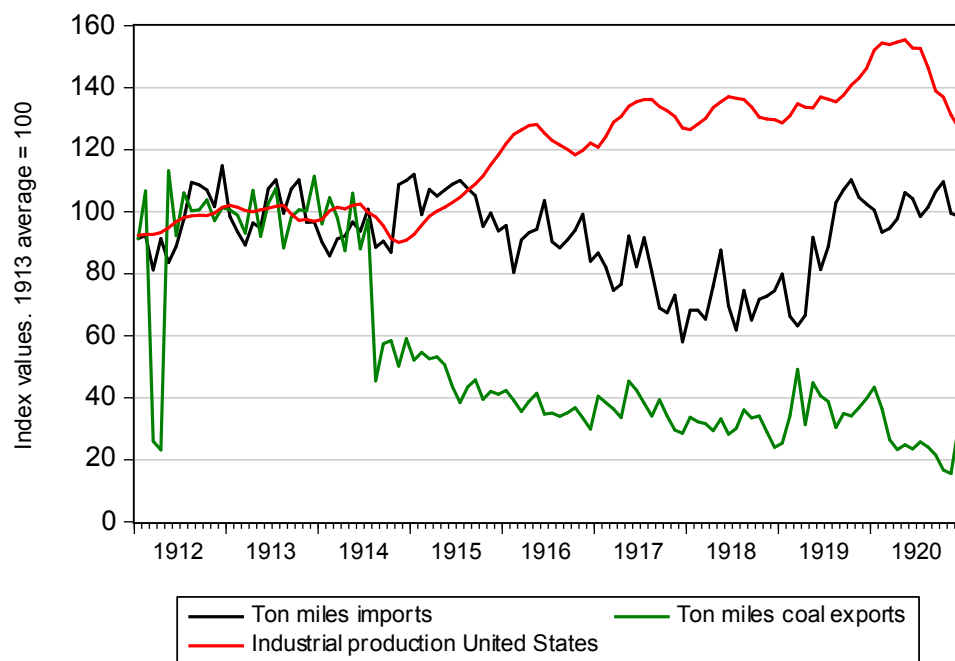
Figure 4: *Indices of ton-miles in UK foreign trade and industrial production in the United States, January 1912–December 1920.*

The coal export trade during the war was characterized by two key factors: a falling output of coal and a controlled redirection of exports in favour of sending increased volumes to France and Italy.[19] Smaller export volumes and the shorter voyages both contributed to the marked fall in ton miles related to coal exports shown in Figure 4. There was consequently much less coal available for exports to other countries, in particular the important markets in South America. This implied that many long-distance voyages had to sail from Britain in ballast rather than having a remunerative outward coal cargo, which increased the total round trip cost of bringing goods to Britain and northern Europe from other continents. We thus have the slightly puzzling

[18]The decline in import volume is of the same magnitude as in the slightly more comprehensive annual data in Fayle (1924, p. 477).
[19]Coal output fell from 287.4 million tons in 1913 to 227.7 million tons in 1918 according to Mitchell and Deane (1971, p. 116).

fact that the increased shipping space needed for imports and the reduction of capacity required for coal exports both tended to increase inward freight rates during the war.

The resilience of the import trade in the first two years of the war may be a bit surprising in view of wartime disturbances. Figure 4 lends some support to the view expounded by Fayle (1920, p. 383), who claimed that there was a striking contrast between the Central Empires on one hand, which had to rely upon 'an inadequate supply of neutral shipping for the export of their own products or the fulfilment of their requirements from abroad' and Britain and her Allies on the other hand, for which 'every sea route in the world, with the exception of those from Black Sea and Baltic ports was open for the distribution of British products or the supply of British needs.' Our data show that this is true with regard to shipping capacity, but some modifications are needed regarding the volume of imports measured in real terms.[20] In order to achieve a largely uninterrupted supply of goods Britain was dependent on foreign shipping, which in 1913 had accounted for 33 per cent of the tonnage of steam ships entered with cargoes. In 1916 this ratio was still well maintained, having fallen slightly to 30 per cent.

3.4 Cost factors

It is likely that nominal freight rates responded to changes in cost factors related to operating the fleet and investment in new ships. An important cost factor was the price of bunker coal, represented in Figure 5 by a price series of best unscreened Durham bunkers.[21] Also shown are *The Economist's* general price indices of minerals (also comprising metals) and sundry raw materials such as timber, petroleum, leather and rubber.

3.5 Government control of shipping

The British Government had been empowered to requisition ships for naval and military purposes already in the first week of the war. Requisition of merchant shipping was soon extended to the carriage of commercial cargoes on Government account. From October 1914 these measures were carried out as time charters to undertake one or several voyages, with the possibility of a subsequent temporary release. The hire paid to the shipowner was stipulated at rates known as Blue Book Rates, which were held fixed throughout the war, except for a small increase effective from January 1915. In the autumn of 1914 these terms were reasonably close to market rates, but very soon they fell increasingly short of the steeply rising freight rates in the market.[22] In the first two years of the war requisitions were mostly used in trades in which the Government had monopolized imports, such as sugar and frozen meat.

In May 1916 37 per cent of British ocean-going steamers under British flag were requisitioned by the Government.[23] Many of these ships were in naval or military employment or in the service

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[20]According to the estimates derived by Schlote (1952, p. 133) total imports in 1915, measured in constant 1913-prices, were nearly up to the 1913 level, but in 1916 the import volume was 17 per cent below the prewar level. In 1917 and 1918 the volume of imports was nearly 30 per cent lower than in 1913.

[21]Beginning in the summer of 1917 coal prices were strictly controlled, see Litman (1920, pp. 142-150). The price of bunker coal for neutral shipping shown here, which was appreciably higher than domestic coal prices, seems to have reflected market conditions to some extent.

[22]Salter (1921, pp. 43-44).

[23]Fayle (1927, p. 163).
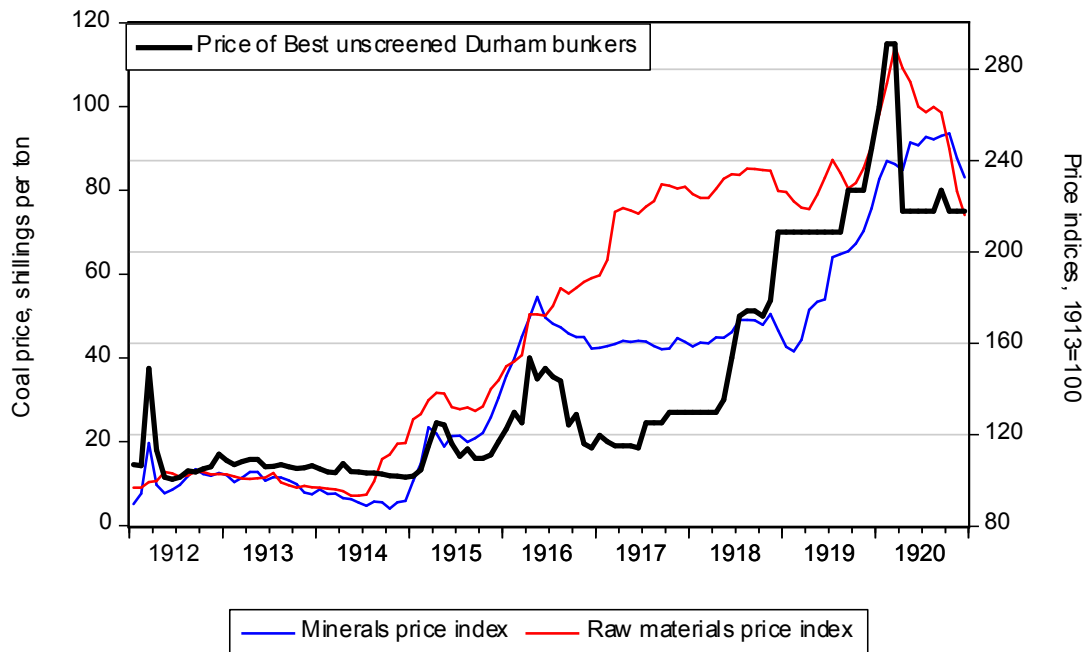
Figure 5: *Price of Best Durham unscreened bunker coals and price indices of minerals and materials (The Economist), January 1912–December 1920.*

of the Allied countries, France and Italy, whose own merchant fleets were insufficient to carry vital supplies of coal and wheat to these countries. A further 19 per cent of the British fleet were classified as 'directed', chiefly carrying iron ore from Spanish and North African ports, flax and timber from the White Sea, and wheat from North America and Australia. Although these vessels were under strict direction as to the port of loading and the nature of the cargo, they were free to charter at market rates. The remaining 44 per cent of the fleet were nominally 'free', but were restricted by the general requirement of obtaining a licence for every voyage.

By the summer of 1916 the British Government's control of shipping had become fairly extensive, but direct intervention regarding commercial freight rates was still rather limited. The large pool of neutral tonnage also ensured that shipping markets operated much as normal. However, in June 1916 limitation rates for coal freights to French Atlantic ports were introduced, which applied to neutral ships as well. At the end of October this scheme was extended to French and Italian Mediterranean ports. The application of limitation rates to neutral shipping had the predictable effect of reducing the incentives to participate in that trade.[24] Coal shipments to France and Italy were totally dependent on neutral shipping, and the main reason why neutral shipping still participated in this trade was the scheme of 'bunker pressure' applied by British authorities. Under this scheme neutral vessels were denied bunker coal in British ports unless they agreed to undertake certain voyages with coal to France or Italy and return with iron ore

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[24]The *Newcastle Journal* noted on 28 October 1916 that 'very few steamers are obtainable for France and Italy under the limitation scheme, and shipments are severely curtailed thereby.'

from the Mediterranean or North Spanish ports.

Apart from this, in the period up to the end of 1916 the bulk of world shipping employed for commercial purposes was still essentially free from direct control by the authorities.[25] But towards the end of 1916 and in the early months of 1917 a new regime of regulation was introduced that significantly altered the character of international shipping. According to Fayle (1927, p. 276) at this point in time 'direct control replaced individual initiative as the main motive power of oversea trade.' In February 1917 universal requisitioning of the British merchant fleet was introduced, which implied that nearly all British ships sailed under Government control at fixed rates.

Neutral shipping was also affected. Although market conditions were still the basis for chartering neutral vessels to Britain and the Allies this activity was centralized in the Inter-Allied Chartering Committee in January 1917. In September the United States Shipping Board centralised all private chartering for American trades. One of the objectives of the Chartering Committee was 'to effect a material reduction in the high charter rates prevailing, especially in trans-Atlantic, but also in South American and oriental trades.'[26] Export prohibitions and bunker regulations directly aimed at neutral shipping were introduced.[27] The powers of the United States Shipping Board over neutral shipping was further extended in the spring of 1918. If neutral ships declined to carry cargoes for such voyages as directed by the Shipping Board they were threatened with requisition.[28] By applying bunker pressure, licensing of exports and imports combined with freight rate limitations and direction of trade the Inter-Allied Chartering Committee and the US Shipping Board had a firm grip on neutral shipping in the Atlantic and in Mediterranean waters in the two final years of the war.

4   The prewar freight market and the first two years of the war

4.1   Freight rates 1912-14: The prewar halcyon days and the first reaction to wartime conditions

The year 1912 was a very profitable year for the world shipping industry[29] Freight rates reached a peak in the autumn of 1912 but were still buyoant until the late autumn of 1913, as can be seen from the indices for the selected trade routes in Figure 6, or in greater detail from Table A1 in the appendix. By the summer of 1914 freight rates had fallen to about 70 percent of the average level of the year 1913. This was evidence of a significant, but by no means unprecedentedly severe, recession in world shipping.

The outbreak of the war may have come much as a surprise to the shipping industry, as it did to other industries, but it is interesting to note that there was a relatively sharp rise in freight rates in some of the inward routes already in July 1914. This concerns in particular the

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[25]Fayle (1927, p. 276).

[26]United States Shipping Board (1918, p. 68).

[27]Fayle (1924, pp. 224-226).

[28]United States Shipping Board (1918, p. 69).

[29]For a review of the shipping industry just prior to World War I see for example British Parliamentary Papers (1918), Smith (1919, pp. 3-25), Fayle (1927, pp. 1-32), Sturmey (1962, pp. 11-29) and Harley (1988). For an account of important the North American liner trade, see Harley (2008).
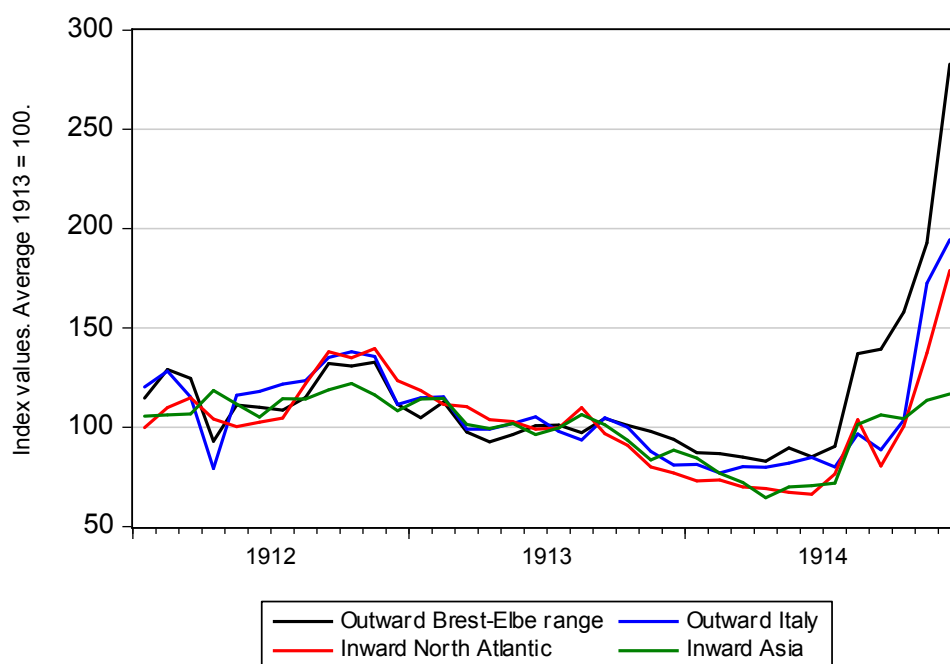
Figure 6: *Nominal freight rate indices January 1912–December 1914.*

North Atlantic tramp as well as liner trade, the Black Sea grain trade and the timber trade with Scandinavia and the Baltic. According to Fayle (1920, p. 30) the apprehension was initially due to a general dislocation of international commercial activity rather than the prospect of an attack on British trade. Towards the end of July chartering in the Black Sea was partly suspended and war risk premiums rose for cargoes under foreign flag, for Austrian vessels from 5 to 20 shillings. From the Baltic ports insurance premiums rose from 5 to 10 per cent because of the possible involvement of Russia in the war.

The new indices tabulated in the Appendix show that the initial impact of the declarations of war upon freight rates in August 1914 was a 35 per cent rise in outward coal freights and a 31 per cent increase in inward freights. A significant increase in freight rates was inevitable due to the general surge in insurance premiums. But when a state of war between the European powers was a fact within the first days of August it immediately became clear that the private underwriting market could not cope with the immense financial risk caused by the war. The British government acted promptly by introducing a State Insurance Scheme, whose office opened for business on 2 pm on the first day of war.[30] This scheme offered both insurance of cargoes and hulls at fixed rates. Another large shipping nation, Norway, introduced a scheme for cargo insurance at flexible rates (see Figure 2).

But once the insurance problem had been overcome it turned out that shipping activity during the first weeks of the war was severely constrained by the dislocation of international

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[30]Fayle (1920, p. 44).

trade. Well established trade connections were severed and important trade routes were closed. Germany commanded the entrance of the Baltic and Turkey blocked grain exports from the Black Sea. In other directions, in particular in the River Plate grain trade, the severance of connections with German financial houses, paralyzed trade. For India and countries in the Far East the loss of continental market access for their exports entailed a cutback of imports from European countries.[31] This brought a significant part of international trade to a standstill.

This development is clearly reflected in monthly freight rate indices. After the initial jump in August 1914 freight rates for the majority of outward and inward trade routes fell in September. The main exceptions were trade in northwestern Europe and on the Pacific trade routes. However, nominal freight rates began to rise steeply again from October 1914, partly driven by a rebound of foreign trade. Grain imports from North America and the River Plate picked up considerably and coal exports increased, in particular to France and Italy. Nominal freight rates were also driven by surging cost factors such as the general rise in prices of of coal and victuals, wages and insurance premiums. Many ports became heavily congested, which led to delays in loading and unloading, thus reducing the efficiency of the fleet. By December 1914 freight rates for many trades had risen by 100 per cent from July. In the coal trade to northern French ports, which was under severe pressure because of the acute coal shortage in France, the level was more than three times as high as in July 1914. The same relative increase was recorded for the River Plate grain trade.

4.2 Freight rates 1915-16: A strong rebound after a temporary lull

It might have been thought that nominal freight rates would have shown a continuous advance month by month in these war years, given the rampant general inflation rates, hovering quite steadily between 25 and 30 per cent per year. In addition there was an ever increasing demand for tonnage from the Government and mounting losses of ships due to enemy actions. But this picture needs to be modified, as evidenced by the freight rate indices for selected trade routes shown in Figure 7. There was a general increase in freight rates between December 1914 and December 1916, but this advance was not monotonic. There were two distinct cycles of falling freight rates in these two years, from a peak in March to a trough in the summer of 1915, and another from a new peak in April 1916 to a trough in September 1916. The second period shows the most significant rate of decline. Using the total freight index (an unweighted average of outward and inward rates tabulated in the appendix), the 1916 decline amounts to about 26 per cent, in the 1915 episode freight rates declined by about 12 per cent. In the expansion periods, however freight rates increased at a very rapid pace. The strongest expansion period was from July 1915 to April/May 1916.

In this period there was a considerable rise in freight rates to all destinations, but a novel feature in this period was the wide spread of rates of change across trade routes. In the pre-World War I period monthly freight rate fluctuations tended to be highly synchronized, even during periods of political disturbances, such as the Crimean War 1854-1856.[32] In World War

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[31]Fayle (1927, pp. 44-45).

[32]For monthly indices covering a number of trade routes see Klovland (2006, 2009).
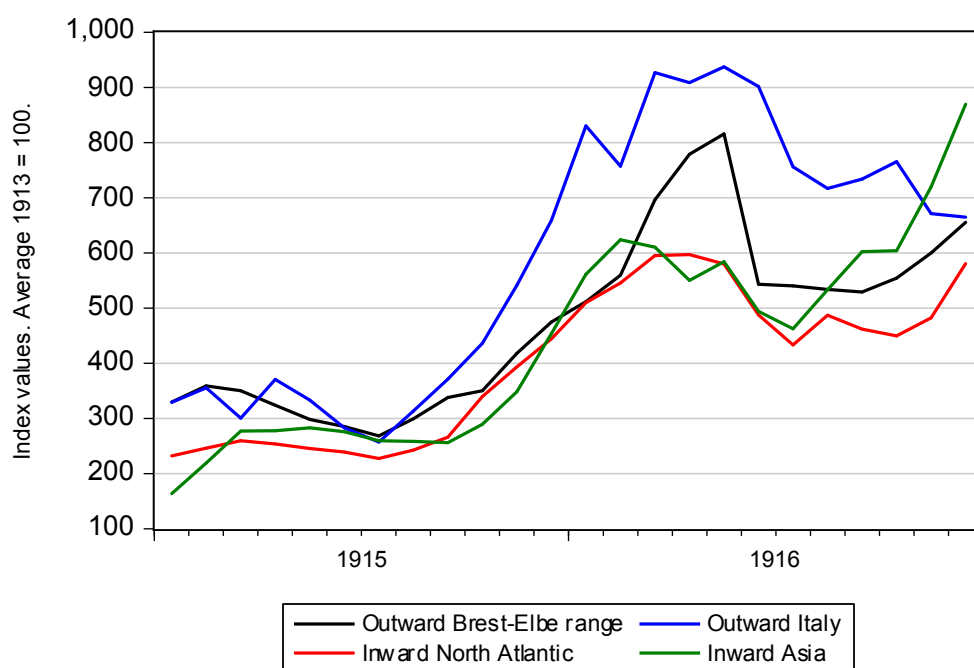
Figure 7: *Nominal freight rate indices January 1915–December 1916.*

I the various trade routes still shared the basic cyclical movements, but the rates of expansion and contraction differed enormously. Relative to the average of the year 1913 coal freights to Scandinavia had increased by a factor slightly more than nine at the end of 1916, to the East Mediterranean by a factor of 8.7, while to the River Plate the expansion factor was only 3.2. Regarding inward freights, Scandinavian and Asian freights were both more than nine times the 1913 level, whereas the Mediterranean and Pacific routes only recorded about 3.5.

5   An empirical model of freight rate determination 1912-1916

To what extent can the determinants of freight rates reviewed above explain the freight rate fluctuations in these years? In this section we focus on the aggregate inward index, which was less affected by government freight limitation schemes than outward coal freights. There are many factors pointing to a sustained rise in freight rates during the first two years of the war: the international trade boom, the surging prices of coal, iron and other cost factors and the reduced efficiency of the merchant fleet due to port congestion and government regulations. The huge reduction of the world's operative merchant fleet must be viewed in conjunction with the reduced geographical area it was to serve, but, as noted above, the net effect may well have been to create a shortage of tonnage relative to demand. In view of the requisition of part of the British merchant fleet for military purposes the sustained demand for carrying capacity for British imports put upward pressure on freight rates. The diminished coal exports increased voyage costs and worked in the same direction.

An empirical model that is consistent with the discussion above can be specified in general form as

$$\ln FINW = a_0 + a_1 \ln TONI + a_2 \ln TONX + a_3 \ln YUSA + a_4 \ln P + a_5 \ln WFLEET + a_6 RISK$$

$$a_1, a_3, a_4, a_6 > 0, \quad a_2, a_5 < 0$$

where $FINW$ is the inward nominal freight rate index, $TONI$ is the ton-miles index of imports, $TONX$ is the ton-miles index of coal exports, $YUSA$ is the US industrial production index, P is the average of *The Economist's* price indices of (1) raw materials and (2) metals and minerals, $WFLEET$ is the gross tonnage of the merchant fleet of the world, and $RISK$ is an average rate of cargo insurance for the East Coast of the United States, the West Coast of the UK and British Channel.[33]

Using a sample period from January 1912 to December 1916 it is found that these six variables are definitely cointegrated. The Johansen (1991) system cointegration test indicates that there are three cointegrating vectors at the 5 per cent significance level, both according to the trace statistic and the max eigenvalue test.[34] The cointegrating equation corresponding to the highest eigenvalues is (standard errors in parentheses):

$\ln FINW =$	$0.937 \ln TONI$	$-0.213 \ln TONX$	$+2.237 \ln YUSA$	$+1.358 \ln P$
	(0.119)	(0.046)	(0.198)	(0.140)
	$-0.070 \ln WFLEET$	$+0.053 RISK$	-12.4	
	(0.006)	(0.019)		

Other explanatory variables were tested but were not found to have much explanatory power. This includes time series of world merchant tonnage lost through enemy action and coal bunker prices.[35] The long-run course of freight rates is fairly well explained by fluctuations in tonnage required for UK imports and exports, the 'global' business cycle (as represented by economic activity in the United States), a price index of materials and minerals, the effective tonnage of the world's merchant fleet and the risk of carrying goods at sea. The signs of all coefficients are consistent with apriori expectations and are clearly significant. Note, in particular, the negative coefficient on the ton miles of coal exports ($TONX$), which is consistent with more of the total round trip cost of voyages falling on the inward freight due to the reduced availability of long-distance coal freights.

The performance of the model is visualized in Figure 8, which shows actual and predicted values of the aggregate nominal freight rate index, including an out-of-sample prediction for the years 1917 through 1920. We first look at the within-sample performance up to December 1916, leaving the performance of the model beyond the estimation period to the next section. We see that the cointegrating equation picks up the broad movements of freight rates in these years,

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[33]The empirical definitions of these variables are explained in detail and tabulated in the appendix.

[34]The results were obtained from running the Johansen cointegration test in Eviews version 9.5, using two lags in the data and the standard assumptions of a linear trend in the data, and an intercept but no trend in the cointegrating equation.

[35]It should be noted that the latter two variables are already reflected in the variables included in the model. War losses of tonnage affect the monthly estimates of the world fleet, and coal prices are one of the components of the price index.
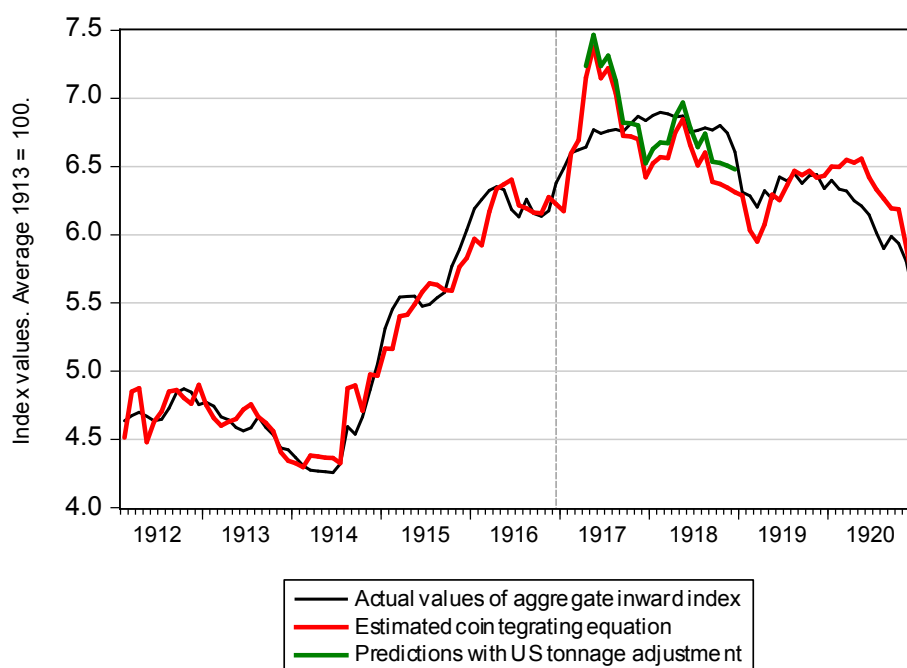
Figure 8: *Actual and predicted values of the aggregate nominal freight rate index February 1912 - December 1920.*

marked by the gradual deterioration of the freight market from the peak in 1912 to a trough in the summer of 1914, followed by a rapid rise when the war came. The model does not fully catch the extreme buoyancy occuring in the first part of 1915 and 1916, but it clearly reflects the slight reversals of freight rates in the summer and autumn months of these two years.[36]

It may be argued that such a model can hardly be expected to comprise all factors that periodically contributed to freight rate fluctuations. In the wartime economy such factors are easily identifiable, but the problem is that they are not quantifiable too. The most important issue concerns the magnitude of the carrying capacity of the British and, later, the American fleet that was requisitioned for naval and military purposes. It is also a question how effectively the remaining tonnage could be used for the transportation of goods. It is known that towards the end of the war (31 July 1918) 25 per cent of British ocean-going tonnage, here defined as steamers above 500 gross tons, and 37 per cent of American tonnage were reserved for naval or military service, including American trooping.[37] The employment of American steamers for naval and military purposes did not commence until the United States entered the war in April 1917; for the United Kingdom such employment was in operation from the beginning of the war. Exact figures do not seem to be available, but an estimate indicates that in 1915 and 1916 about one-fifth of the ocean-going British tonnage was continuously in naval or military

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[36]A closer fit may be obtained by augmenting the long-run equation with some short-run dynamics in the rate of changes in prices and economic activity, introducing dummy variables to account for the coal strike in March and April 1912 and accounting for seasonality, but this line of research is not pursued here.

[37]Salter (1921, p. 364).

employment.[38] This figure may have increased somewhat in the two final years of the war, but figures on tonnage available for carrying goods are difficult to pin down exactly, partly due to the fact that steamers requisitioned to Admiralty or War Office were also used for the importation of such goods as nitrates, petroleum and munitions.

In the United Kingdom port congestion soon developed as a very serious problem, which greatly affected the effective carrying power of all shipping, both British and foreign.[39] Attempts were made by the authorities to relieve the problem, and temporary improvements took place, most notably in 1916, but the severe interference with the discharge of goods caused by port congestion remained throughout the war and beyond.[40]

6   The world freight market in the final two years of the war

6.1   Freight rates 1917-1918: Freight rates under crossfire

In 1917 and 1918 the course of freight rates of the various trade routes displayed highly diverging trends. In the outward coal trade (see the data appendix) there is a marked contrast between trade routes that were strictly controlled, such as the politically prioritized coal exports to Italy and France, and the trade routes that were not subject to freight control, such as coal exports to Spain and Scandinavia. In the former case neutral ships were paid six times the 1913 freight rate, in the latter case up to 35 to 50 times the 1913 level. Figure 9 shows the indices of the five inward trade routes during 1917 and 1918. The most tightly controlled route, the homeward Mediterranean route (largely dominated by the Spanish ore trade) shows the lowest freight rate level compared with prewar figures, but even here there was a rise of about 70 per cent from the end of 1916 to the peak in November 1917. The North Atlantic freight rates showed little further advance from the high level established in 1916. This may derive from the fact that the bulk of wheat imports to the UK in British vessels were carried in requisitioned steamers at a fixed rate, and charters from the United States, irrespective of flag, were subject to strict freight rate limitation by the Inter-Allied Chartering Committee from the beginning of 1917. Much of the grain imports from the River Plate was carried in British ships at limitation rates, which are not reflected in the South Atlantic index, but other goods, such as linseed from South America and ground nuts from West Africa, were lifted by neutral ships at increasing rates. The homeward trades from Asia and Scandinavia were not subject to direct control and consequently surged to levels that were nearly twice as high compared with the end of 1916.

6.2   Wartime controls and acute tonnage shortage

From the evidence presented above it seems clear that freight rates could be held down to some extent by enforcing freight rate limitations, trading direction and requisitioning of tonnage. But this applied directly only to British ships and to the carriage of controlled commodities such

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[38]Fayle (1927, p. 256).

[39]Smith (1919, pp. 160-164).

[40]Port congestion once again became a serious problem during the postwar shipping boom of 1919-1920, see Aldcroft (1961).
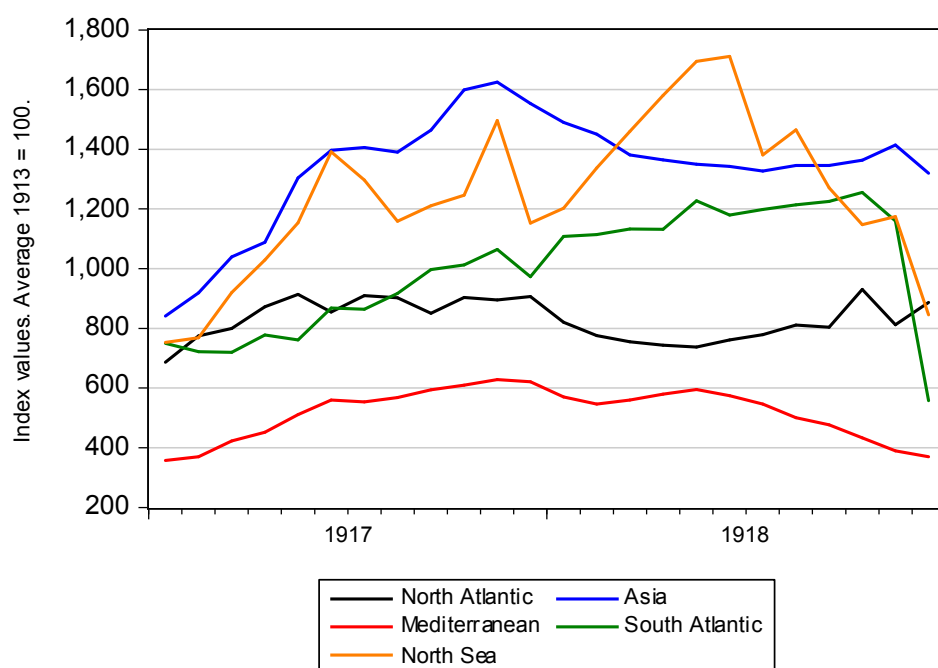
Figure 9: *Nominal inward freight rate indices January 1917 - December 1918.*

as grain, sugar, ores and coal exports to allied countries. Freight markets outside the sphere of the control system were competing fiercely for free tonnage, which became increasingly scarce in 1917 due to the expansion of requisition and the German submarine campaign. The Liverpool Steam Ship Owners' Association had strongly advocated already in the spring of 1916 that the solution to the ever more acute problem of the shortage of tonnage was not requisition and freight rate limitations but a much stricter control of import licences.[41] The British Government finally did this in 1917 when non-essentials imports were severely reduced, but these measures came in addition to stricter controls of shipping, not as an alternative, as suggested by the shipowners.

In the period up to the end of 1916 the bulk of world shipping employed for commercial purposes was still essentially free from direct control by the authorities, except for navigational restrictions for reasons of defence.[42] Part of the British fleet had been requisitioned to carry goods at Blue Book rates, which were below market rates, and in certain trades, such as sugar and iron ore, direction of shipping was enforced. But neutral shipping, including the American fleet, was still able to sail largely without direct controls, although some indirect control in the form of bunker pressure had been applied to direct neutral ships to carry coal to France and Italy and return with ore from Spanish ports.

The freight index figures examined here are those which applied to neutral shipping, which best conform to free market rates.[43] In January 1917 the Inter-Allied Chartering Committee was

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[41]Fayle (1923, p. 189).

[42]Fayle (1927, p. 276).

[43]The limitation freight rates applied to British shipping are not included in our freight index figures.

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established, which held a firm grip on the North Atlantic and Mediterranean trade. Chartering of non-British ships without a licence from the Committee now became prohibited.[44] Britain had begun to apply bunker pressure to neutral shipping earlier in the war to enforce their services, but in 1917 more drastic measures were introduced. The Allied Governments tried to make shipping agreements with the Scandinavian countries for the acquisition of a major part of their tonnage, but only in the case of the Norwegian fleet, which was by far the largest, did this ensure a full-scale cooperation. Britain introduced a 'ship for ship' principle, which allowed a certain number of vessels of a particular country to leave only when an equal number arrived. Norwegian and Danish authorities reluctantly entered into an agreement with Britain for the compulsory requisitioning of their merchant marine. A large Dutch fleet, which had lain idle in American and British ports, was also requisitioned without the consent of the Dutch Government or the shipowners.[45]

A crucial question here is whether the control system really had a dampening effect on aggregate freight rates. Liverpool Steam Ship Owners' Association argued that it did not. The inefficiencies of the centrally directed fleet of requisitioned ships and the freight rate limitations that made neutral shipping seek employment elsewhere reduced the effective supply of tonnage, which tended to increase freight rates. The shipping statistics shows that neutral shipowners withdrew their vessels from British and Allied trade. The proportion of foreign vessels that entered UK ports with cargoes fell from 33 per cent on average in 1916 to 17 per cent in September 1917.[46] The escalation of the submarine campaign was probably the main cause of the neutral withdrawal, but Fayle (1927, p. 279) argued that 'it is unquestionable that a good deal of neutral tonnage was driven away from British and Allied ports by ill-conceived schemes of freight limitation.' Even when a more effective convoy system had been put in place in the autumn of 1917, and insurance rates fell towards the pre-1917 levels, many neutral shipowners did not return to the British import trade. The proportion of foreign shipping tonnage in 1918 was 14.2 per cent, increasing to 24.5 per cent in 1919 and 29.5 per cent in 1920.[47]

Figure 8 shows out-of-sample predictions for the inward freight rate index for 1917 and 1918 on the basis of the model estimated on data from 1912 to 1916. By comparing these predictions with the actual course of freight rates under the more controlled regime the counterfactual question we ask is thus how freight rates had developed, given the actual course of trade, prices, tonnage and insurance risk, if the former regime had still prevailed. Referring back to Figure 8 it is seen that the model of the aggregate freight rate index predicts a steep rise in freight rates between April and August 1917. This is largely due to the sharply increased insurance rates following the large-scale submarine attacks in the spring of 1917. After the late summer of 1917, however, the predicted freight rates stayed below the actual rates throughout the war. On balance, then, there is not much evidence that the new control regime introduced in 1917 'retarded and reduced the rate of increase [of freight rates]', as argued by Salter (1921, p. 106), except during the submarine crisis months of 1917.

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[44]Fayle (1927, p. 215).
[45]Salter (1921, pp. 106-108).
[46]British Parliamentary Papers (1918, p. 58).
[47]British Parliamentary Papers (1921).

The conclusions from this counterfactual does of course rest on a number of tenuous assumptions. It can be argued that the model is no longer valid for the changing circumstances of 1917 and 1918. The greatly increased submarine danger beginning in the autumn of 1916 may have driven many neutral vessels out of British and Allied trade. However, it should be borne in mind that such effects are partly reflected in our model through the insurance rate term and the loss rates affecting the world tonnage. The subsequent involvement of the United States in the war from April 1917 may have reduced the quantity of American tonnage available for trade. The sensitivity of the model's predictions to adjustments of the effective tonnage available to commercial shipping due to America's involvement in the war may be investigated by rerunning the model with a, say, 30 per cent reduction in the American fleet beginning in April 1917.[48] It turns out from Figure 8 that this does not materially affect the prediction results. Predicted freight rates did increase in both years due to the assumed smaller effective tonnage, but they were still well mostly below the actual values.

7 A sequel on the postwar freight market 1919 - 1920

In the first months after the Great War ended in November 1918 the freight market nearly came to a standstill and freight rates fell markedly, as shown in Figure 10. Freight rates were subdued in the first part of 1919, but rose perceptibly during the postwar restocking boom of 1919-1920. This boom entailed a worldwide surge in import volumes once trade restrictions were lifted and business was on its way back to normal.[49] Coal freights were exceptionally buoyant during this period, in particular to France and Italy, which had experienced a persistent coal shortage during the war.

The postwar decontrol of British shipping was a gradual and long drawn-out process. All chartering was controlled by licence and many ships were directed towards the import of basic foodstuffs, such as cereals and sugar, which was still on Government account. The Chamber of Shipping estimated that 25 per cent of the imports into the UK in 1919 were carried at Government freights, and a further 25 per cent below market rates.[50] This was in stark contrast to the recommendations of the Departmental Committee on Shipping and Shipbuilding of 1917 which envisaged that privately owned shipping should be released from Government control when the war came to an end and that vessels still required for Government purposes should be chartered at market rates.[51]

The limitation freight rates fixed by the UK Government for 'directed' British ships were still far below the market rates. This scheme implied a distortion to relative import prices across commodities and reduced earnings of British shipowners relative to foreign shipping. One extreme example is provided by two fixtures concluded in the middle of May 1919, both from San Lorenzo in Argentina to the UK: one for wheat at 52.5 shillings and another for

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[48]A flat rate of reduction throughout the war hardly corresponds to the actual situation, but is used for illustrative purposes only.

[49]See Eichengreen (1992) for a detailed account of this boom period.

[50]Fayle (1927, p. 370), Sturmey (1962, p. 47).

[51]British Parliamentary Papers (1918, p. 63).
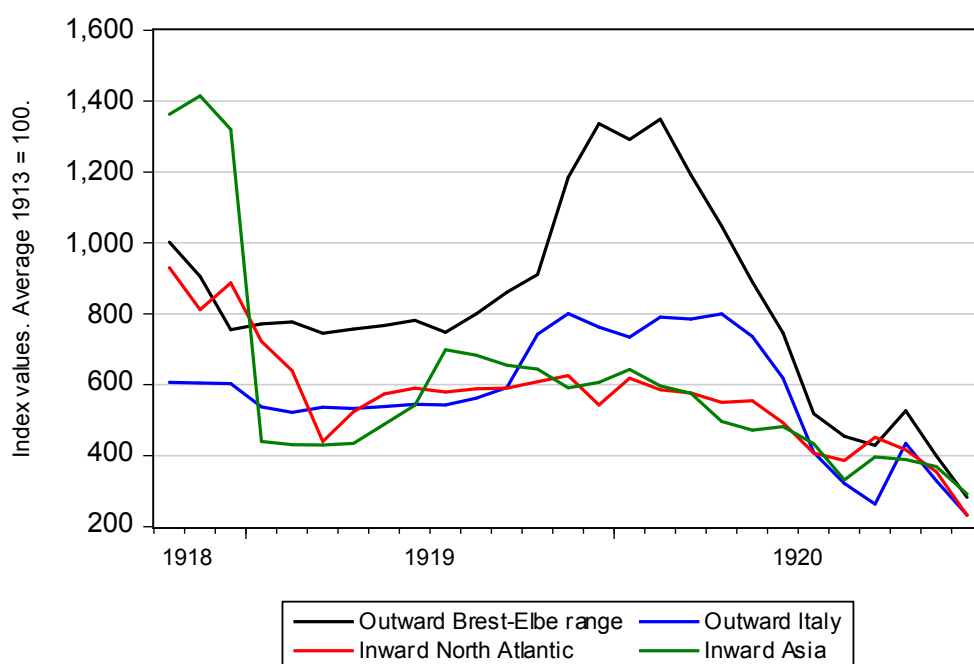
Figure 10: *Nominal freight rate indices October 1918 - December 1920.*

linseed, which was not controlled, at 235 shillings per ton.[52] Normally these two cargoes would command the same freight. The licence system with limitation rates was only abolished in July 1920, when the market rates had fallen so much that these rates were no longer effective. The British steamers that were directed to the controlled trades thus had to forego huge earnings compared with foreign shipping in this period. These anomalous features of the freight market no doubt worsened the competitive position of British shipping relative to foreign shipping in the postwar period.[53]

8   Freights and prices

In the two final years of World War I state control largely replaced market forces in European and North Atlantic shipping markets. The main feature of the shipping market of 1916, according to the annual review of the shipping broker Angier, was 'the gradual passing under the complete control of the Government of the British shipping industry'.[54] This process culminated with the universal requisition of all British ships in February 1917. This measure did not imply a full nationalisation of the shipping industry, as shipowners were still running the fleet on Government account, but all chartering decisions were now to be taken by the Ministry of Shipping. The fundamental problem regarding the supply situation was that the demand for

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[52]*Fairplay*, 15 May 1919, p. 1021.
[53]Sturmey (1962, p. 44).
[54]*Fairplay*, 4 January 1917, p. 33.

tonnage outstripped the available carrying capacity, and had done so for a long period. It could be argued that only the Government should be in a position to decide how the scarce shipping capacity should be divided between munitions, food and raw materials, but contemporary critics pointed that this could be achieved by other means, in particular by stricter import controls. The control measures did not add a single ship to the merchant fleet; the critics would say that in view of the intricate coordination problems associated with world trade and shipping the effective carrying capacity of the fleet had been diminished.

But restrictions did not only apply to British and Allied ships. Beginning with the Inter-Allied Shipping Control in February 1917 the merchant fleets of European neutrals and Japan were also affected. According to Fayle (1927, p. 197) '[t]he effect was that neutral shipowners tended, more and more, to withdraw their vessels from British and Allied trade.' This implied a further aggravation to the tonnage problem, including coal shipments to France and Italy, which by 1917 had reached a critical level.

So why was this strategy chosen? Was it an inevitable outcome of the dynamics of regulation and state control, as more and more industries were subject to price controls and government interference? Some importance should be attached to the escalation of merchant tonnage lost due to enemy action through 1916. But it should be noted that these decisions were taken before the full effect of the German submarine offensive was felt in the winter of 1917. Furthermore, the entry of America into the war implied a net reduction in tonnage available for commercial purposes, but the declaration of war was not a fact until April 1917.

It is our contention that the decision of centralized control of shipping by the new government under Lloyd George, inaugurated in December 1916, was a response to the popular demand to clamp down on the surging ocean freights and huge profits accruing to the shipowners. The hypothesis that the rising freight rates were the main cause of the price increase of imported goods had been launched already early in 1915 and was widely believed, not only by newspaper columnists but also in political circles. On 22 August 1916 the Member of Parliament for Dundee, Mr. Winston Churchill, spoke to the House of Commons on the subject of the inflated shipping freights, which he referred to as 'an absolute scandal'. He maintained that 'owing to the uncontrolled rise in freights there has grown up - unconsciously, of course - a virtual blockade of this country by the shipping interests, which blockade is again represented, and accurately represented, by the movement and elevation of prices.'[55] He even maintained that the shipping industry could be as easily organized by the State as munitions and railways. This may be seen as a rather unusual position for a liberal-conservative politician to hold, and it was indeed characterized by Mr. Houston, member of Parliament for Liverpool, as a 'socialist dodge'. Mr. Philip Snowden, a member of Parliament for Blackburn with socialist views, treated Churchill as an interloper, stealing the thunder of the Socialists.[56] This bears witness of how contentious the issue of shipping freights had become.

Among contemporary informed observers opinions were divided. In his review of wholesale prices in 1915 the editor of the *Statist*, Paish (1916, p. 190), wrote that '[t]he rise in prices

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[55] *Hansard*, House of Commons, 22 August 1916, vol 85, cc2511.

[56] *The Economist* 26 August 1916, p. 355 and *Yorkshire Post*, 23 August 1916, p. 4 and 24 August 1916, p. 7.

last year was due in large measure to a great advance in freight rates', and he repeated this assessment in the following year.[57] But this was not the universal opinion. A Board of Trade Committee launched to the investigate the sources of the rise in prices during the war concluded that freights 'do not constitute a main item in the increased cost of imported meat'.[58] Fayle (1927, pp. 105-108 and 444-447) presented much evidence to show that the increase in foreign prices played a larger role than freights in this regard. Litman (1920, p. 62) was reluctant to accept the large role of freights as the main source of the rise in prices suggested by Paish (1916).
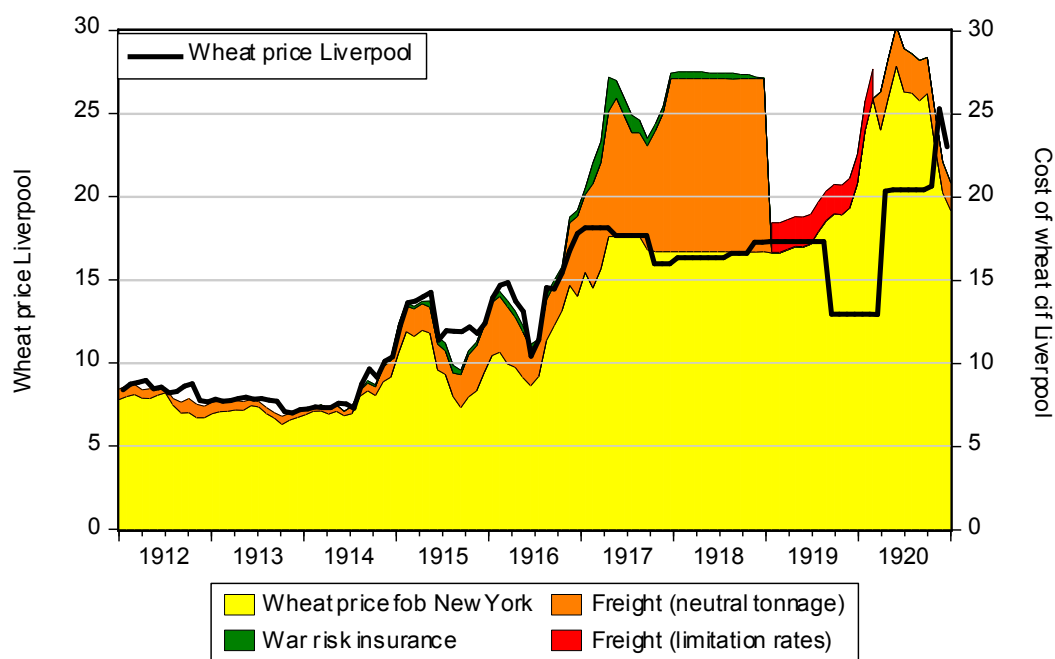
Figure 11: *Prices in New York and Liverpool, freight and insurance for 100 lbs No. 1 Manitoba wheat January 1912–December 1920.*

As the most heated discussion concerned the price of wheat it seems appropriate to present some exact evidence on this matter in the case of best Manitoba wheat, which was traded both in New York and Liverpool. Fob prices in New York, wholesale prices in Liverpool, wheat freight rates from the Northern Range of the eastern seaboard of the United States and cargo insurance rates are shown in Figure 11.[59] Normally the bulk of wheat imports from America went by the regular Atlantic liners, but individual charter voyages (tramps) were often also required to transport the wheat supplies. Figure 11 clearly shows that the Liverpool price reflected fluctuations in the New York price prior to 1917. The freight rate component did also contribute to the price increase in Britain, but during most periods this effect was of smaller magnitude than the effect from the foreign wheat price. Looking at the price increase from July

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[57]Paish (1917, p. 294).

[58]British Parliamentary Papers, Cd. 8358 of 1916. See also *The Economist* October 7, 1916, p. 595.

[59]See the appendix for sources and further details on the data.

1914 to August 1916, when the House of Commons speech by Churchill took place, it is found that the Liverpool price was exactly doubled, from 7.27 shillings (quoted in decimal terms) per 100 lbs to 14.52 shillings. Of this price increase 61 per cent can be accounted for by increased prices in New York, 28 per cent by increased freight rates and 4 per cent by war risk insurance, leaving a residual of 7 per cent which may be due distribution costs and other elements. The freight factor, calculated as freights as a percentage of the Liverpool price, rose from about 6 per cent in the summer of 1914 to somewhat above 20 per cent late in 1915 and in parts of 1916. Wheat freights fell considerably in the summer and early autumn of 1916, when many British vessels were directed to the Atlantic wheat trade, but rose again after October 1916 when wheat imports were monopolized by the Royal Commission on Wheat Supplies.

Under the regime of price controls in 1917 and 1918 imported wheat was heavily subsidized, making the price in Liverpool nearly equal to the New York price.[60] Carrying space had become so scarce that very high freight rates had to be paid to attract neutral steamers to lift the wheat supplies over the Atlantic. But even such high rates were not enough to attract sufficient neutral tonnage, so the bulk of wheat imports went by British and Allied vessels at fixed freight rates well below the rates offered to neutral shipping shown in Figure 11.

After the war limitation rates applied to wheat cargoes in neutral ships as well, and these were fixed at about 50 per cent of the rates paid to French Atlantic ports, which were also set below market rates. This of course resulted in the withdrawal of neutral tonnage from this trade.[61] For the year 1919 and through February 1920 Figure 11 shows the limitation freight rates, which were thus only relevant to British shipping still under control. Even at these much lower rates the controlled price in Liverpool fell significantly below the cif-price, also being much lower than the New York price between September 1919 and the autumn of 1920. Figure 11 is a poignant illustration of how far the Government was willing to go to subsidize the purchase and transport of wheat.

The system of freight controls must be viewed in connection with the system of price controls and grain subsidies.[62] The wisdom of several aspects of this policy may be disputed. One implication was that a considerable amount of foreign tonnage was kept away from British ports by the freight rate limitations. Much of the British merchant fleet was restricted to the direct import services of the United Kingdom and the trade with France and Italy, which implied a partial withdrawal of British shipping from world markets. This created an artificial distribution of the pool of world tonnage, which may have led to inefficiencies. Furthermore, the power of directing British ships at fixed rates may have tempted the Government to prolong the purchases of grain and other commodities beyond real economic demand. Fayle (1927, p. 375) was of the opinion that 'the effect of the whole system seems to have been to subsidize the purchase and transport of certain specified commodities at the expense of the general financial and economic position.'

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[60]The wheat crop of 1917 in the United States was very poor for a second year in a row, which led to surging prices and a disorderly market. A price fixing committee was established in May 1917 to settle the market. See Litman (1920, pp. 219-228).

[61]*Fairplay*, April 10, 1919, p. 768.

[62]Fayle (1927, pp. 371–391) presents a perceptive analysis of how the shipping markets worked in the immediate aftermath of the Great War.

9   Conclusion

Ocean freight rates rose to very high levels during World War I, both in nominal and real terms. In the first two years of the war freight markets functioned fairly well. British shipping was partly subject to requisitioning for military as well for commercial purposes, and British steamers were directed to certain trades, obtaining freight rates that were fixed somewhat below market rates. But a large fleet of neutral shipping ensured that the imports of goods to Britain and her main European Allies, France and Italy, did not fall to critically low levels. According to our estimates, imports measured by weight fell by 6.7 per cent between the first half of 1914 and the first half of 1916. But there was an adverse effects of the redirection of imports towards more distant sources due to the closure of the Baltic and the Black Sea, so more tonnage per ton of imports was now required. An estimate of ton-miles of shipping required to provide the UK with her imported goods shows an increase of 3.1 per cent over the same period, which results from the fact that Britain succeeded in attracting a substantial carrying capacity of foreign shipping.

There was a marked policy change with respect to shipping in the UK following the establishment of the new government led by Lloyd George in December 1916. Universal requisitioning of all British vessels was introduced and extensive control measures affecting neutral shipping was effectuated through the Inter-Allied Chartering Committee. A system of restrictions of bunker coal for foreign steamers, freight licences and limitation freight rates were applied to neutral shipping in the last two years of the War.

The unrestricted submarine warfare campaign that commenced in February 1917 entailed a dramatic increase of war losses at sea, which reduced the world tonnage by 3.4 per cent from 1916 to 1917 and may have discouraged shipowners from participating in the North Atlantic and Mediterranean trade. But there is also firm evidence that the new freight control system had the effect that neutral shipping sought safer and better paid employment elsewhere. The proportion of tonnage entered in foreign vessels fell further in 1918, down from 18.3 per cent in 1917 to 14.3 per cent in 1918, even if tonnage losses were halved due to the adoption of the convoy system,.

The reduced foreign participation resulted in an acute shortage of tonnage in 1917, which necessitated a drastic reduction of the imports of raw materials and non-essential foodstuffs.[63] The imports of wood and timber, paper-making materials and jute in 1917 were less than one half of the 1916 figures, and there were significant reductions in many essential raw materials, including iron ore. Agricultural production was affected by the diminished supply of fertilizers, cereal feeds and oilseed cakes.[64] Consumers had to accept a curtailment of the supply of fruit and vegetables, tobacco and 'luxury' food and drink. There is no way that Britain could have escaped some reductions in the supply of goods during the war, but the point made here is that the shipping policy in the final two years of the war had a significant negative impact on the supply situation.

An empirical model in which the inward freight rate index is explained by economic activity,

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[63]Fayle (1924, p. 267-280).
[64]Dewey (1989, pp. 164-169).

prices of minerals and metals, world tonnage, and insurance risk was estimated on monthly data from 1912 to 1916. This model tracks the actual course of freight rates fairly well. The model was then used to predict freight rates for the last two years of the war, making the counterfactual assumption that the same essentially free market regime for neutral shipping continued to prevail. It was found that freight rates would have been much higher during the period of the unrestricted submarine warfare in 1917, but considerably lower during the remainder of the war. The conclusions were somewhat mitigated, but not materially affected, by assuming that 30 per cent of the American fleet was unavailable for commercial purposes during the American participation in the war starting in April 1917. Taken at face value these results suggest that Britain could have benefited from a larger supply of tonnage without substantially higher freight rates by still adhering to a more liberal shipping policy towards neutral shipping.

Previous writers have criticized many aspects of British policy affecting the shipping industry during World War I – the failure to allocate more men and steel to shipbuilding, the belated introduction of systematic import control, the failure to take effective measures against port congestion, and the ineffectiveness of the excessive control system of British and neutral shipping in the last two years of the War.[65] The reasons for the widespread use of centralized control of shipping markets must in part be ascribed to the widespread misconception that the high freight rates were the main cause of the rising commodity prices. By limiting freight rates well below the market level the Lloyd George Government sought to dampen the pressure on prices and strike a blow at the 'prodigious profits' of shipowners as well. The latter problem was a real challenge that no government could disregard, but there were other instruments, for example the Excess Profits Duty, that might have been more effectively applied to the shipping industry.[66] This policy exacerbated the most serious problem of shipping during World War I, the severe shortage of tonnage, which could have been handled in other ways that might have been more beneficial to British consumers and producers.

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[65]Fayle (1924, 1927), Smith (1919).

[66]One peculiar aspect of the Excess Profits Duty was that the normal years, against which the excess profits were measured, included 1912, which was the most profitable year for shipping for more than a decade. In addition, the tax did not apply to profits from the sale of ships.

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A Appendix: Freight rate indices

The monthly indices presented in Table A1 below are based on freight rate quotations reported in newspapers and trade journals.[67] Freight rates quoted in US dollars, French francs and Scandinavian currencies were converted to pound sterling using mid-month exchange rate quotations from *The Economist* for the years 1912–1913 and Diesen (1922) thereafter. Beginning 1916 neutral steamers obtained higher freight rates than British and Allied vessels in certain trades. In such cases only freight rates pertaining to neutral steamers were used.

A.1 Outward routes

Outward routes for coal exports from Britain are defined as follows (weights in the aggregate index, to be explained below, are in parentheses):

UK coastal (0.087) All UK ports, of which by far the largest share is represented by London.

Brest-Elbe (0.155) All French Atlantic ports to the east of Brest, all Belgian, Dutch and German North Sea ports.

Scandinavia (0.142) All Danish, Norwegian and Swedish ports. Also including a few fixtures to Iceland and Finnish ports in Upper Gulf of Bothnia north of Wasa.

Baltic (0.000) All German and Russian ports from Flensburg to St. Petersburg and Finnish ports up to and including Wasa.

French Bay ports (0.085) French ports in the Bay of Biscay from Brest to Bayonne.

Spain (0.042) Both Atlantic and Mediterranean Spanish ports.

French Mediterranean (0.125) French Mediterranean, Algerian and Tunisian ports.

Italy (0.158) All Italian ports, also including Trieste.

Portugal and Atlantic islands (0.043) Portugal, Gibraltar and West African ports from Tangier to St Paul do Loando (Angola), Canary Islands, Madeira, Azores and Cape Verde Islands.

Eastern Mediterranean (0.086) Non-Italian Adriatic ports, Greece, Black Sea, Turkey, Egypt and North Africa east of Tunisia, including Malta and Cyprus.

South America East (0.077) All ports on the eastern seaboard of America south of the United States, largely dominated by Rio de Janeiro and River Plate.

North America East (0.000) Eastern seaboard of the United States and Canada.

Asia (0.000) From Suez and eastwards, mainly Aden, East Indian and Chinese ports.

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[67]The main sources include *Yorkshire Post, Newcastle Journal, Fairplay, Norges Handels- og Sjøfartstidende and Farmand.* Atlantic liner freights are taken from *Statistical Report of the New York Produce Exchange* for the years 1912 to 1920.

Pacific (0.000) Australia and western seaboard of North and South America.

Because of few observations available for the war years the subindices for Baltic, North America East, Asia and Pacific are not included in the aggregate index. The weights are based on combining data on the quantity of coal exported to the various regions with a measure of transport distance, thus obtaining a measure of the transport work done in ton-miles. Weights were computed as averages for the years 1913, 1916 and 1919. Coal exports are from *Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions*, Cd. 8632 of 1917–18 and Cmd. 1503 of 1921. For the UK coastal trade estimates of the domestic seaborne coal trade in Armstrong (1998) were used. The average sea distance from London to three representative ports in each importing region was obtained from *http://www.sea-distances.org/*.[68] A particular problem is how to split coal exports to France on the three trade routes Brest-Elbe range, French Bay and French Mediterranean ports. This was done by applying an estimate of the relative number of coal fixtures in the data sample, adjusted for ship size (which was smallest for the northern ports, largest for Mediterranean trade). The estimated percentage shares for the French Atlantic ports were 26, 48 and 61 in the years 1913, 1916 and 1919, respectively; for the Mediterranean 33, 19 and 21, respectively.

A.2 Inward routes

Inward routes for imports into Britain are defined as follows (weights in aggregate index in parentheses):

Mediterranean (0.066) All ports in the Mediterranean and Black Sea ports (the latter until August 1914), also including Spanish Atlantic, French Bay and North African ports.

Scandinavia (0.055) Also including Baltic ports (until August 1914) and White Sea.

North Atlantic (0.300) Eastern seaboard of the United States and Canada. This index is based on tramp (individually chartered) fixtures only.

South Atlantic (0.148) The eastern seaboard of America south of the United States, also including a few observations from West African ports.

Asia (0.157) East India, Indo-China and Java.

Pacific (0.145) Australia and western seaboard of North and South America.

Atlantic liners (0.129) Regular liners from New York, Baltimore and Philadelphia to North Europe, chiefly Britain.

The aggregate inward index is constructed along the same principles as the outward index, using tonnage of ships entered with cargoes to the United Kingdom from each of the regions in 1913, 1916 and 1919 and average distance from 3 representative ports within each region. Data on tonnage entered with cargoes are from *Annual Statement of the Navigation and Shipping of the United Kingdom*, Cd. 7616 of 1914 and Cmd. 1442 of 1921.

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[68]For the coastal coal trade the distance was computed as the average of Newcastle to London, Cardiff to London, and Cardiff to Devonport.

A.3 Index aggregation

Because data are missing for some months in many of the subindices the aggregate indices cannot be constructed by simply weighing together the subindices for each month with a fixed weight. A more satisfactory procedure is the weighted country-product-dummy (CPD) method suggested by Rao (2005). A slight modification of this procedure involves running a standard least squares regression, using a dummy variable for each sailing route, DS_i, taking a value of 1 for the i-th route and zero otherwise, and by constructing time dummy variables, DT_t, taking on a value of 1 for the t-th month of the sample and zero otherwise. P_{it} is the subindex value for trade route i in month t and w_i is the corresponding weight of this route:

$$\sqrt{w_i} \ln P_{it} = \lambda_1 \sqrt{w_1} DS_1 + \lambda_2 \sqrt{w_2} DS_2 + \ldots + \lambda_S \sqrt{w_S} DS_S + \psi_1 \sqrt{w_i} DT_1 + \psi_2 \sqrt{w_i} DT_2 \ldots + \psi_T \sqrt{w_i} DT_T + u_{it}$$

$$i = 1, \ldots S, t = 1, \ldots T$$

u_{it} is a random disturbance term.[69] The aggregate index value in period t, X_t, is computed as

$$X_t = 100 \cdot \exp(\psi_t) \qquad t = 1, \ldots T$$

and then normalized relative to a benchmark period.

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[69]Note that there may be less than S times T observations when some of the subindex values are missing. The model is estimated by ordinary least squares after selecting an arbitrary time dummy variable as numeraire to avoid perfect multicollinearity.

B Appendix: Data series

These time series are reproduced in Table A2.

B.1   1 - 6 Tonnage of world's merchant fleet 1912–1920

The data series represent the gross tonnage of ocean-going steamers of 100 tons and upwards, measured in 1,000 tons. *Allied* denotes France and Italy, *Axis* is Germany, Austria and Turkey, *neutrals* contain all other nations than Britain and its colonies, United States of America, Allied and Axis countries. American steamers on the Northern Lakes are excluded.

The data are benchmarked to June figures in each of the years 1912–1916 and 1918–1921 from *Lloyd's Register of British and Foreign Shipping, volume II Appendix*. Lloyd's did not publish data for the years 1917 and 1918. For the British Empire and Norway December figures from national ship registers were also used. The sources are annual issues of *Annual Statement of the Navigation and Shipping of the United Kingdom*, London and annual issues of *Norges Skibsfart*, Kristiania (Norway). To fill the gaps in the years 1917 and 1918 supplementary tonnage data for various countries published in *Répertoire General du Bureau Veritas* were used, taken from *Annuaire Statistique de Norvège*, issues of 1917–1919, Kristiania. Monthly data were linearly interpolated between the benchmark months, also taking into account (1) the monthly estimates of losses due to war damage August 1914 - November 1918 for all countries and (2) monthly data on tonnage of British ships added to the register and removed from the register due to marine losses January 1912-December 1914 from *Lloyd's Register of British and Foreign Shipping, volume II Appendix* and quarterly data from Fayle (1924, p. 467) August 1914–October 1918. The latter source also includes data on ships interned in enemy ports and enemy tonnage brought into service.

B.2   7 - 9 Tonnage of merchant shipping lost through enemy action 1914-1918

The figures (in 1,000 gross tons) include steam and sailing vessels of all sizes, excluding Germany and Austria. Data are from Fayle (1924, p. 465).

B.3   10 - 14 Cargo insurance rates 1914–1919

The cargo insurance rates apply to Norwegian steamers quoted by the Norwegian War Risk Association *Norsk Varekrigsforsikringsfond*, see Norsk Varekrigsforsikring (1931). The rates are averages of quotations prevailing at mid-month, applying to eastbound sailings (i.e to Britain) in the case of the Atlantic (series 12 and 14), and outbound (series 13) for Italian West Coast ports. Data after January 1918 are in part interpolated on the basis of UK East Coast quotations.

B.4   15 - 18 Foreign trade volumes and ton-miles 1912–1920

B.4.1   Trade volumes

Monthly data series on the volume of imports and coal exports are given in series 15 and 17, respectively. The sample contains 280 time series of quantities imported, covering 143 different

commodities. All bulky commodities of any significance for which weights were given in the Monthly Trade Returns are included here. For the main commodities the Monthly Trade Returns specify the most important countries from which the goods are imported, which account for the other 137 series in the sample (i.e wheat from the United States, wheat from Argentina etc.). Wood and timber imports are converted from loads to tons assuming one load equal to one ton, as was done by Salter (1921) and Fayle (1924). One cubic foot of timber was assumed a weight of 0.0156 tons. Import volumes of petroleum, wine and spirits, which were given in gallons, were converted to tons assuming one UK gallon being equivalent to 8.66, 9.99 and 9.42 lbs, respectively. From 1915 through June 1917 a substantial part of imports of oil fuel, imported on Government account, was not included in the Monthly Returns. Adjusted figures were calculated on the basis of the information in Fayle (1924, p. 175 and p. 477).

There are monthly data on coal export volumes to 31 countries, which accounted for the bulk of coal exports. Total exports of coke and manufactured fuel have been added to the coal export series. For the latter two items as well as the residual coal exports the distribution between export countries is only known on an annual basis, which had to be used to estimate the geographic distribution of monthly exports .

The Monthly Trade Returns were published annually in British Parliamentary Papers as *Accounts Relating to the Trade and Navigation of the United Kingdom for Each Month During the Year 1912 (to 1920)*. The trade returns were also published each month, but in somewhat less detail, in *The Economist Monthly Trade Supplement* through 1915 and more irregularly thereafter.

B.4.2   Ton miles

The ton-miles series were computed as trade volumes in tons times the sea distance from the main port in the importing or exporting country to London. The distance data were obtained from *www.sea-distances.org/*. For the 137 import commodities and three coal export series (residual coal, coke and manufactured fuel), for which the geographical distribution is not known on a monthly basis, the average distances were computed each year on the basis of the distribution of trade volumes in the Annual Trade Returns. Regarding coal exports to France the changing pattern of export destinations, partly shifting from the Mediterranean to Northern France during the war, was taken into account, see the notes to the freight rate indices above. All trade with Russia 1915-1918 was assumed to go via the White Sea (Archangel). The point of clearance regarding trade with the United States was assumed to be an average of New York, Baltimore, Philadelphia and New Orleans.

B.5   19 - 21 Prices 1912–1920

The coal price is represented by best unscreened Durham bunkers, shillings per ton, as quoted in Newcastle at the middle of the month. Quotations are taken from *Newcastle Journal* and *Yorkshire Post*. The price indices are from *The Economist*, rebased to show average values in 1913 equal to 100. The price index of minerals and metals includes 3 series of iron and steel, 3

series of non-ferrous metals and 2 coal prices. The index of sundry raw materials is composed of 10 price series: timber (2), leather, oils (2), oilseed, tallow, indigo, soda crystals and rubber.

B.6   22 - 25 Wheat prices and wheat freights 1912–1920

B.6.1   Wheat prices

Liverpool quotations for Manitoba no. 1 or Red Winter no. 2 and fob prices at New York for the same qualities are shown here, both in shillings per 100 lbs, which was the standard way of quoting wheat in Liverpool. The data were extracted from *Yorkshire Post* and *Annual Statistical Report of the New York Produce Exchange.* The American prices in cents per bushel have been converted to shillings per 100 lbs, using mid-month dollar exchange rates taken from *The Economist* 1912–1913 and from Diesen (1922) for the years 1914 through 1918.

B.6.2   Freight rates

The charter (tramp) freight rates 1912–1918 are monthly averages of all recorded fixtures from New York or Northern Range to Liverpool or Bristol Channel included in the North Atlantic freight rate index. The freight rate series for 1919 and through February 1920 is set equal to the limitation rate fixed by the Government, which strictly controlled all trade in wheat. After February 1920 the data reflect a limited activity in licensed commercial wheat cargoes from the United States to the UK. In July 1920 all controls were abolished. The liner (berth) rates are monthly averages quoted in annual issues of *Annual Statistical Report of the New York Produce Exchange.* All freight rates were converted to shillings per 100 lbs of wheat. The latter series ends in October 1916 when all liners were taken over by the Government.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1912													
Outward													
UK coastal	119.2	132.8	105.0	100.0	111.4	111.9	107.8	113.3	130.0	131.9	141.3	114.0	118.3
Brest-Elbe range	114.6	129.0	124.5	92.6	111.0	110.0	108.5	114.9	132.0	130.7	132.6	111.5	117.7
French Bay ports	110.0	114.6		73.7	113.6	107.5	114.8	109.1	130.9	131.4	126.5	106.7	* 112.7
Spain	101.2	112.0		83.5	108.2	113.7	116.2	112.2	125.9	128.9	126.0	101.3	* 111.8
French Mediter.	107.2	111.6	110.8	81.1	113.6	121.4	123.7	120.9	134.4	131.3	127.5	108.3	116.1
Italy	120.1	128.2	115.0	79.1	116.1	117.9	121.6	123.4	135.0	138.0	135.5	111.4	120.2
Atlantic Islands	110.7	114.8	104.1	80.6	108.1	109.4	117.1	117.2	121.2	117.7	115.2	99.9	109.7
Eastern Mediter.	105.2	116.3	99.5	73.8	101.5	111.9	119.2	126.7	132.5	139.7	130.1	117.6	114.6
Scandinavia	93.0	119.9	110.5	77.8	90.8	108.5	123.2	130.3	134.2	132.7	136.0	131.1	115.8
Baltic	120.5	154.2	100.3	82.3	101.3	110.7	113.0	120.2	124.5	126.9	125.2	125.9	117.1
S America Atl.	119.9	118.0	97.6	91.7	101.9	108.6	124.6	114.8	130.8	127.1	120.7	102.5	113.2
N America Atl.	96.6					142.9							* 119.6
Asia	95.0	92.8	96.0	75.1	103.6	94.8	105.9	104.2	113.8	128.0	111.8	102.0	102.0
Pacific	103.6	105.8		87.1	82.4	94.9	98.5	115.0	114.2	104.7	109.3	101.8	* 101.7
Inward													
Mediterranean	110.2	106.6	108.3	112.9	114.1	105.7	117.3	117.5	135.1	163.0	132.7	109.3	119.4
Scandinavia	96.2	104.3	99.0	93.4	93.6	126.8	119.1	116.4	136.4	144.5	142.3	118.6	116.0
North Atlantic	99.5	109.8	114.8	104.0	100.3	102.5	104.6	121.8	137.9	134.8	139.5	123.4	116.1
South Atlantic	94.5	106.9	125.7	155.7	150.6	111.7	106.5	123.4	154.9	146.5	132.0	121.7	127.5
Asia	105.6	106.2	106.6	118.5	111.6	105.0	114.2	114.2	118.7	122.0	116.2	108.2	112.3
Pacific	82.8	90.2	92.8	98.0	96.2	100.5	100.2	104.1	105.3	111.7	110.4	107.6	100.0
Atlantic liners	91.6	91.5	90.8	89.6	87.6	84.8	82.9	87.8	103.2	113.7	117.2	114.1	96.2
Aggregate indices													
Outward	110.2	121.3	111.3	83.3	107.7	112.7	117.9	119.6	132.3	132.4	131.1	112.5	116.0
Inward	96.7	103.1	107.0	109.8	106.6	103.0	104.2	112.9	127.0	130.3	127.1	116.1	112.0
Total	103.5	112.2	109.2	96.6	107.1	107.9	111.1	116.2	129.6	131.4	129.1	114.3	114.0

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1913													
Outward													
UK coastal	111.0	107.6	92.3	89.7	95.1	109.1	106.8	100.8	107.8	101.1	90.1	87.7	100.0
Brest-Elbe range	104.6	112.7	97.1	92.1	96.9	100.7	101.1	97.1	104.4	100.9	97.3	93.3	100.0
French Bay ports	103.3	102.5	93.9	90.2	96.9	113.3	107.7	96.6	112.7	105.7	92.9	85.8	100.0
Spain	104.0	104.2	95.3	95.6	103.9	108.9	108.6	103.4	105.9	103.2	86.9	80.7	100.0
French Mediter.	108.6	104.7	98.5	102.4	106.7	106.3	102.3	95.6	106.2	100.7	89.6	79.4	100.0
Italy	114.7	115.2	98.5	99.6	101.8	105.1	97.3	93.3	104.7	100.0	87.4	80.6	100.0
Atlantic Islands	99.9	103.9	92.8	95.7	103.4	106.0	102.4	102.4	108.2	102.2	93.7	89.5	100.0
Eastern Mediter.	121.8	120.5	108.9	101.1	103.7	101.3	97.7	91.8	98.3	94.6	84.9	75.0	100.0
Scandinavia	103.3	111.4	102.6	92.4	88.8	93.5	96.5	99.0	106.1	109.9	101.4	95.4	100.0
Baltic	115.3	117.7	104.3	99.0	91.1	97.9	93.9	92.2	99.7	97.6	96.1	95.3	100.0
S America Atl.	99.5	96.8	92.0	93.9	105.7	111.6	107.8	106.4	116.4	100.6	89.8	79.1	100.0
N America Atl.						83.4				116.6			* 100.0
Asia	108.8	111.9	104.8	106.8	101.0	101.6	102.1	99.3	98.6	94.5	89.3	80.6	100.0
Pacific	111.1	109.3	101.8	93.9	89.3	94.7	103.1	97.7	103.7	100.6	96.9	98.9	100.0
Inward													
Mediterranean	112.9	103.8	92.1	94.4	95.2	92.9	98.2	113.4	116.3	102.5	91.9	86.7	100.0
Scandinavia	118.7	103.9	93.7	103.1	79.8	107.4	107.4	107.2	101.1	100.9	91.0	84.4	100.0
North Atlantic	118.5	111.5	110.3	103.8	102.8	99.7	99.5	109.8	96.8	90.2	79.2	76.6	100.0
South Atlantic	132.8	140.5	115.4	114.2	88.9	84.8	94.4	105.3	89.1	83.7	74.3	77.0	100.0
Asia	114.1	114.4	101.3	99.5	101.8	96.2	99.1	106.3	101.2	93.0	83.4	88.5	100.0
Pacific	112.1	110.5	104.9	102.2	97.4	97.5	95.4	101.8	101.3	96.4	91.3	89.5	100.0
Atlantic liners	114.7	109.7	106.1	103.5	104.4	94.4	94.1	98.3	93.0	96.0	93.8	90.4	100.0
Aggregate indices													
Outward	107.8	109.3	98.1	95.4	99.3	104.3	101.8	97.6	106.7	102.2	92.1	85.3	100.0
Inward	118.3	114.7	106.2	103.8	98.1	95.7	98.0	106.2	98.2	92.9	84.4	83.4	100.0
Total	113.0	112.0	102.2	99.6	98.7	100.0	99.9	101.9	102.4	97.5	88.3	84.4	100.0

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1914													
Outward													
UK coastal	87.7	82.1	82.4	78.7	85.9	83.7	85.0	110.5	115.8	116.7	144.5	188.4	105.1
Brest-Elbe range	87.8	86.4	84.2	82.9	89.0	85.3	90.9	136.9	139.2	157.9	192.8	282.8	126.4
French Bay ports	83.3	84.2	81.5	80.2	87.8	87.8	89.4	105.8	98.4	116.7	172.1	211.6	108.3
Spain	78.0	74.3	76.6	78.0	91.6	88.3	82.0	94.1	88.3	95.9	144.4	163.8	96.4
French Mediter.	80.2	75.3	79.0	80.1	81.6	85.6	80.3	108.9	88.0	105.5	165.1	196.6	102.4
Italy	81.7	76.1	80.7	79.5	81.2	84.8	80.1	96.1	88.9	103.6	172.5	194.4	101.7
Atlantic Islands	84.6	79.8	82.7	80.9	89.2	89.3	87.7	109.4	93.1	99.7	138.8	154.0	99.2
Eastern Mediter.	80.1	74.3	71.9	72.3	74.1	76.2	73.2	111.6	85.5	110.0	163.2	186.0	98.4
Scandinavia	89.7	83.2	83.1	79.0	78.6	81.8	87.5	138.6	145.9	123.0	126.5	219.7	111.4
Baltic	90.7	86.2	80.6	72.0	80.1	87.0	87.8						* 83.6
S America Atl.	84.3	84.0	83.1	77.3	83.8	83.9	86.2	101.1	87.4	79.5	103.2	101.4	88.2
Asia	77.8	69.2	80.3	79.5	81.9	75.5	73.3	96.4	72.7	75.4	124.8	141.6	87.2
Pacific	91.5	90.7			84.2	84.3	84.2			75.9			* 85.4
Inward													
Mediterranean	77.2	77.0	79.3	75.8	80.6	79.1	83.3	93.4	84.7	81.5	99.4	120.8	86.1
Scandinavia	93.3	78.2	77.4	80.7	82.2	78.2	94.6	114.9		105.4	141.9		* 94.8
North Atlantic	72.1	73.8	69.1	69.6	67.7	66.9	76.1	103.8	80.7	100.4	137.2	178.8	91.3
South Atlantic	70.8	60.0	62.8	72.0	67.2	68.5	65.2	96.8	93.4	129.8	162.1	218.3	97.3
Asia	84.7	76.8	72.0	64.3	69.4	70.1	71.0	101.4	106.1	104.2	113.5	116.7	87.7
Pacific	83.8	78.3	74.6	72.7	72.2	70.6	70.1	69.2	86.4	91.8	99.6	116.7	82.3
Atlantic liners	85.3	80.2	76.8	75.6	74.7	75.9	81.7	123.1	125.1	131.2	150.4	166.1	103.8
Aggregate indices													
Outward	84.3	80.6	81.0	79.5	83.7	84.3	84.3	113.6	105.4	113.8	155.0	196.7	105.2
Inward	78.8	74.2	71.8	71.3	71.0	70.6	75.3	98.7	93.5	106.2	129.6	156.1	91.4
Total	81.6	77.4	76.4	75.4	77.3	77.4	79.8	106.2	99.5	110.0	142.3	176.4	98.3

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1915													
Outward													
UK coastal	296.6	338.9	266.5	199.4	202.9	198.2	201.7	198.2	239.3	256.5	370.5	438.7	267.3
Brest-Elbe range	329.8	358.5	350.0	323.7	297.9	285.1	268.3	298.9	337.8	349.7	417.6	474.4	341.0
French Bay ports	307.4	319.9	269.6	332.2	290.8	261.8	229.4	329.3	374.5	399.6	503.5	546.7	347.1
Spain	258.7	288.9	259.7	284.3	254.0	235.7	222.0	223.1	294.2	360.9	370.3	419.1	289.3
French Mediter.	279.3	295.1	260.4	297.6	258.8	250.8	221.2	282.8	337.0	421.5	483.5	567.6	329.7
Italy	328.7	355.4	300.1	370.2	333.2	282.7	256.8	313.3	371.1	435.8	541.3	658.7	379.0
Atlantic Islands	252.5	254.7	252.2	277.9	280.8	256.2	237.2	259.2	311.5	380.2	403.8	447.2	301.2
Eastern Mediter.	260.1	295.7	295.9	286.8	265.7	252.7	230.8	266.9	331.2	377.3	419.9	530.8	317.9
Scandinavia	259.5	344.7	377.2	278.9	273.5	299.7	288.7	242.5	250.5	264.0	340.3	404.1	302.0
S America Atl.	151.7	156.2	161.5	166.3	158.7	162.3	164.0	136.3	169.4	242.0	240.6	257.8	180.6
Asia	249.7	218.9	216.3	219.2	219.0	183.6	199.5	192.1	282.0	362.7	396.1	374.6	259.5
Inward													
Mediterranean	174.7	204.8	212.6	200.3	195.0	189.6	175.9	171.6	191.2	245.4	250.1	299.8	209.3
Scandinavia	192.7	222.2	222.5	217.6	248.2	276.6	273.8	330.0	314.1	398.5	366.1	388.0	287.6
North Atlantic	231.7	246.1	259.4	253.4	245.2	239.0	227.0	242.1	265.6	339.4	393.3	444.0	282.2
South Atlantic	312.8	359.8	363.3	373.2	373.1	276.1	330.3	360.4	331.7	383.1	469.0	619.3	379.4
Asia	163.3	218.7	276.9	277.3	283.0	275.5	259.5	258.0	255.9	289.0	348.2	453.5	279.9
Pacific	126.8	139.5	168.0	179.1	181.1	163.5	189.7	193.9	210.4	233.3	246.8	261.9	191.2
Atlantic liners	218.7	264.1	276.0	283.4	283.7	272.7	263.5	273.9	291.9	379.9	422.5	428.8	305.0
Aggregate indices													
Outward	278.1	309.1	287.8	286.4	266.0	254.4	237.7	258.9	302.1	345.3	413.1	480.9	310.0
Inward	203.0	233.8	255.7	256.9	256.9	239.0	242.2	254.1	264.2	320.3	361.8	418.1	275.5
Total	240.5	271.4	271.7	271.6	261.4	246.7	239.9	256.5	283.2	332.8	387.4	449.5	292.7

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1916													
Outward													
UK coastal	376.8	370.3	421.6	414.3	388.7	318.8	315.4	324.6	325.5	327.4	398.8	423.5	367.2
Brest-Elbe range	511.1	559.4	695.9	778.9	815.4	542.9	539.8	533.5	529.0	554.2	599.5	655.4	609.6
French Bay ports	625.9	648.2	792.6	773.0	820.1	475.1	482.6	481.6	473.7	470.8	460.2	458.3	580.2
Spain	493.2	555.1	675.1	727.9	777.4	651.6	585.4	563.8	499.6	493.1	622.7	592.2	603.1
French Mediter.	656.4	642.8	819.6	810.2	747.1	742.9	618.8	566.5	542.5	557.7	580.9	563.0	654.1
Italy	830.1	757.3	926.5	908.5	937.0	901.6	755.6	716.8	733.5	765.2	671.0	664.8	797.4
Atlantic Islands	470.8	501.2	615.1	564.4	615.1	556.0	519.8	456.8	400.5	399.5	562.4	577.8	520.0
Eastern Mediter.	625.8	684.3	833.1	921.3	961.8	961.3	848.3	753.0	713.3	716.1	812.6	864.2	808.0
Scandinavia	490.3	595.7	653.6	1015.5	1054.4	925.1	802.4	684.5	614.0	616.8	744.1	887.6	757.1
S America Atl.	259.0	290.5	410.6	362.6	357.9	279.5	261.4	218.9	180.6	185.1	247.3	324.0	281.5
Asia	659.5									443.4	470.3		* 524.5
Inward													
Mediterranean	317.1	326.7	350.2	323.2	291.7	292.4	294.5	293.3	290.8	295.7	321.9	369.9	314.0
Scandinavia	347.9	426.7	603.8	879.6	567.0	486.7	445.2	345.2	360.6	481.4	759.9	931.1	552.9
North Atlantic	509.5	545.0	595.1	596.9	579.6	487.6	432.8	486.7	461.7	449.6	482.4	580.2	517.3
South Atlantic	755.9	748.0	752.4	851.1	935.2	840.8	888.7	872.4	764.6	731.6	658.8	779.3	798.3
Asia	561.3	623.6	610.2	550.2	584.0	494.1	462.1	532.8	602.0	603.9	719.7	869.2	601.1
Pacific	318.2	360.4	358.5	348.9	345.4	343.1		575.9	314.3	262.1	213.7	336.2	* 343.4
Atlantic liners	521.6	528.5	610.7	683.1	653.4	475.3	441.8	480.7	467.7	484.1	506.1	536.0	532.5
Aggregate indices													
Outward	539.7	567.4	691.8	742.2	754.0	628.1	571.3	531.4	505.6	515.6	567.5	604.6	601.6
Inward	488.5	522.9	558.2	574.3	561.0	485.8	459.5	523.5	470.9	462.1	480.9	589.4	514.7
Total	514.1	545.2	625.0	658.2	657.5	556.9	515.4	527.5	488.3	488.8	524.2	597.0	558.2

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1917													
Outward													
UK coastal	447.9	493.2	541.3	565.5	547.7	506.7	419.5	417.3	515.3	552.1	572.9	573.4	512.8
Brest-Elbe range	621.2	779.1	822.4	1016.6	1099.9	1122.2	1117.7	1113.3	1138.8	1108.8	1086.6	1057.7	1007.0
French Bay ports	499.3	645.9	711.6	944.1	869.1	935.8	936.8	943.3	943.5	948.3	947.0	942.8	855.7
Spain	643.5	859.4	1259.9	1438.8	1567.7	1601.1	1796.6	1882.2	1988.8	2172.2	2160.0	2513.3	1657.0
French Mediter.	577.3	575.4	575.1	572.2	576.4	569.9	568.8	570.5	568.6	573.3	564.3	566.3	571.5
Italy	620.4	650.4	648.2	646.0	643.7	641.5	639.3	637.1	634.9	632.7	630.5	628.4	637.8
Atlantic Islands	578.3	782.6	901.3	997.1	1086.6	1117.7	1145.5	1169.9	1222.2	1268.8		1299.9	* 1051.7
Eastern Mediter.	898.6	940.8	1060.0		1560.0	1548.8	1612.2	1722.2		1987.7			* 1416.4
Scandinavia	1210.0	1967.7	2494.4	3951.1	5722.2	5824.4	5966.6	5998.8	6022.2	6367.7	7778.8	6577.7	4990.2
S America Atl.	372.6	498.4	582.1	721.6	659.9	588.4	714.6	733.7	719.5	758.6	756.6	800.3	658.9
Asia	632.3									1470.0			* 1051.2
Inward													
Mediterranean	357.2	369.5	422.5	451.6	511.2	559.5	553.1	567.9	594.4	609.1	627.9	620.9	520.5
Scandinavia	752.3	768.3	919.5	1029.9	1153.3	1391.1	1296.6	1158.8	1210.0	1245.5	1496.6	1152.2	1131.3
North Atlantic	686.3	774.7	799.3	871.8	913.7	855.0	910.1	902.1	850.8	903.9	895.1	906.6	855.8
South Atlantic	750.2	721.6	719.2	777.4	760.9	868.3	863.5	917.4	997.3	1012.2	1064.4	972.7	868.8
Asia	841.2	919.1	1039.9	1088.8	1304.4	1396.6	1405.5	1390.0	1464.4	1599.9	1625.5	1553.3	1302.3
Pacific	395.3		387.5	376.2		447.0	446.3	483.9	407.3	441.0	396.0	396.4	* 417.7
Atlantic liners	849.0	994.4	1199.9	936.2	914.2	907.8	933.4	917.6	923.0	997.3	1471.1	1478.8	1043.6
Aggregate indices													
Outward	640.5	776.5	860.0	1003.1	1093.2	1088.7	1099.5	1111.3	1103.9	1176.2	1153.5	1139.5	1020.5
Inward	656.8	734.8	752.7	767.4	871.0	849.4	864.5	873.0	859.1	911.3	961.4	932.1	836.1
Total	648.6	755.7	806.4	885.2	982.1	969.0	982.0	992.2	981.5	1043.8	1057.4	1035.8	928.3

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1918													
Outward													
UK coastal	587.0	480.9	486.6	492.4	495.3	482.9	470.8	485.9	493.6	497.8	502.0	418.4	491.2
Brest-Elbe range	1050.0	1026.6	954.6	1001.1	1015.5	1004.4	1008.8	997.7	996.8	1002.2	905.5	755.1	976.6
French Bay ports	921.3	903.6	908.4	876.4	893.1	863.3	878.6	822.6	837.4	832.5	709.8	673.8	843.5
Spain	3029.9	3675.5	4647.7	4470.0	4343.3	4344.4	4553.3	4113.3	3638.8	2959.9	1498.8	854.4	3510.7
French Mediter.	569.1	567.3	566.2	569.3	563.2	566.3	566.0	566.2	566.5	564.2	564.0	556.0	565.4
Italy	626.2	624.0	621.9	619.8	617.6	615.5	613.4	611.3	609.2	607.1	605.0	602.9	614.5
Atlantic Islands	1316.6	1294.4	1292.2	1339.9	1275.5	1224.4	1202.2	1196.6	1158.8	1227.7	1062.2	850.3	1203.4
Eastern Mediter.	2162.2	2221.1		2120.0	1814.4	1785.5	1677.7		1564.4	1458.8	825.4	610.7	* 1624.1
Scandinavia	5617.7	4787.7	4837.7	5392.2	5695.5	6290.0	6716.6	6826.6	5660.0	3352.2	1387.7	1488.8	4837.7
S America Atl.	787.3	774.7	750.5	731.9	688.9	739.6	768.5	751.3	734.7	702.3	616.9	309.0	696.4
Inward													
Mediterranean	569.7	546.7	559.4	579.7	595.5	573.8	545.9	500.7	477.0	433.6	389.4	369.5	511.8
Scandinavia	1202.2	1337.7	1459.9	1579.9	1695.5	1711.1	1381.1	1464.4	1271.1	1147.7	1174.4	845.0	1356.0
North Atlantic	820.6	775.4	755.2	743.5	737.7	761.2	778.5	811.0	804.0	929.9	811.8	887.3	801.4
South Atlantic	1107.7	1113.3	1132.2	1132.2	1227.7	1179.9	1198.8	1213.3	1225.5	1255.5	1159.9	557.3	1125.2
Asia	1489.9	1450.0	1381.1	1364.4	1349.9	1342.2	1327.7	1346.6	1346.6	1363.3	1414.4	1319.9	1374.7
Pacific	385.2	502.3	484.0	407.6	389.9	418.6	483.1	485.6	484.7	452.9	468.5	443.5	450.5
Atlantic liners	2395.5	2421.1	2450.0	2480.0	2506.6								* 2451.1
Aggregate indices													
Outward	1176.2	1132.5	1069.5	1147.6	1134.8	1145.9	1154.3	1112.5	1100.8	1006.1	785.1	673.6	1053.2
Inward	967.4	989.7	979.0	956.4	964.5	855.4	868.3	883.0	870.5	898.3	850.6	739.5	901.9
Total	1071.8	1061.1	1024.3	1052.0	1049.6	1000.6	1011.3	997.8	985.6	952.2	817.8	706.6	977.6

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1919													
Outward													
UK coastal	452.2	498.9	502.2	364.0	346.2	359.5	398.5	366.3	421.0	439.9	444.1	460.9	421.2
Brest-Elbe range	771.5	777.2	745.4	757.1	767.3	781.3	747.6	799.6	861.2	911.1	1184.4	1335.5	870.0
French Bay ports	675.9	672.4	657.0	689.4	677.8	685.9	690.4	689.7	634.7	720.9	855.0	783.5	702.8
Spain	678.1	721.4	815.8	839.1	849.3	827.6	635.3	594.7	668.8	708.8	795.1	861.8	749.7
French Mediter.	492.8	439.9	443.3	455.3	422.6	420.6	406.5	422.0	429.6	558.4	733.9	633.4	488.2
Italy	537.0	522.1	536.6	532.7	538.1	544.6	542.7	562.0	591.9	742.4	801.0	762.8	601.2
Atlantic Islands	619.8	557.6	558.5	567.6	561.0	560.4	589.3	580.5	604.5	664.5	714.2	655.2	602.8
Eastern Mediter.	506.3	526.7	551.7	530.1	581.0	549.8	551.2	560.7	575.4	707.8	792.7	760.8	599.6
Scandinavia	1259.9	983.7	962.7	949.3	787.6	757.8	765.9	661.3	946.7	1339.9	905.4	994.2	942.8
Baltic					1040.0	969.9	556.1		677.2	1622.2			* 973.2
S America Atl.	383.1	331.6	312.0	293.6	311.4	321.0	289.9	263.2	274.5	314.7	309.3	266.3	305.9
Asia									404.3	404.3		518.9	* 442.5
Inward													
Mediterranean	331.7	316.6	322.5	306.4	307.1	384.7	389.8	365.6	375.6	371.7	372.5	375.4	351.7
Scandinavia	474.0	468.1	481.4	498.3	485.7	552.7	541.9	553.4	584.5	603.8	580.6	604.5	535.8
North Atlantic	722.1	639.7	440.1	523.6	573.4	590.5	579.6	588.7	590.5	608.0	625.5	542.9	585.4
South Atlantic		972.5	1063.3	1284.4	1266.6	1274.4	1217.7	1024.4	859.3	907.8	996.0	985.2	* 1077.4
Asia	439.8	430.8	430.2	434.5	488.2	541.7	698.5	683.2	655.2	644.3	590.9	606.8	553.7
Pacific		324.9	385.6	456.1	238.3		313.3	517.0	405.8	510.1	516.1	362.2	* 403.0
Aggregate indices													
Outward	628.3	595.3	594.7	578.5	563.9	563.6	554.0	544.6	595.9	710.6	756.8	746.4	619.4
Inward	551.1	536.5	494.1	557.1	524.8	616.2	599.0	631.1	587.6	621.3	627.3	566.6	576.1
Total	589.7	565.9	544.4	567.8	544.4	589.9	576.5	587.9	591.8	666.0	692.0	656.5	597.7

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A1. Freight rate indices monthly, 1912 - 1920. Average of 1913=100.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1920													
Outward													
UK coastal	443.2	417.2	399.0	389.1	390.2	379.7	316.3	266.1	267.7	302.4	278.9	237.4	340.6
Brest-Elbe range	1291.1	1349.9	1191.1	1047.7	890.2	745.9	518.4	455.0	428.8	526.1	398.6	282.3	760.4
French Bay ports	784.7	792.1	697.9	645.0	558.8	396.2	359.0	285.8	301.6	412.5	279.6	180.6	474.5
Spain	682.3	720.5	674.7	593.0	840.5	497.5	623.1	410.5		480.0	305.6	228.5	∗ 550.6
French Mediter.	587.1	672.2	567.0	553.0	557.4	564.2	381.6	277.1	227.2	343.3	249.5	174.5	429.6
Italy	733.7	790.6	785.4	799.7	736.2	618.1	408.8	321.6	262.8	434.6	328.5	232.0	537.7
Atlantic Islands	572.0	605.2	499.7	489.7	488.4	446.1	359.1	302.2	294.2	367.7	297.6	250.6	414.4
Eastern Mediter.	728.8	832.3	792.3	699.5	628.3	566.5	422.4	336.4	339.6	424.3	275.0	220.7	522.2
Scandinavia	1206.6	1098.8	1105.5	899.9	811.9	839.5	607.7	516.9	468.7	370.0	386.1	331.7	720.3
S America Atl.	255.8	248.5	243.7	246.6		226.4	248.3	257.8	243.9	352.2	210.6	173.2	∗ 246.1
Asia		672.8										219.2	∗ 446.0
Inward													
Mediterranean	443.0	522.6	535.7	516.5	457.0	425.2	364.5	293.9	293.9	328.3	305.8	257.4	395.4
Scandinavia	513.4	532.7	588.3	597.0	576.7	529.1	380.3	322.5	286.4	332.2	309.3	328.4	441.4
North Atlantic	618.2	585.9	576.2	550.4	554.7	492.4	407.4	386.5	451.4	416.2	354.6	231.2	468.8
South Atlantic	1113.3	993.1	1001.1	802.3	689.9	564.7	519.8	482.5	554.1	510.3	370.2	263.0	655.5
Asia	642.8	596.3	575.3	496.5	472.0	482.3	433.6	331.7	395.9	388.7	369.2	291.2	456.3
Pacific	586.8	480.5	428.6	391.8	363.4	385.0	358.8	324.7	328.5	338.3	302.1	230.6	376.6
Atlantic liners	327.3	315.8	328.9	361.4	393.7	389.6	368.9	342.6	339.7	264.5	259.2	269.6	330.1
Aggregate indices													
Outward	732.2	755.8	703.4	652.9	642.3	545.2	420.9	345.5	318.3	401.8	307.9	232.9	504.9
Inward	602.0	563.9	556.2	517.4	498.2	467.2	409.6	364.7	398.6	378.5	331.9	256.3	445.4
Total	667.1	659.8	629.8	585.1	570.3	506.2	415.3	355.1	358.4	390.1	319.9	244.6	475.1

NOTE: Asterisks (∗) denote cases where the annual averages in the far right-hand column are based on less than 12 monthly observations.

Table A2. Data series monthly, 1912 - 1920

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1912													
Tonnage													
1 British Empire	19116	19133	19157	19164	19220	19203	19281	19347	19436	19537	19579	19705	19323
2 Allied	2680	2695	2711	2727	2742	2758	2784	2810	2835	2861	2887	2913	2783
3 USA	1810	1817	1824	1831	1838	1845	1859	1874	1888	1902	1917	1931	1861
4 Neutrals	8903	8952	9002	9051	9101	9150	9223	9297	9370	9443	9517	9590	9217
5 Axis	5207	5226	5244	5262	5281	5299	5346	5393	5441	5488	5535	5582	5359
6 World	37715	37823	37938	38035	38181	38255	38494	38720	38970	39231	39434	39721	38543
Foreign trade													
15 Tons imports	369.5	319.6	299.1	304.3	337.2	383.9	433.8	473.1	452.8	486.4	432.4	436.6	3941.0
16 Ton-miles imports	91.2	92.2	81.6	91.1	83.8	88.4	97.0	109.4	108.6	106.9	101.5	114.8	97.3
17 Tons coal exports	568.5	578.3	165.4	152.9	662.8	591.4	731.7	672.9	629.9	705.7	646.4	596.6	5585.4
18 Ton-miles coal exports	91.1	106.6	25.3	23.9	113.1	92.3	106.0	100.3	100.5	103.7	97.3	101.3	88.5
Prices													
19 Coal price	14.0	14.5	37.0	18.0	11.0	11.0	11.0	13.0	12.5	13.0	14.0	17.0	15.71
20 Index metals	89.5	94.4	116.4	98.7	94.3	95.7	98.7	101.9	104.9	102.7	101.9	103.3	100.16
21 Index materials	96.9	96.9	99.4	99.6	103.6	103.0	101.5	102.2	103.9	103.6	102.6	102.8	101.35
Wheat													
22 Wheat price Liverpool	8.38	8.73	8.83	8.94	8.44	8.54	8.19	8.27	8.60	8.75	7.73	7.65	8.42
23 Wheat price New York	7.84	8.02	8.15	7.92	7.90	8.09	8.24	7.49	7.02	7.05	6.74	6.73	7.60
24 Charter freight rate	0.63	0.65	0.60		0.57					0.83	0.81	0.69	* 0.68
25 Liner freight rate	0.45	0.53	0.49	0.49	0.38	0.30	0.28	0.41	0.64	0.71	0.77	0.65	0.51

Table A2. Data series monthly, 1912 - 1920

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1913													
Tonnage													
1 British Empire	19689	19702	19706	19782	19834	19849	19932	19999	20054	20123	20223	20320	19934
2 Allied	2938	2964	2990	3016	3041	3067	3091	3115	3138	3162	3186	3210	3076
3 USA	1945	1960	1974	1988	2003	2017	2021	2026	2030	2035	2039	2044	2007
4 Neutrals	9658	9725	9793	9860	9928	9995	10072	10149	10226	10303	10380	10457	10045
5 Axis	5629	5676	5724	5771	5818	5865	5902	5938	5975	6011	6048	6084	5870
6 World	39859	40027	40186	40416	40623	40793	41018	41226	41423	41634	41875	42114	40933
Foreign trade													
15 Tons imports	413.6	359.5	365.0	389.5	411.3	459.3	505.2	448.4	464.1	508.1	405.5	403.9	4278.4
16 Ton-miles imports	98.8	93.9	89.4	96.1	94.0	107.3	110.2	99.7	107.2	110.2	96.9	96.7	100.0
17 Tons coal exports	637.3	581.8	582.9	660.4	614.8	626.8	727.7	607.2	651.1	705.8	620.3	652.9	6390.8
18 Ton-miles coal exports	100.6	98.4	93.1	106.8	91.9	102.6	107.4	88.0	98.5	100.5	100.2	111.3	100.0
Prices													
19 Coal price	15.0	14.0	15.5	15.5	15.5	14.0	14.3	14.0	14.0	13.3	13.5	14.5	14.58
20 Index metals	102.2	99.1	101.2	103.7	103.7	99.8	101.4	101.2	100.0	98.6	94.2	93.6	100.00
21 Index materials	102.6	101.7	100.8	100.6	101.0	101.2	103.3	99.7	97.8	96.9	97.6	96.6	100.00
Wheat													
22 Wheat price Liverpool	7.81	7.69	7.73	7.85	7.94	7.81	7.85	7.75	7.69	7.06	6.98	7.19	7.61
23 Wheat price New York	6.98	7.10	7.12	7.22	7.18	7.47	7.38	6.98	6.73	6.33	6.60	6.77	6.99
24 Charter freight rate	0.69	0.64	0.58	0.55	0.52					0.49	0.41	0.39	* 0.53
25 Liner freight rate	0.60	0.44	0.43	0.39	0.46	0.36	0.34	0.37	0.31	0.38	0.32	0.28	0.39

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1914													
Tonnage													
1 British Empire	20368	20352	20405	20396	20510	20524	20627	20616	20580	20661	20686	20752	20540
2 Allied	3233	3257	3281	3305	3328	3352	3362	3372	3381	3389	3393	3396	3337
3 USA	2048	2052	2057	2061	2066	2070	2117	2164	2211	2258	2305	2352	2147
4 Neutrals	10530	10602	10675	10747	10820	10892	10930	10950	10978	11007	11040	11068	10853
5 Axis	6121	6157	6194	6230	6267	6303	6350						* 6232
6 World	42300	42420	42610	42738	42990	43141	43386	37102	37151	37315	37425	37569	40512
Tonnage lost													
7 British Empire								40	88	78	9	26	* 48
8 Others								23	10	10	11	18	* 14
9 Total								63	98	88	19	44	* 63
Cargo insurance rates													
10 British Channel									2.50	1.50	1.50	1.50	* 1.75
11 UK East Coast									2.75	1.50	1.25	1.13	* 1.66
12 UK West Coast									1.50	1.25	1.50	1.50	* 1.44
13 Western Italy									2.50	1.25	1.25	1.25	* 1.56
14 USA East Coast									1.50	1.25	1.50	1.50	* 1.44
Foreign trade													
15 Tons imports	361.8	314.0	345.3	342.3	366.8	416.8	459.8	328.9	353.3	372.9	368.5	338.1	3640.8
16 Ton-miles imports	90.3	85.8	91.2	92.3	96.6	93.4	100.7	88.8	90.2	86.6	108.6	110.0	94.6
17 Tons coal exports	608.9	597.4	617.2	544.6	646.9	600.1	691.6	320.8	409.6	415.1	342.8	388.0	5152.5
18 Ton-miles coal exports	96.4	104.5	98.0	87.4	105.9	88.3	97.8	45.4	57.2	58.7	50.1	58.8	79.0
Prices													
19 Coal price	13.0	12.5	12.3	14.5	12.8	12.5	12.0	12.0	12.5	11.8	11.5	11.0	12.64
20 Index metals	96.6	94.5	94.4	92.3	91.5	90.2	88.9	90.0	90.2	87.4	90.1	91.9	91.51
21 Index materials	96.8	96.5	96.2	95.5	93.0	93.0	93.4	99.8	109.3	111.3	116.0	116.3	101.51
Wheat													
22 Wheat price Liverpool	7.23	7.35	7.31	7.31	7.56	7.52	7.27	8.73	9.63	9.13	10.10	10.35	8.29
23 Wheat price New York	6.92	7.14	7.14	6.96	7.12	6.86	6.99	8.03	8.37	8.08	8.90	9.19	7.64
24 Charter freight rate	0.39		0.36	0.36	0.39		0.44		0.45	0.52	0.90	0.99	* 0.53
25 Liner freight rate	0.29	0.24	0.20	0.19	0.21	0.27	0.35	0.35	0.40	0.54	0.84	1.03	0.41

Table A2. Data series monthly, 1912 - 1920

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1915													
Tonnage													
1 British Empire	20805	20827	20804	20883	20852	20831	20866	20791	20780	20802	20785	20804	20819
2 Allied	3402	3397	3402	3411	3417	3424	3444	3471	3481	3489	3485	3497	3443
3 USA	2396	2439	2486	2530	2577	2624	2645	2666	2687	2710	2733	2756	2604
4 Neutrals	11079	11094	11109	11103	11094	11071	11074	11086	11103	11133	11154	11163	11105
6 World	37682	37757	37801	37927	37940	37950	38030	38015	38051	38133	38157	38221	37972
Tonnage lost													
7 British Empire	32	36	71	22	84	83	53	148	102	54	94	74	71
8 Others	16	24	9	33	36	48	57	37	50	34	59	49	38
9 Total	48	60	81	56	120	131	110	186	152	89	153	123	109
Cargo insurance rates													
10 British Channel	1.50	1.50	1.00	1.00	1.75	1.50	1.50	1.50	1.00	0.75	0.75	0.75	1.21
11 UK East Coast	1.13	1.13	1.00	1.00	1.75	1.50	1.50	1.50	1.00	0.75	0.75	0.75	1.15
12 UK West Coast	1.50	1.50	1.00	1.00	1.75	1.50	1.50	1.50	1.00	0.75	0.75	0.75	1.21
13 Western Italy	1.25	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.50	1.25	1.25	1.00	1.13
14 USA East Coast	1.50	1.50	1.00	1.00	2.50	4.00	4.00	4.00	2.25	2.00	2.00	2.00	2.31
Foreign trade													
15 Tons imports	330.2	288.6	357.3	352.0	351.1	387.0	418.0	394.3	381.6	350.5	368.2	348.4	3606.5
16 Ton-miles imports	112.0	98.7	107.1	105.0	106.9	108.8	110.0	107.5	105.1	95.0	99.9	93.4	104.2
17 Tons coal exports	376.8	378.2	414.4	398.4	396.5	372.5	373.4	385.3	409.7	377.1	346.9	338.0	3806.0
18 Ton-miles coal exports	52.1	54.6	52.2	53.4	50.0	43.5	38.1	43.7	45.7	39.1	41.8	41.5	46.4
Prices													
19 Coal price	11.5	13.5	19.0	24.0	24.0	19.0	16.0	18.5	16.0	16.0	16.8	20.0	17.97
20 Index metals	99.0	107.4	123.2	120.5	114.8	119.4	119.6	116.8	118.5	120.8	127.7	136.1	118.74
21 Index materials	126.8	129.0	135.1	138.3	137.9	132.0	131.2	131.8	130.4	132.3	140.0	143.8	134.09
Wheat													
22 Wheat price Liverpool	12.25	13.63	13.71	13.98	14.25	11.38	11.94	11.90	11.88	12.17	11.77	12.38	12.60
23 Wheat price New York	10.64	11.92	11.63	12.01	11.83	9.60	9.35	8.02	7.35	7.99	8.37	9.48	9.85
24 Charter freight rate	1.56				1.56	1.56			1.97	2.53	2.69	2.79	* 2.10
25 Liner freight rate	1.33	1.53	1.67	1.60	1.61	1.61	1.41	1.41	1.88	2.69	2.71	2.67	1.84

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1916													
Tonnage													
1 British Empire	20750	20686	20592	20473	20464	20464	20413	20397	20296	20164	20022	19900	20385
2 Allied	3521	3534	3540	3563	3554	3537	3564	3544	3559	3560	3582	3573	3553
3 USA	2779	2802	2825	2848	2870	2891	3009	3128	3246	3364	3470	3589	3068
4 Neutrals	11193	11211	11214	11222	11248	11265	11325	11343	11334	11282	11264	11220	11260
6 World	38243	38232	38170	38105	38137	38157	38311	38413	38436	38370	38338	38282	38266
Tonnage lost													
7 British Empire	62	76	99	141	65	37	82	43	105	176	169	182	103
8 Others	19	42	68	50	65	72	36	119	126	177	143	173	91
9 Total	81	118	167	192	129	109	118	163	230	354	312	355	194
Cargo insurance rates													
10 British Channel	0.50	0.50	1.00	2.00	2.00	2.00	1.50	1.50	1.50	1.50	2.00	4.50	1.71
11 UK East Coast	0.50	0.50	0.88	2.00	2.00	2.00	2.00	2.00	1.50	1.38	1.38	1.38	1.46
12 UK West Coast	0.50	0.50	1.00	1.00	1.00	1.50	1.50	1.50	1.25	1.25	1.25	1.25	1.13
13 Western Italy	0.75	0.75	1.25	2.00	2.00	2.00	2.00	2.00	1.75	1.75	3.50	10.00	2.48
14 USA East Coast	1.88	1.88	2.38	2.75	2.75	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.14
Foreign trade													
15 Tons imports	328.6	276.5	335.0	320.7	348.0	394.0	372.7	369.6	338.8	326.2	326.9	264.3	3335.1
16 Ton-miles imports	95.0	80.8	90.6	93.9	94.1	103.5	90.6	88.9	90.0	93.4	99.0	83.5	92.0
17 Tons coal exports	338.7	331.1	328.0	319.9	382.4	350.0	357.2	366.2	369.8	369.8	322.3	278.1	3427.9
18 Ton-miles coal exports	42.3	39.1	35.4	38.3	41.7	34.6	35.1	33.6	35.3	36.0	33.9	29.3	36.3
Prices													
19 Coal price	23.0	27.0	24.0	40.0	35.0	37.0	35.0	34.0	24.0	26.0	19.0	18.0	28.79
20 Index metals	145.7	153.3	162.8	171.2	180.2	171.2	168.5	167.0	164.2	162.7	162.7	157.7	163.99
21 Index materials	149.9	152.1	154.7	172.7	172.7	172.0	176.3	184.0	181.8	184.3	186.8	188.5	173.03
Wheat													
22 Wheat price Liverpool	13.92	14.67	14.83	13.71	13.08	10.40	11.40	14.52	14.44	15.40	16.75	17.77	14.24
23 Wheat price New York	10.49	10.69	9.97	9.78	9.14	8.67	9.22	11.40	12.28	13.18	14.72	14.04	11.13
24 Charter freight rate	3.18	3.35	3.45	3.00	2.77	2.26	2.02	2.45	2.45	2.33	3.75	4.82	2.99
25 Liner freight rate	2.94	3.29	3.39	2.80	2.71	1.82	2.05	2.33	1.86	1.98			* 2.52

Table A2. Data series monthly, 1912 - 1920

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1917													
Tonnage													
1 British Empire	19830	19619	19432	19005	18764	18535	18264	18060	17996	17872	17820	17725	18577
2 Allied	3553	3528	3522	3482	3482	3441	3427	3406	3338	3269	3233	3189	3406
3 USA	3707	3821	3919	4014	4115	4213	4304	4416	4527	4635	4743	4868	4273
4 Neutrals	11151	11077	10987	10842	10753	10670	10633	10625	10584	10535	10510	10459	10735
6 World	38241	38044	37860	37343	37113	36858	36629	36507	36445	36311	36306	36241	36991
Tonnage lost													
7 British Empire	154	313	353	545	352	418	365	330	196	276	174	253	311
8 Others	215	227	240	336	244	270	193	182	156	182	116	146	209
9 Total	369	540	594	881	597	688	558	512	352	459	289	399	520
Cargo insurance rates													
10 British Channel	4.50	11.00	11.00	21.00	24.00	19.00	17.00	15.00	12.00	12.00	8.00	8.00	13.54
11 UK East Coast	1.38	10.00	10.00	15.00	20.00	15.00	12.00	10.00	8.00	8.00	5.00	5.00	9.95
12 UK West Coast	1.25	10.00	10.00	15.00	20.00	15.00	12.00	10.00	8.00	8.00	6.00	6.00	10.10
13 Western Italy	10.00	12.00	12.00	23.00	26.00	21.00	20.00	20.00	16.00	18.00	15.00	15.00	17.33
14 USA East Coast	2.00	7.00	7.00	11.25	6.00	6.00	6.00	4.25	2.50	2.50	2.50	2.00	4.92
Foreign trade													
15 Tons imports	295.8	253.4	248.7	252.2	303.2	284.8	325.1	311.5	261.6	260.7	261.8	203.4	2719.1
16 Ton-miles imports	86.3	82.6	74.2	76.0	92.0	82.1	91.2	80.9	68.5	67.1	73.0	58.2	77.8
17 Tons coal exports	349.0	290.6	302.7	270.9	366.6	366.6	339.4	324.3	334.0	318.3	280.2	237.9	3150.4
18 Ton-miles coal exports	40.2	38.6	36.2	33.7	45.1	42.0	38.6	34.5	39.7	34.8	29.3	28.1	36.7
Prices													
19 Coal price	21.0	20.0	19.0	19.0	19.0	18.0	24.0	24.0	24.0	27.0	27.0	27.0	22.63
20 Index metals	157.9	158.7	159.6	161.1	160.6	161.0	160.7	158.8	157.3	157.6	162.2	160.6	159.73
21 Index materials	189.7	196.5	217.4	219.1	218.0	216.7	219.7	222.3	229.6	229.0	227.8	228.5	217.91
Wheat													
22 Wheat price Liverpool	18.13	18.13	18.13	18.13	17.67	17.67	17.67	17.67	17.67	15.96	15.96	15.96	17.39
23 Wheat price New York	15.48	14.55	15.71	17.63	17.63	17.63	17.63	17.63	16.84	16.72	16.72	16.72	16.74
24 Charter freight rate	4.69	6.25	6.38	7.55	8.33	7.29	6.25	6.25	6.25	7.29	8.33	10.42	7.11

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1918													
Tonnage													
1 British Empire	17652	17532	17484	17383	17383	17415	17425	17415	17497	17595	17590	17601	17498
2 Allied	3131	3093	3041	3015	2977	2954	2923	2898	2895	2880	2920	2960	2974
3 USA	4964	5101	5283	5474	5757	6059	6329	6632	6974	7364	7669	7977	6299
4 Neutrals	10404	10373	10323	10305	10286	10255	10231	10185	10180	10161	10199	10237	10262
6 World	36150	36099	36130	36177	36404	36683	36909	37131	37546	38001	38378	38775	37032
Tonnage lost													
7 British Empire	180	227	199	216	192	163	165	146	137	59	10		* 154
8 Others	127	92	143	63	103	93	96	138	51	59	7		* 88
9 Total	307	319	343	279	296	256	261	284	188	119	18		* 242
Cargo insurance rates													
10 British Channel	8.00	8.00	8.00	7.00	6.00	5.00	4.00	3.00	2.00	1.50	0.75	0.75	4.50
11 UK East Coast	5.00	5.00	5.00	3.50	3.00	2.25	2.25	1.75	1.50	1.50	0.50	0.25	2.63
12 UK West Coast	6.00	6.00	6.00	4.25	3.50	2.75	2.75	2.00	1.75	1.75	0.50	0.25	3.13
13 Western Italy	15.00	15.00	15.00	13.00	11.50	10.00	8.50	8.00	7.00	6.00	1.75	1.75	9.38
14 USA East Coast	2.50	2.50	2.50	2.50	2.00	2.00	2.00	2.00	1.50	1.50	0.50	0.25	1.81
Foreign trade													
15 Tons imports	246.8	230.2	239.4	277.3	304.7	240.9	259.9	287.2	241.5	271.6	269.2	268.5	2614.7
16 Ton-miles imports	68.0	68.4	65.7	76.2	87.0	69.8	61.6	74.0	64.7	71.9	72.0	74.3	71.3
17 Tons coal exports	288.7	263.2	263.9	278.5	304.5	255.8	304.2	360.9	299.3	313.0	259.3	224.6	2846.6
18 Ton-miles coal exports	33.2	32.9	31.2	29.1	33.7	28.9	30.7	36.0	33.5	34.5	28.5	23.8	31.2
Prices													
19 Coal price	27.0	27.0	27.0	27.0	30.0	40.0	50.0	51.5	51.5	50.0	53.5	70.0	42.02
20 Index metals	158.6	160.3	159.9	162.6	162.4	164.8	170.2	170.2	170.1	168.1	172.8	165.7	165.51
21 Index materials	225.2	223.5	223.5	227.5	232.0	234.0	233.7	236.4	236.3	235.8	235.5	226.6	230.89
Wheat													
22 Wheat price Liverpool	16.33	16.33	16.33	16.33	16.33	16.33	16.33	16.58	16.58	16.58	17.25	17.25	16.55
23 Wheat price New York	16.72	16.72	16.72	16.72	16.72	16.72	16.72	16.71	16.72	16.71	16.71	16.72	16.72
24 Charter freight rate	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42

Table A2. Data series monthly, 1912 - 1920

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1919													
Tonnage													
1 British Empire	17702	17803	17905	18006	18107	18208	18348	18487	18627	18767	18906	19046	18326
2 Allied	3000	3040	3080	3120	3160	3200	3357	3514	3670	3827	3984	4141	3424
3 USA	8285	8592	8900	9208	9516	9824	10043	10263	10482	10701	10921	11140	9823
4 Neutrals	10272	10307	10342	10377	10412	10447	10719	10992	11264	11537	11809	12081	10880
5 Axis							35	70	105	140	175	210	* 122
6 World	39259	39742	40227	40711	41195	41679	42502	43325	44148	44971	45794	46617	42514
Cargo insurance rates													
10 British Channel	0.75	0.75	0.75	0.20	0.20	0.20	0.20	0.20	0.20				* 0.38
11 UK East Coast	0.25	0.25	0.25	0.20	0.20	0.20	0.20	0.20	0.20				* 0.22
12 UK West Coast	0.25	0.25	0.25	0.20	0.20	0.20	0.20	0.20	0.20				* 0.22
13 Western Italy	1.75	1.75	1.75	0.30	0.30	0.30	0.30	0.30	0.30				* 0.78
14 USA East Coast	0.25	0.25	0.25	0.20	0.20	0.20	0.20	0.20	0.20				* 0.22
Foreign trade													
15 Tons imports	286.2	211.0	214.4	227.0	302.9	269.5	342.5	371.5	342.4	385.7	317.7	317.0	2990.3
16 Ton-miles imports	79.3	66.5	63.7	66.6	91.0	81.6	88.6	102.9	107.0	110.2	104.5	102.3	88.7
17 Tons coal exports	254.8	294.6	413.3	278.2	408.7	348.7	368.1	246.7	296.0	302.1	303.2	330.9	3204.4
18 Ton-miles coal exports	25.9	34.8	49.2	31.8	44.6	40.5	38.0	30.9	34.8	34.9	36.2	39.8	36.6
Prices													
19 Coal price	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	80.0	80.0	80.0	90.0	74.17
20 Index metals	158.4	156.5	161.6	174.6	178.1	179.3	197.7	199.0	200.3	203.6	209.1	219.1	186.47
21 Index materials	226.3	222.1	219.3	218.7	224.9	232.4	240.2	234.4	227.8	230.2	236.6	246.3	229.98
Wheat													
22 Wheat price Liverpool	17.29	17.29	17.29	17.29	17.29	17.29	17.29	17.29	12.94	12.94	12.94	12.94	15.84
23 Wheat price New York	16.65	16.65	16.83	17.02	17.00	17.17	17.91	18.57	18.98	18.96	19.36	20.81	17.99
24 Charter freight rate	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77

Table A2. Data series monthly, 1912 - 1920

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
1920													
Tonnage													
1 British Empire	19229	19412	19595	19777	19960	20143	20119	20094	20070	20046	20021	19997	19872
2 Allied	4297	4454	4611	4768	4924	5081	5138	5195	5252	5309	5366	5424	4985
3 USA	11359	11579	11798	12017	12237	12456	12550	12644	12738	12832	12926	13020	12346
4 Neutrals	12349	12616	12883	13150	13417	13684	13806	13929	14051	14173	14296	14418	13564
5 Axis	244	279	314	349	384	419	439	458	478	497	517	537	410
6 World	47478	48339	49200	50061	50922	51783	52052	52320	52589	52857	53126	53394	51177
Foreign trade													
15 Tons imports	294.2	256.6	318.8	334.9	353.9	376.6	382.5	390.5	380.9	384.4	328.9	338.5	3451.0
16 Ton-miles imports	100.4	93.7	94.4	97.0	106.1	104.1	98.1	101.3	106.4	109.6	99.8	98.6	100.8
17 Tons coal exports	379.5	298.6	270.7	225.2	236.3	227.4	249.2	221.1	184.1	166.3	154.9	261.5	2395.7
18 Ton-miles coal exports	43.8	36.8	26.3	23.7	24.8	23.9	25.4	24.2	21.3	16.8	15.4	31.2	26.0
Prices													
19 Coal price	100.0	115.0	115.0	75.0	75.0	75.0	75.0	75.0	80.0	75.0	75.0	75.0	84.17
20 Index metals	231.8	239.8	238.4	235.8	247.9	246.6	250.3	249.2	250.8	251.9	241.0	232.6	243.05
21 Index materials	260.2	273.6	289.7	280.4	274.4	263.6	261.2	263.5	260.9	245.1	226.4	216.1	259.65
Wheat													
22 Wheat price Liverpool	12.94	12.94	12.92	20.33	20.42	20.42	20.42	20.42	20.42	20.63	25.27	23.00	19.18
23 Wheat price New York	24.02	25.93	24.04	25.96	27.90	26.33	26.27	25.80	26.22	23.04	20.27	19.20	24.58
24 Charter freight rate	1.77	1.77	2.29	2.40	2.40	2.60	2.36	2.42	2.19	2.08	1.85	1.67	2.15

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