A Repeat Sailings Index of Ocean Freight Rates for the 1850s*

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Abstract

The middle of the nineteenth century has long been a challenge to researchers of ocean freight rates. The data originating from the circulars of the London shipbroker firm of Angier Brothers have been the basis of much of the early work on pre-WWI freight rate movements, including the well-known Isserlis index published in 1938. These data only extend back to 1869, however. This paper presents new ocean freight rate indices for the 1850s using a number of previously unexplored data sources, including contemporary Norwegian and British newspapers and freight rate circulars. Monthly indices of 14 homeward trade routes and 14 outward coal freight routes from Britain are presented, giving new information on the cyclical movements of ocean freight rates in the 1850s. The application of a new method of index construction to the freight rate data is suggested. This method has previously been successfully applied to construct price indices for property markets, where it is known as a 'repeat sales index'. It is argued that this method may be applied to ocean freight rate data as well, because the property markets and the tramp shipping markets share the basic characteristics of the price information flow: prices of specific objects are usually available only at infrequent and irregular intervals.

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1 Introduction

'Beyond general agreement that freight rates fell in the last quarter of the nineteenth century, there is little consensus among maritime historians about the subject.'

Fischer and Nordvik (1986)

Although some progress has been made with respect to bringing our knowledge of nineteenth century ocean freight rates on a firmer ground in recent years, most notably by Harley (1989), the citation by Fischer and Nordvik (1986) is still basically valid with respect to the period from 1850 to 1914. The well-known data originating from the circulars of the London shipbroker firm of Angier Brothers, which have been the basis of much of the early work on pre-WWI freight rate movements, including the well-known Isserlis (1938) index, only extend back to 1869.[1] For the 1850s and 1860s no such convenient single data source is available.

This paper adds to this literature by exploiting sources that have not previously been systematically investigated. These include contemporary Norwegian and British newspapers and trade circulars, which contain a wealth of quantitative information on ocean freight rates furnished by shipbrokers, correspondents and foreign consuls in major ports all over the world.

A further contribution of the paper is the application of a new method of index construction to the freight rate data. This method has previously been applied to the housing market with some success (where it is known as a 'repeat sales index').[2] It is argued that it is eminently suitable to indices of ocean freight rates because the property markets and the tramp shipping markets share the basic characteristics of the price information flow: prices of the individual objects (a house or a particular cargo transported from one port to another) are typically published infrequently and at irregular intervals. By using this method – referred to here as a 'repeat sailings index' – it is possible to extract indices using information contained in all available freight rate quotations in the sample. Using freight rate data on a large number of specific trade routes and cargoes is an improvement compared with traditional indices which often rely on one or a few 'representative' freight rate series.

By applying this method to a large sample of freight rate quotations from the period 1848 to 1861 monthly indices for 14 homeward trade routes and 14 outward coal freight routes from Britain are derived.[3] This gives a much firmer basis for discussing the turbulent cyclical movements of ocean freight rates in the 1850s, also providing some perspectives on the controversial issue of the long run course of freight rates in the nineteenth century.[4]

2 Sources of ocean freight rate quotations for the 1850s

2.1 Freight rate data in the existing literature

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[1] The data were published in Fairplay in 1920, and later used by Isserlis (1938) to construct an annual index of freight rates beginning in 1869. Recently Mohammed and Williamson (2004) have presented new indices using these data with some supplements.

[2] The method was developed by Case and Shiller (1989).

[3] The sample contains about 130,000 freight rate quotations, of which about 45,000 refer to outward coal freights from Britain.

[4] North (1958), Harley (1988, 1989), Mohammed and Williamson (2004) and Persson (2004).

Major contributions to the history of nineteenth century freight rates which contain mid-century time series include the North American export freights derived by North (1958, 1965); grain, timber and cotton freights to the United Kingdom, mainly originating from British Parliamentary Papers, compiled by North (1958) and Harley (1988, 1989), as well as outward coal freights from Britain constructed by Harley (1989). For the 1850s and 1860s in particular there is also useful material in Davis (1894), Matthews (1979), Fischer and Nordvik (1987), Fischer (1991) and Persson (2004).

Douglass North's index of American export freight series has been critically discussed by Harley (1988). In this index the weights were changed every decade, reflecting export shares of staple commodities like cotton, tobacco, grain, flour, naval stores and, from the 1860s, petroleum. Because the freight rates of the individual commodities were not separately published the changing composition of the index causes problems of interpretation regarding its use as a price (freight rate) index.[5] The problem is aggravated by the severe measurement problems of the cotton freight series that Harley have identified, which stemmed from the fact that cotton freights were quoted by weight rather than volume, the latter being the most critical factor with respect to shipping capacity in the case of light cargoes. Major improvements over time in packing cotton for shipment made the freight rates quoted by weight a biased measure of the cost of cotton transport.

Harley (1988, 1989) compiled some important homeward (to the UK) freight rate series on the basis of British consular reports and other material published in *Parliamentary Papers*. These data cover an impressively long time span, extending back to the 1810s, and in one case, back to 1757. For the late 1840s and part of the 1850s there are significant gaps in these data series, however, which make them less useful for a more detailed study of the cyclical movements around the middle of the century. These time series have been pieced together from various sources by splicing data series on timber freights from Riga, Memel and St. Petersburg, which may create a source uncertainty as to consistency over time.

The annual coal export freights from Britain derived by Harley (1989), covering the period from 1838 to 1913, are constructed in a consistent way from contemporary North of England newspaper sources. This is a rare example of high-quality freight rate series with no gaps covering a considerable time span. These data may be extended with respect to frequency (from annual to monthly) and with respect to regions,[6] which may be useful for a more detailed analysis of short run movements at middle of the century.

Davis (1894) contains monthly data on wheat freights from San Francisco to Liverpool from 1860, the first year in which the wheat trade from California to Europe became quantitatively important. Matthews (1979) presents graphs of freight rates to Europe on key American export commodities, mostly beginning in the middle of the 1850s. Persson (2004) derived a weekly time series of wheat freights from New York to the United Kingdom for the period 1850 to 1900. The data are based on the freight rates charged by regular packet ships to Liverpool 1850-1880, and to London thereafter, with steam substituted for sail after 1864. The berth grain rates from New York to Liverpool or London

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[5]This objection does not necessarily apply to its use as an implicit deflator for nominal export earnings within a national accounting framework, which was the original motivation for constructing the index.

[6]In Harley (1989) freights to the East (Colombo) begin in 1853, to the west coast of South America (Chilean ports) in 1858 and to the east coast of South America (River Plate) in 1862. It is feasible to extend all these series back to 1850 or earlier.

rate are among the most important freight rates in this period, but there is some uncertainty whether the Liverpool rate in particular was representative of the general movements of north Atlantic freight rates of the period.[7]

2.2   New sources

This brief review of the existing published material on freight rates indicates that significant further improvements of the quality and coverage of freight rate series covering the 1850s in particular depend on bringing in new sources of data. This is of course even more required when monthly, rather than annual, data series are desired.

The well known British weekly trade journals *Shipping and Mercantile Gazette* and *Mitchell's Maritime Register* have been much used as sources of freight rate quotations later in the second half of the nineteenth century, and these sources are important for our purposes as well. The more useful of the two, *Mitchell's Maritime Register*, began publication in September 1856. This source contains a weekly review of the London charter market, often including a few quotations for selected trade routes; in addition, reports containing some locally determined freight rates from various ports all over the world can be found, although the frequency of reporting from a specific port might be highly variable. Coal freights from Tyne and Wales to selected ports were also printed in tabular form.

British consular reports contain some additional data, but a preliminary search in British Parliamentary Papers in the 1850s revealed only a few monthly time series for selected years from a few ports. In general the amount of useful data in these sources seems to be limited.[8]

Coal freight tables from Tyne and Wales were frequently published in the standard sources cited above. However, Harley (1989, p. 315) makes an important point regarding British coal freight rates, which applies fully to the 1850s: exports to Home waters, encompassing ports from Brest to the river Elbe (inclusive), accounted for a significant part (26 per cent in the 1850s) of coal exports, but coal freight quotations to these ports were often not to be found in coal freight tables published in London based sources, including the above mentioned *Mitchell's Maritime Register*. It is thus easier to find a good time series of coal freights to Callao than to Calais, although the latter port, Havre, Rouen and other northern French ports as well as Hamburg, the most important of all, must weigh heavily in any representative index of outward coal freights from Britain in this period. The data can, however, be retrieved from local newspapers published in the North of England.[9]

Shipbrokers in London and Newcastle published freight circulars with a fairly high frequency, but with one important exception more fully discussed below, few seem to have survived in the archives. Fortunately, some of these circulars found their way to the pages of the contemporary newspapers. A few may be found in the specialized trade journals referred to above,[10] but by far the richest collection

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[7]Harley (1990).

[8]For some years in the second half of the 1850s freight rates from Shanghai, Canton, Rio Grande, Bahia and Odessa can be found. These data were found in the following volumes of *British Parliamentary Papers: LV(1854-55), LVII (1856), XXXVIII (1857), LV (1857-58), XXX (1859)* and *LXIII (1861)*.

[9]The main newspaper source for the 1850s is *Newcastle Courant*, but due to the bad physical condition of some of the volumes of this paper held by the British Library other newspapers sources had to be used as well. These included *Newcastle Chronicle* (1854, 1855), *Newcastle Guardian* (1856, 1857, 1860) and *Newcastle Journal* (1858).

[10]See for example the freight report furnished by the well-known shipbroker, author and member of Parliament, W. S. Lindsay in *Mercantile and Shipping Gazette,* January 13, 1854.

of such circulars appears to have been published in contemporary Norwegian daily newspapers.

Following the abolition of the British navigation laws, effective from January 1850, the Norwegian shipping industry expanded rapidly[11] and London shipbrokers frequently used Norwegian newspapers to advertise their services to shipowners. Throughout the 1850s excerpts from freight rate circulars from leading British shipbrokers were published in the main newspapers.[12] In addition to the freight circulars and advertisements from foreign shipbrokers the business columns of Norwegian newspapers also frequently contained reports and short notices on individual fixtures as well as general market conditions with prevailing freight rates in various parts of the world.

With the exception of the freight rates circulars of the London shipbrokers Goodliffe & Smart (hereafter G&S) the frequency at which these were published in newspapers was highly variable, however; in some cases being concentrated to the first months of the year in order to catch the attention of shipowners preparing for the spring charters. In contrast, the fortnightly G&S circulars were published in Norwegian newspapers quite regularly from October 1849 to April 1861, although there were a few gaps in some years.[13] This is an extremely valuable source of freight rate quotations in the 1850s.

The freight rates quoted in these circulars form the backbone of the monthly indices derived here. An typical example of homeward rates from this source for 5 May 1855 is shown in Table 1. The format of the circulars remained much the same over the years: general comments on the state of trade with respect to the most important trade routes along with prevailing rates and the broker's view of the most likely freight to be obtained interspersed among the text. The quotations included in Table 1 are examples of the most frequently quoted rates and give a fairly representative (although not complete) summary of the key homeward freight rates of the 1850s.[14]

The key trade routes and cargoes suggested by the G&S data include the following:

- Black Sea: grain

- Mediterranean: grain, flour, beans, sulphur, salt, wine, oil, timber, corkwood

- Baltic: grain, oilseed, tallow, flax and hemp

- Baltic: timber

- North Sea: timber

- White Sea: timber, oats, tar

- North America Atlantic seaboard: timber

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[11]See Kiær (1893) and Nordvik (1985).

[12]The most important newspapers were the Christiania papers *Morgenbladet, Christianiaposten* and *Aftenbladet* (beginning in 1855) and *Vestlandske Tidende* published in Arendal. The most active shipbrokers included Lindsay, Northcote, Clarkson, Goodliffe & Smart, and Windle of London; William Southern, Boldemann Borries and Jobson of Newcastle; Lotinga of Sunderland, and Tellefsen & co. of Cardiff.

[13]The most critical year is 1851, but fortunately this is one of the few years for which some copies of the G&S circulars can be found in original form in the British Library Newspaper Section at Colindale in London.

[14]The circulars as published in the newspapers contained a few more quotations than reproduced here, also including coal freights from Tyne and Wales. A set of more extensive inward and outward freight rates were often appended to the original circulars but excluded from the newspaper versions.

- Central America: mahogany, dyewood, sugar, coffee

- South America Atlantic seaboard: coffee, hides, sugar

- America Pacific seaboard: guano, nitrate of soda, saltpetre

- Far East: rice, teak, cotton, sugar, coffee, oilseed, jute, general cargo.

The rates quoted by G&S applied mostly to cargoes chartered in London. However, in the middle of the nineteenth century it was often the case that ships were not chartered in advance before sailing to a port looking for a cargo. The lower Baltic and the Black Sea were typical regions with important local freight markets.[15] Freight rate reports from Danzig, Memel, Königsberg, Stettin, Riga and Kronstadt are therefore essential to a broad coverage of the Baltic Sea freights. In the same way many charters for Black Sea and eastern Mediterranean grain freights were fixed in Constantinople. Local chartering in the Far East was extensive from such ports as Calcutta, Bombay, Hong Kong and Shanghai, as well as in the West Indies sugar trade and the Brazilian coffee trade to Europe.[16] The North Sea timber trade from the ports of Gothenburg and southeastern Norway to Britain and France was also largely chartered locally in this period, although this practice seems to be in decline after the 1850s. Local freight reports from all these regions therefore constitute a necessary supplement to information from British sources.

The London brokers were less active with respect to fixtures from North America, although grain freights were also chartered in London during certain periods when imports of breadstuffs to Europe was heavy. Freight rate data from America must therefore mostly be acquired from American sources. The *New York Times* was used for this purpose, since it provides daily freight rate information beginning in 1852. The additions to the list of trade routes from this source include the following freights from the Atlantic seaboard:

- cotton

- *charter rates* of grain, flour, provisions, tobacco, naval stores and other general cargo (in addition to the separate indices for cotton and timber)

- *berth (packet) rates* of grain, flour, provisions, tobacco, naval stores and other general cargo.

Because cotton transport was quantitatively important, and the freight rates often seemed to fluctuate independently of other trades, it is desirable to separate cotton freights from other cargoes. It is further essential to distinguish between the freight rates for charter cargoes on sailing ships on the one hand, and berth cargos on packet ships on the other hand.[17] The berth freight rates tended to be more variable than the corresponding cargo rates because the supply of shipping space on ships on a regular schedule by its nature was quite inflexible in the short run.

This gives us a list of fourteen inward routes for which it it desirable to construct monthly indices. With respect to outward coal freights from Britain the same number of indices have been constructed,

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[15]Kaukiainen (1998).

[16]New York charters seem to have dominated the sugar trade to North America.

[17]See Harley (1990).

basically corresponding to the geographical areas of the homeward indices (excluding the White Sea), but using a somewhat finer grid in European and Mediterranean waters. Australia has also been separated from the American Pacific because of the special focus on this region in the 1850s. Further details on the geographical delimitation of these indices are given in the appendix.

3 The sample of freight rates

From the various British and Norwegian contemporary newspaper sources about $130,000$ freight rate quotations have been extracted for the years 1848 to 1861, of which $55,000$ apply to homeward tramp cargoes, $45,000$ to outward coal freights Britain and $30,000$ berth rates and part cargoes from New York.[18]

The great majority of inward or homeward freight rates (as defined here for convenience) are for ports in the United Kingdom, which is consistent with the dominant position of Britain as a major importer of raw materials and as a hub for the re-export trade in these years. It should be noted, however, that the sample also includes a substantial number of quotations for other destinations: for example, timber from Baltic and North Sea ports to French (Atlantic as well as Mediterranean), Dutch and Belgian ports; likewise grain from Baltic (including Denmark) and the Black Sea to European continental and northern Scandinavian ports; sugar, coffee, hides and salt and guano from Latin America to the USA; salt from the Mediterranean and Portugal to South America. Although Liverpool, London and Glasgow dominated the New York berth rate sample it also includes quotations relating to packet line services to Havre, Antwerp, Bremen and Hamburg.[19]

3.1 Steam versus sailing ship freight rates

Nearly all freight quotations are for sailing ships; in very few instances were separate steam ship rates quoted. Regular steamship routes did carry goods to some extent, but the rates offered were apparently usually not published in the freight rate columns in the 1850s, except for the eastbound New York sailing packets. Towards the end of the 1850s it was common to see steam ship rates quoted along with sailing packet rates, although not so regularly and for a smaller range of commodities. The sailing packets lost the bulk of cabin passenger and fine freight to the steam liners following the commencement of a regular New York to Liverpool line service by the Cunard line in 1848, but heavy freight was still the domain of the sailing packets in the 1850s.[20] By 1860 it was particularly provisions (meat, cheese and lard) that went by steam, at a much higher rate than for sailing ships. For these commodities the premium on transport by steam was typically in the order of 30 to 70 percent.

In our sample steamer rates begin to be more regularly quoted in the Mediterranean grain and cotton trade, especially from Alexandria, towards the end of the 1850s. In the second half of 1860 we have twelve simultaneously recorded quotations from Alexandria to Liverpool with wheat cargoes. In

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[18]Before January 1852 berth rates were not available on daily basis, but a sufficient number of quotations can be found in Norwegian newspaper sources. The *Economist* of 26 November 1853 gives a useful summary of monthly rates for grain and flour from New York to Liverpool and London from January 1846 to October 1853.

[19]Occasional quotations for Bristol, Irish ports and Rotterdam are also included.

[20]See Albion (1938, pp. 253-272) for a good description of the competition between 'canvas and steam' in the packet boat trade.

this sample the steam rates were ranging from 89 to 159 percent of the corresponding rates for sailing ships. On average steam ship rates were 22 percent higher, close to the median figure, with the bulk of observations clustering between 18 and 33 percent. Cotton steamer rates from Alexandria were also definitely higher than sailing ship rates but highly variable. There are also scattered observations from the Baltic grain trade, particularly in the very early or late parts of the season, which indicate a range of 25 to 40 percent difference.

Our observations from the 1850s are in line with Matthews (1979, p. 232) who noted that in the North American trade '[s]teamers, especially during the 1860s, commanded much higher rates than did sailing vessels.' In the 1850s the premium on steam was substantial but seemed to vary much according to trade routes, cargoes, season and the general state of trade.

3.2 Annual averages of key freight rates

Tables 2 and 3 present the annual averages 1848-1861 of some of the key freight rate series contained in our sample. All data are computed as means of up to 12 monthly average observations. In general, however, quotations may exist for a limited number of months only, often because of no or little activity in a particular trade during parts of the season. This feature of the data may create some distortions when comparing the data series, particularly concerning averages in years of great fluctuations in freight rates. Thus, although the most significant distortions are believed to be confined to the New York berth rates, a general warning concerning this aspect of the data is necessary.[21] For this reason it is not advisable to use such annual figures as the basis for index construction - even if one is only interested in an annual index.[22]

The two tables nevertheless contain some useful information on the key freight rate series of the period. With few exceptions none of the inward series in Table 2 have previously been published for this period. Grain and timber rates are well represented from the Baltic, the North Sea, the White Sea and the North Atlantic, whereas for the other regions a variety of the most actively transported cargoes are included. During the Crimean War exports from the Russian ports of Archangel and Odessa was suspended from the spring of 1854 until the spring of 1856, which is the reason why there are no data for 1855 and parts of 1854 and 1856.[23]

The important New York to Cork for order tramp cargo (no. 31 in Table 2) rate has been extended back to 1852, which is eleven years prior to the existing series.[24] Harley (1990) has argued that the New York to Liverpool berth rate for grain (32) is not typical of the North American grain rates after 1870 because it fell significantly relative to the Cork for order tramp rate and other berth rates

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[21]This effect is clearly distorting the New York (B) to Liverpool rates on corn (maize) and wheat in Table 2. The New York rate on corn to Liverpool was quite regularly about 90 percent of that of wheat when quoted on the same day, but as can be seen from Table 2, there are fairly large discrepancies between the two rates on an annual average basis.

[22]A similar caution is appropriate regarding the Angier data used by Isserlis (1938). These data are averages of the highest and lowest quotation each year, and the majority of series have large gaps.

[23]For series no. 18, the Odessa - UK rate chartered in London nevertheless contains an entry for 1855. Some London brokers quoted freights from Odessa, Kertch and the Sea of Azov in the first five months of 1855, presumably intended for neutral ships, but Goodliffe & Smart in their circular of 8 March (*Morgenbladet* 22 March 1855) maintained that the prevailing freight rate quotations from these port were nominal. They have nevertheless been included here to give an indication of the level of freight from the Black Sea in this year. Shipments from the Danube continued in 1855 despite rumours of Russian interference in this trade.

[24]See Harley (1990) and Matthews (1979). Note that there is no observation for 1859, a year in which negligible amounts of wheat were exported from the United States to the UK.

thereafter. We note from Table 2 that there does not appear to be any such tendency between the 1850s and 1870; the available data for the 1850s show that the Liverpool berth rate was 71 per cent of the tramp cargo rate, which is nearly the same as what is observed around 1870.[25]

The coal freight quotations in Table 3 for the period 1848 to 1861 supplement and extend those published by Harley (1989) which cover a much longer period. It should be noted that coal freight rates from Tyne (chiefly Newcastle) were quoted in pounds per keel (of 21.2 tons) and those from Wales in shillings per ton.[26] The sample consists of fairly regular coal freight quotations to more ports than shown here but the rates in Table 3 are among the most quoted routes and include the ports receiving the largest export volumes.[27]

3.3 The reliability of the freight rate quotations

Two factors support the proposition that the freight rate data collected here must be considered as fairly reliable. First, the quotations furnished by shipbrokers should in general be a fair estimate of the likely market rates in the near future. Although some shipbrokers had a financial interest in shipping they were basically intermediators: if they were systematically biased the brokers would lose the confidence either of the shipowners or the goods trading firms.[28] Secondly, in addition to quotations from various shipbrokers' circulars our sample contains a variety of data from local consulars and correspondents in all major ports, also including the freights obtained in actual fixtures. This provides a useful cross-check on the data. No systematic bias is apparent from such comparisons. On the other hand, there might exist discrepancies between the level of freights chartered in London and those obtainable on the spot – which could go either way. A ship chartered in London would usually have to go from somewhere in northern Europe in ballast or try to get a cargo, which was often was coal, to a nearby port before arriving at the port of clearance. Particularly before the widespread use of the telegraph the London and the local freight markets could be separated because of the time lags involved. In addition, weather conditions might affect chartering activity towards the end of season in northern waters; late autumn freight rates from the Baltic, Black Sea or Quebec might drop substantially if there was a surplus of unchartered ships looking for employment before the winter set in.

4 A repeat sailings index

Even in cases where the sample of freight rate quotations at hand is fairly large there is a fundamental problem which all previous researchers attempting to construct indices of freight rates have struggled with: how to cope with the fact that nearly all available time series of individual freight rates do have

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[25]The difference between the two rates can be decomposed into two separate components: one referring to the difference between tramp cargo and berth rates and one reflecting the premium paid for chartering indirectly, i.e. for order, rather than to a direct port. The latter component was typically around 10 per cent, thus accounting for somewhat less than half of the difference.

[26]Note that most of the long-distance coal freights in Harley (1989) are from Wales.

[27]A detailed list of export volumes to individual ports can be found in the Royal Commission on Coal Supply, vol III, Appendix to the Report of Committee E., *British Parliamentary Papers (1871), vol. XVIII.*

[28]An example of the strong financial links is the fact that London shipbrokers like C. J. Northcote and H. Clarkson gave financial assistance to Norwegian shipowners and held shares in Norwegian sailing ships, see Worm-Müller (1950, pp. 251-253) and Bakka (1999, pp. 18-19).

gaps – either because no data have been found or simply because no voyages were undertaken for a period of time due to frozen waters, no trade activity or blockade. Isserlis (1938) tried to tackle the problem by using a rather unsatisfactory type of chain index, which was later modified by Mohammed and Williamson (2004). Harley (1988, 1989) used splicing factors in an ingenious way to link various time series of grain and timber freights from a number of different sources. None of these methods are wholly satisfactory.

The measurement problems we are facing can be illustrated by referring to Table 4, which contains some charter freight rate quotations from North America between March and August 1856. The freight market was quite buoyant early in 1856 as grain and flour exports to Britain and the European Continent had increased significantly in the late autumn of 1855. The high level of activity continued throughout 1856, although there was a temporary slackening in the volume of shipments in the months March, April and May. The falling freight market in the spring is quite evident from the quotations of Table 4; note, for example, the decreasing rates quoted for wheat cargoes to Liverpool and of rye cargoes to Rotterdam and Bremen between March and May. But then the course of freight rates becomes less clear because there are no data on these routes until August, when the New Orleans to Liverpool wheat freight is quoted again, slightly higher than in May. The quotations on flour and rosin to Bristol and Glasgow give somewhat conflicting evidence over these months; the Glasgow flour rate rebounds vigorously from May to June while the Bristol rosin quotations are unaltered and the Bristol flour rate falls between April and June.

This example is fairly typical as to the problems inherent in the construction of freight rate indices: even for the most quoted routes it is virtually impossible to piece together a continuous time series of a single trade. The problem is obviously less acute in the case of an annual rather than a monthly index, but even in the former case gaps in data series will be rather common. Basing the index on a few spliced series represents an inefficient use of the available data in large samples and is also unfeasible in practice when there are numerous gaps in the series. Splicing may also be rather hazardous as the relative freights to or from the various ports are in general far from constant over time even in monthly comparisons. This is in part due to the fact that freights may change daily within a particular month, the prospects of a return cargo from the destination port may develop differently as well as a variety of special factors attached to each fixture which is not reflected in the quoted freight rate.[29]

Given these problems I suggest using a type index extensively employed in the construction of house price indices, where it is referred to as a *repeat sales* index. This index has been developed for a market where the price of each object is quoted infrequently and at irregular intervals, which typically characterizes the house market. As we have seen in the sample discussed above a somewhat similar situation is typical in the freight market: a quotation for any specific voyage with a particular cargo (referred to here as a *sailing*) is typically available at irregular intervals.

Formally, the index is derived from estimating the model

$$\ln(p_{it}) - \ln(p_{i,t-j}) = \gamma_2 D_{i2} + \gamma_3 D_{i3} + \ldots + \gamma_t D_{it} + \ldots + \gamma_T D_{iT} + \varepsilon_{it}$$

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[29]Any known primage paid to the shipowner is accounted for in the freight data used here but a number of other factors are not. These may include the size, nationality and classification of the ship, availability as to loading date, lump-sum gratification payments etc.

where p_{it} is the freight rate of a particular sailing i (for example wheat from New York to Liverpool) at time t; similarly, $p_{i,t-j}$ is the freight rate pertaining to exactly the same sailing j months earlier; D represents a set of dummy variables that take a value of 1 at time t, a value of -1 in month $t-j$ when the last sailing took place and zero elsewhere (so that $D_{it} = 1, D_{it-j} = -1, D_{it-s} = 0$ for $s \neq 0$ or $s \neq j$); ε_{it} is an error term. The estimates of the vector of γ-parameters can be obtained by standard regression methods. The final stage is then to compute the values X_t of the *repeat sailings index* at time t as

$$X_t = 100 \cdot \exp(\gamma_t)$$

and then rebasing all index values in order to establish a base period value of 100. The application of this model can be illustrated with reference to the sample data of Table 2. Before estimating the model the primary sample must be ordered in such a way that the observations correspond to *transaction pairs*, i.e. the (log) difference between the freight rates of two sailings at different points in time. This implies that those sailings which do not have an exact match in any earlier month are bypassed when the regression sample is prepared. Let us assume that period t is May 1856. The first sailing is New Orleans to Liverpool (wheat), which matches with a similar observation in April. Hence it is transferred to the regression sample with a left-hand value of $\ln 8.75 - \ln 9 = -0.0282$, (a decline of 2.82 per cent) and the values of the dummy variables are $+1$ for period t, -1 for period $t-1$, and zero elsewhere. The next line is New York - Glasgow (flour), which occurs for the first time (in this excerpt of the sample), and hence is bypassed for the moment (note that the information it contains is utilized when a similar sailing occurs in June); the last two observations for May are also temporarily not in use.[30] Proceeding to June we see that New York - Bremen (rye) is matched by a quotation in March, New York - Glasgow (flour) matching an observation in May, New York - London (flour) has no previous match, and so on.

The repeat sailings index offers a number of attractive features. It utilizes much more of the available freight rate information compared to methods that rely on interpolating and splicing data on a few key trade routes. In the sample forming the basis of the repeat sailings index there is no limit to the number of different routes from which information is obtained. The description of each type of sailing can be made very precise, so that the other component of each transaction pair (from which the change in the freight rate is calculated) reflects a charter with exactly the same port of call, cargo and other conditions. For example, regarding grain freights from the Baltic (say, Königsberg) to southeastern England there were a number of nearly similar descriptions of the port of call that commanded different freights. The lowest rate applied to (1) a direct voyage to a specific coal port (Newcastle, Sunderland, Hartlepool); a slightly higher rate was required for (2) Hull, Grimsby or other major ports directly, and successive increases were required for (3) 'East Coast', (4) 'East Coast or London', and, finally, (5) London. Between each of these alternatives the typical spread equalled 5 to 8 percent in the 1850s. In general, for all trade routes it is essential to distinguish between direct voyages to a specified port and those calling on Falmouth, Cowes or Cork for order; the latter would usually command 10 to 15 percent higher freight in the Mediterranen grain trade and similar spreads

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[30]In fact, going through the data set in Table 4 all primary sample observations except the last one is part of a transaction pair, and will therefore contribute to the index estimates. But the actual sample typically also includes sailings which occurs only once, as examplified by the City Point to Bremen tobacco freight in the last line.

in other trades.[31]

In contrast to the chain index method used by Isserlis (1938) and Mohammed and Williamson (2004) the repeat sailings index not only uses information from the previous month (year in the case of Isserlis) $t-1$, but searches backward until the beginning of the sample is reached for a similar sailing observation. There are thus many 'chains' of unequal length that contribute to consistency over time.

The list of characteristics that defines what constitutes a transaction pair can be very detailed given that the number of freight rate quotations are reasonably high. In this paper it comprises the following:

- port of loading

- port of call (distinguishing direct voyages from those 'for order')

- cargo (commodity and unit of measurement)

- currency of charter party

- type of ship (sail vs. steam)

- charter (London vs. local)[32]

Several other factors may influence the freight rate obtained for a specific fixture, including the size, classification and nationality of the ship. Extreme freight rate observations due to atypical ship types were excluded, particularly with respect to the nationality of ships in cases of a pending or an ongoing war. This affected in particular the Black Sea trade in the buildup to the Crimean War, and, of course, during the war, as well as the Baltic and Mediterranean trade in various periods of the 1850s. In such cases the freight rates included in the sample reflect those obtained by neutral ships as far as possible.

Port charges and taxes in general might also depend on the nationality of the ship, typically favouring ships of the importing country, but these features were probably not so much reflected in prevailing market freight rates. An extreme example is the British Navigation Acts, repealed at the beginning of 1850, which placed severe restrictions on nationality of ships engaged in British foreign trade.[33]

Other features that also affected freight rates were less transparent in the freight rate reports, such as the fact that small ships obtained slightly higher freight rates than large ships in many cases. Ships with copper-sheated hulls and first class ships with an A1 certificate commanded the highest freight rates. In some trades there were minimum standards as to the quality of the ship which tended to alleviate the problem.

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[31]A similar distinction applies to charters specifying 'UK' only and those with a continental clause, referred to as 'UK/Continent'.

[32]This distinction is used primarily for Black Sea and Far East homeward routes.

[33]See Lindsay (1874, pp. 107-135) for a summary of the principles of these laws and their effects on shipping prior to their repeal.

5 The homeward and outward subindices 1848 - 1860

The estimates of the fourteen homeward indices are graphed in Figures 1 - 14, the outward coal freight indices in Figures 15 - 28. For each of the trade routes one important single freight rate series is also shown, which allows us to compare the movements of the index with some key freight series included in the sample.

5.1 The homeward routes

The conclusion from an inspection of these 28 graphs is that the subindices and the single freight rate series – which may be one of several hundred series forming the basis of the index – give broadly the same picture of the cyclical fluctuations and trend movements for a specific trade route. There are indeed some discrepancies, which will be discussed below, but in general it seems well founded to conclude that the estimated indices appear to give much the same picture of the freight rate fluctuations. The index also has the advantage of exhibiting fewer gaps than the single freight rate series (gaps are indicated by straight-line dots in the graphs).

The Baltic grain (and general cargoes) and wood indices (Figures 1 and 2) are both characterized by fairly strong seasonal movements, as freight rates typically rose in the winter months. The wheat freight series in Figure 1, which is the average of Danzig and Königsberg to London or the East Coast UK, appears to be high relative to the index in the first few years.[34] The extreme freight rates in the summer of 1848 may be attributed to the blockade of the lower Baltic ports during the skirmishes with Denmark; otherwise this index is comprised of a large number of trade routes (including Stettin, Memel, Riga, Kronstadt and Danish ports) and some cargoes other than grain (oilseeds, oilcakes, flax and hemp, bones, zinc) which may account for the discrepancies between the two curves in general. In Figure 2, however, there is a particularly close correlation between the Baltic wood index and timber from Danzig or Memel. Because this index is also heavily influenced by sawn wood from Swedish and Finnish ports in the Gulf of Bothnia it indicates that timber freight rate movements in the two regions must have been very similar – an indication of a well integrated market for timber freights in the Baltic.[35]

The North Sea (Figure 3) and White Sea (Figure 4) trade routes were also characterized by high freight rates during the late autumn and winter months (or no activity at all in the case of the White Sea). Chartering activity resumed early in the new year, however, when contracts were made for spring shipments. The North Sea wood index is to a large extent firmly based on excellent weekly data from Gothenburg, which in the 1850s still accounted for a significant part of Swedish timber exports.[36] The index values of North Sea wood are roughly the same in the low year of 1858 as in the

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[34]The single freight rate series shown in these graphs are in some cases the averages of several specific series which moved closely together. The data in Figure 1 is the average of six individual series: from Danzig or Königsberg to the East Coast UK, to London or East Coast, or to London. This is done in order to present series with fewer gaps.

[35]Compare also the fairly strong comovements of the freight rates on timber and sawn wood from the lower Baltic, the Gulf of Bothnia and Kronstadt in Table 2. The evidence of market integration is noteworthy in view of the findings of Fischer and Nordvik (1987), who claimed that for the period 1863 to 1869 there was 'no particular pattern of relationships' between the freight rates from the various ports in the Baltic. Their suggested rationale for this finding is that 'the trade had not yet fully developed' is questionable in view of the evidence from the 1850s.

[36]Later in the nineteenth century ports in the Gulf of Bothnia came to dominate the export trade, but Gothenburg was the single most export region in the 1850s, see Söderlund (1951).

early 1850s, whereas the key freight rate of deals to Hull fell from about 30 shillings per St. Petersburg standard to about 25 shillings. It turns out, however, that freight rates to French ports, which were very important as well, were less depressed than freight rates to Britain at the end of the 1850s; hence, this is but one example of the fact that the index gives a more representative picture than a single freight rate series.[37] The White Sea index is based on a rather limited sample of London charters, with few observations after late summer when chartering activity ceased. A lack of timber freights during the middle of the 1850s distorts the comparison between the two data series in these years.

The Mediterranean freight rate data comprise a variety of cargoes cleared from ports all over the region. The freight rate shown in Figure 5, Alexandria to the UK with beans (the same rate applied to wheat), is the most consistently quoted rate, but the index also reflects such freights as for example sulphur from Sicily; flour and oilcakes from Marseilles; salt, wine and corkwood from Spain and Portugal; valonia from Smyrna, and grain from various ports (varying much from year to year according to harvests). No single freight rate series is therefore wholly representative of the whole Mediterranean region.

The Black Sea index in Figure 6 is almost exclusively based on grain freights from Odessa, the Sea of Azov, Constantinople and the Danube, and thus fairly homogenous. During the blockade of Russian ports from the spring of 1854 to the end of the Crimean War in March 1856 grain was exported only from the Danubian region (under Turkish control) and from Constantinople. All the homeward routes indices show a steep rise in 1853 and a more or less rapid decline from early 1854, but the Black Sea index rose much higher than any other index – more than three times as high as in 1850 – and fell more slowly thereafter.

The four North American indices are portrayed in Figures 7 to 10. The basically Canadian wood index (some cargoes of pipe staves to Europe and lumber to South America from US ports are also included) in Figure 7 shows a pattern quite similar to the Baltic wood index in Figure 2, while the cotton freight index in Figure 8 is much more volatile, partly due to seasonal effects.[38]

An issue which is still contentious in the literature is how representative berth freights were of the general north Atlantic freight rate movement in the nineteenth century, in particular the New York to Liverpool wheat freight rate.[39] We note from Figures 9 and 10 that at least with respect to cyclical movements there is much similarity between a north Atlantic index based on tramp cargoes and a berth rate (or sailing packet) index. In both cases the index is not restricted to freight rates of breadstuffs; the cargo index also includes such cargoes as tobacco and naval stores (but not cotton or timber), the berth index also comprises provisions and a variety of other heavy goods. The North American indices except the timber index are characterized by twin peaks in the 1853 - 1856 period, with deep troughs in 1852, 1854-1855 and in the spring and summer of 1857.

Figure 9 portrays the New York to Cork for order rate on grain, which from the 1860s became the

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[37]Timber freights to French ports were always stipulated in French francs. Because the Paris rate of exchange (on London) was virtually constant in the 1850s the index values are unaffected by the fact that freight rates were in francs.

[38]Harley (1988) noted that most of the increased density of packing of the cotton bales had been accomplished by the late 1830s, hence the trend value of the index should not be severely distorted by the fact that cotton freights were quoted by weight and not volume, which was usually the case with light goods.

[39]See in particular the extensive discussion in Harley (1990). The analysis in Persson (2004) is based on grain berth rates from New York to London and Liverpool.

standard benchmark rate of the grain trade.[40] Although observations are patchy in the first half of the 1850s, it is sufficient to show that it was generally highly correlated with the general index. The same conclusion applies to the New York to Liverpool rate on flour and the berth rate index in Figure 10, except possibly in the first few years of the 1850s. Implicitly it points to a strong correlation of berth freight rates on grain, flour and provisions because the latter goods are important goods in the berth rate index.

Two separate indices represent freights from Central and South America, shown in Figures 11 and 12. The rate on mahogany cargoes from Belize, a key freight rate commonly quoted in shipbrokers' circulars, falls distinctly below the Central American index from about 1856, implying that other freights, particularly sugar from the West Indies, must have shown more resilience during the years of declining freight rates towards the end of the 1850s. From South America coffee, sugar and hides were the chief export staples in this period.[41] The Rio de Janeiro freight rate on coffee should be fairly representative, although we see that it too was rather weak in the late 1850s, but staging a strong rebound from 1860.

The Far East index covers home freights from a vast region around the Indian ocean, South East Asia and China, from Karachi and Mauritius in the west to Manila and Shanghai in the east. The sample comprises both London charters and locally determined rates, which might deviate considerably from each other in the short run. This situation was particularly visible during the period of low shipping activity following the worldwide slump after 1856, which no doubt was exacerbated by the local disturbances connected with the Indian mutiny of 1857.[42] The freight on teak from Moulmein (London charter) shown in Figure 13 had held up better than most other Indian freights, it was remarked by Goodliffe & Smart in their circular of 10 June 1858,[43] but now this freight rate was coming down as well. This development is well illustrated in Figure 13. Apart from the deviations in 1856 to early in 1858 it is, however, quite remarkable how well this particular freight rate – which represents only one of many trade routes with diverse cargoes – follows the index.

Guano cargoes from the Peruvian Chincha islands were the backbone of the homeward trade from the pacific coast of South America in the 1850s. The freight rate on guano from Chincha islands to the UK is shown in Figure 14. Towards the end of the 1850s there was some increase in the demand for shipping space from other export trades: Chilean copper, ores, wheat and other fertilizers (nitrate of soda, saltpetre) from the Pacific coast of South America.[44] After 1857 the market for guano in the UK was glutted and the tonnage despatched from Peru fell significantly.[45] In a period of surplus

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[40]The earliest previous annual record of this freight rate probably dates from 1863, see Matthews (1979) and Harley (1990). In our sample there are a few scattered observations of this particular freight rate or the near equivalent rates to Cowes or Falmouth for order beginning in 1851. In the 1850s this rate was mostly quoted as pence per bushel of wheat, from the early 1860s shillings per quarter became the standard measure.

[41]Greenhill (1979).

[42]It was reported in the Goodliffe & Smart's circular of 24 June 1858 (*Morgenbladet* 2 July 1858) that the latest news from Bombay indicated that first class ships for Liverpool could be obtained at the spot at 10 shillings per ton - a level of freights previously unheard of (normally cotton freights to the UK would be in the 30 to 50 shillings range). This had of course a depressing effect on the London charter market as well, but at such low local freight rates it was difficult to close any charter from London.

[43]*Morgenbladet* 18 June 1858.

[44]Exports of wheat from California did not commence until the autumn of 1860, see Davis (1894).

[45]See Mathew (1970) and Mathew (1981, p. 122). In 1858 chartering was suspended from June to November, whence it opened again with a reduction of 10 shillings in the freight rate to the UK (falling from 60 to 50 shillings per ton), see Goodliffe & Smart circular of 6 January 1858, printed in *Morgenbladet* 22 January 1858.

shipping capacity it was likely that the monopoly-export system with only one contractor supplying the European market could exploit the situation to obtain low freight rates.[46] These features of the guano trade may explain the downward shift in the guano freight rate compared with the index in 1858.

5.2 The outward routes

The outward indices shown in Figures 15 to 28 are all based on coal freights from Britain to the various regions of the world. It is well known that the average level of coal freights to the various ports of call were not a linear function of distance – shipments to individual ports could be significantly more expensive than to nearby alternatives.[47] Differences in costs of port handling, turnaround time and prospects of return cargoes may all play a role here.[48]

The indices are based on all available freights to all ports in the region. Coal freights were sampled from both Tyne and Wales, but in the early years the bulk of observations are from the northern ports, chiefly Newcastle. Some quotations from other coal ports (Hull, Liverpool and Scottish ports) are included as well.

An inspection of the graphs show, as might be expected, a fairly strong correlation between the indices and the relevant individual freight rate series, but there are in several cases both short-run and long-run deviations between the curves. This observation indicates that relying on a single representative freight rate series may give a slightly distorted view of average freight rate movements within the region. In some cases there is a particular seasonal pattern in the coal freights to individual ports, most clearly visible in the case of Havana (Figure 23). In the case of North America (Figure 22) it appears that the Tyne to New York rate rose relative to freights to other ports during the 1850s. Coal freights to Calcutta deviated considerably from the Far East index (Figure 25); some discrepancies may be due to a particular seasonal variation, but it also strongly suggests that one single time series can hardly reflect all movements within this vast and diverse region. We also note fairly unsynchronized movements in the cases of Atlantic South Europe (Figure 18), South Africa (Figure 26) and the American Pacific (Figure 28). On the other hand, there are also examples of one single series being highly representative of the whole region, note in particular the two Mediterranean indices (Figures 19 and 20), the Black Sea (Figure 21) and Atlantic South America (Figure 24).

6 The construction of the aggregate indices

Weighting the subindices to obtain aggregate inward and outward indices can be approached in various ways. The most obvious procedure is to base the weights on trade flows. This is also the procedure followed here, but a further refinement is to adjust the import and export quantities by freight rates in order to obtain weights reflecting approximate freight earnings, which is a better indicator of the

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[46]Mathew (1981, pp. 124, 229). Relatively large ships were used in the guano trade and they might have some problems finding employment at remunerative rates in other trades when demand was low.

[47]This was shown by Palmer (1979) and Kaukiainen (1992) using coal freights data from 1885 and some later periods before WWI. Although no formal analysis was undertaken on our data from the 1850s it appears that a somewhat similar pattern of 'expensive' and 'cheap' ports emerges here.

[48]In the age of sailing ships prevailing winds and currents may also have affected relative freight rates when larger regions are compared.

use of shipping capacity associated with the various trade routes than import quantities alone. Grain imported from the Black Sea or North America represented more ton-miles than grain from the Baltic, approximately reflected in relative freight rates, and should thus obtain a higher weight.[49]

For the inward index import quantities to the UK in 1857 were used.[50] The base year of 1857 was chosen because it seems to be the most 'normal' year concerning trade flows in the mid and late 1850s in several respects; 1854 to 1856 are excluded because of the blockade of Russian imports during the Crimean War, in 1858 grain imports from the United States were unusually low and ceased almost entirely in 1859.

In detail the weights were computed in the following way. Import quantities (including re-exports) were collected for 72 commodities and distributed on the 14 subindices by country of origin.[51] All bulky goods that were imported in any significant quantity were included. A representative freight rate for each commodity and region was then stipulated on the basis of actual freight rates in 1857 and multiplied by import volumes to derive the freight earnings that form the basis of the weights.[52] The estimated freight earnings distributed by cargoes are given in Table 5. The data representing the relative weights of the various inward subindices, to be further discussed below, are shown in Table 6.

The geographic distribution of coal exports from the UK, which forms the basis of the weights of the outward index, did not vary much from year to year. The choice of base year is thus of little consequence as far as coal exports is concerned. The year of 1860 was chosen in this case because more detailed data on coal exports by destination exist for 1860 than for previous years.[53] A similar procedure of weighting the trade flows by representative freight rates was used here. For each of the 14 export regions average coal freight rates from Tyne were computed for three major ports. These data were used to compute estimates of freight earnings by export region.

The distribution of shipping freights by types of cargo in Table 5 shows that the timber trade is quantitatively the most important with 27.3 percent of the estimated freights. The grain trade, including its closely affiliated oil seeds trade, accounts for 23.2 percent. Timber, grain and seeds thus engaged a little more than 50 percent of the capacity of the carrying trade. Other important trades in this period comprised sugar and beverages (coffee, tea and wine) with 18.2 percent and cotton and fertilizers which each had a share of nearly 10 percent. The dominant position of timber and grain was a feature of the shipping trade in the entire period until WWI; by 1913 their share of imports into the UK by weight (but not adjusted for transport distance) was about 47 per cent.[54] The expanding trades after the 1850s were petroleum from the early 1860s (the first New York quotation recorded

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[49]Aggregating the various export areas on the basis of freight earnings rather than export volumes alone was suggested by Harley (1989) in the case of the outward coal freight index. His published index is weighted by export volumes only, though.

[50]Annual Statement of the Trade and Navigation of the United Kingdom in the Year 1857, *British Parliamentary Papers (1858)*.

[51]Actually, the trade returns give the country from which the goods were imported, which is really what is most appropriate for our purposes.

[52]For some goods the freight rates of general cargo or similar products were used.

[53]Detailed tables of coal exports to each port for selected years beginning in 1858 can be found in Royal Commission on Coal Supply, vol III, Appendix to the Report of Committee E., *British Parliamentary Papers (1871), vol. XVIII*. A detailed breakdown of exports by individual ports is required to allocate the figures to the correct index for several countries, particularly in the cases of France, Spain, Russia, Sweden and Denmark (the latter includes some German ports on the North Sea and in the Baltic that belonged to the 'Duchies').

[54]See the Final Report of the Departmental Committee on Shipping and Shipbuilding, *British Parliamentary Papers (1918), vol. XIII*.

appears to date from December 1861), the cattle and frozen meat trades that took off from 1870s and 1880s, respectively; in addition there was a gradual expansion of imports of metal ores. In essence, however, the basic structure of shipping trade patterns of the pre-WWI period was fairly established already by the 1850s.

The computed relative freight earnings in the various trades, which are used to weigh together the subindices, are given in Table 6. For both inward and outward routes the Far East is the most important subindex, in both cases representing a little above twenty percent of the total. In the 1850s the North American timber trade still enjoyed tariff privileges relative to European timber on the British market, which is reflected by the 16.3 percent weight of the inward index.[55] We also note the relatively significant shares of the Pacific homeward index, where the guano freights from the Chincha islands of Peru required much carrying capacity. Central America with its sugar and hardwood trade is also of importance. Almost thirty percent of inward freight earnings stem from North Atlantic routes. The two general (i.e. excluding wood and cotton) North American indices together account for 7.4 percent of the inward trade. The relative shares of berth (packet ships) and charter cargoes in the 1850s is uncertain; here it has been fixed at 50 percent each in want of any exact information.[56]

The importance of including the Home trade ports in a coal export freight index, which was duly stressed by Harley (1989), is confirmed by the data in Table 6. Ports from Brest to the river Elbe account for 26.8 percent of the export volume in 1860, but because of the short voyage, freight rates to this area were comparatively low, and its overall share of outward freight earnings is 13.6 percent.[57] The Mediterranean area at large also stands out as quite important with regard to coal export freights; including the Western and Eastern Mediterranean Sea and the Black Sea, it represents a share of 26 percent.[58]

7 The course of freight rates 1848 - 1861

The inward and outward aggregate indices are shown in Figure 29. The total index, computed as an average of the inward and outward indices, is portrayed in Figure 30. Detailed monthly data of the 28 inward and outward indices and the aggregates are in Table 7.

A detailed analysis of the cyclical movements in freight rates in the 1850s has not previously been published;[59] hence, it is appropriate to give a short summary of the results obtained from the present study – although any comprehensive analysis is beyond the scope of this paper.

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[55]The colonial preference was removed in 1860, after which the share of Canadian timber on the British market fell considerably, see Potter (1955). Thus, although the weights seem to be representative of the 1850s, the relative weight of Canadian timber would decrease and those of Baltic, North Sea and White Sea would increase later in the century.

[56]It is known that the share of berth cargoes increased after the American Civil War with the ascendancy of liners (driven by steam), see Harley (1990) and Albion (1938).

[57]The estimated average coal freights from Tyne to the various regions in 1860 are (in pound sterling per keel of 21.2 tons): Home Trade 9.2, Baltic 10.5, North Sea 7.6, South Europe Atlantic 16.0, Western Mediterranean 22.6, Eastern Mediterranean 23.2, Black Sea 19.9, North America Atlantic 15.7, Central America 19.7, South America Atlantic 37.2, Far East 49.7, South Africa 38.4, Australia 47.7, American Pacific 45.0.

[58]By the late 1870s the Mediterranean had surpassed the Home trade area as the largest export region, reckoned by export volumes alone. Together with the Baltic these areas were the leading regions by 1913, see Harley (1989)

[59]Quarterly time series of outward general cargo freight rates from London to New York, Calcutta and Melbourne were presented in Tooke and Newmarch (1857, pp. 41-43). Hughes (1960) used these time series as the basis of his discussion of the freight market in the early and middle of the 1850s. The data series end in 1856 and comprise no inward freight rates.

7.1 The cyclical movements

From the graphs of the aggregate freight rate series in Figures 29 and 30 it is clear that in general freight rates were falling from the start of our sample period in 1848 towards a cyclical low in 1851 or 1852.[60] The next major turning point is the culmination of the extreme rise in freight rates of all trades. The movement started some time in 1852 in most cases, thereafter all freight rates were surging upwards towards a very marked peak late in 1853 or the first part of 1854. From this peak the general trend is downwards until 1858, with a partial rebound in 1855, which probably may not be considered strong enough to qualify as a separate cycle. There are thus three major turning points within our sample period: a trough in 1851/52, a peak in 1853/54 and a new trough around 1858. A suggested chronology of the major turning points of the individual indices are given in Table 8. These were determined by seasonally adjusting each series with the X12 method[61] and then determining the peaks and troughs from the trend-cycle curve from which seasonal and irregular components in the data series are purged.[62]

The dating of the trough in the early years of the decade varies quite much between the individual indices, reflecting the fact that the recession in freight rates was protracted but rather shallow in most cases.[63] In general, inward freight rates seem to have led the turnaround movement. The aggregate inward index (and the total index) has a trough in November 1851, the outward index in March 1852. The most notable exception from this picture is represented by Black Sea and Mediterranean inward indices which both reached a trough at the very beginning of the decade.

It is well known that the spectacular boom of 1853/54, often associated with the Crimean War, was one of the major shipping cycles in the whole of the nineteenth century, but the magnitude of the movements has previously been difficult to measure with precision because of the fragmentary state of the available freight rate series. In very general terms it appears that freight rates of the majority of trade routes approximately doubled from the cyclical low in 1851/52; those representing grain imports from the Black Sea or coal exports to that region were roughly three times as high at their highest. All trade routes shared in the buoyant freight market during 1853, even Far East and Pacific trades both inward and outward were booming, indicating the general nature of the surge in demand for shipping space. The Australian trade had its own momentum at that time, being driven by the Australian gold discovery in 1851. The cycle in coal freight rates to Australia does not deviate much from the general pattern, but the index rose strongly already from the early autumn of 1852 and hovered around the 200 level (relative to 1850) during the whole of 1853, peaking in November 1853.

The cyclical timing of the freight rate indices during the so-called 'Crimean War Cycle' following from our time series may indeed cast some doubt on the issue of whether this name is appropriate. War against Russia was formally declared at the end of March 1854 and lasted until March 1856 when

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[60]As noted above the sample contains less data for 1848 and 1849, which results in a weak basis for determining cyclical movements in some cases.

[61]Gaps in the time series were interpolated before applying the seasonal adjustment procedure, which was done using the Eviews X12 program.

[62]This is but one of many possible approaches to determining turning points, see Bry and Boschan (1971) for a general discussion of such procedures.

[63]The Far East and Pacific inward freight rate were quite weak in the second half of 1851.Coal freights to the American Pacific seaboard were generally rising from 1848 until 1854 with only a minor setback in 1850. In the case of coal freights to Australia it is also difficult to determine any turning points in the early 1850s because of data limitations.

the siege of Sevastopol was ended. Although there had been skirmishes between Russia and Turkey in the Black Sea from July 1853 actions of war between the allied forces (Britain and France) and Russia did not take place until September 1854.[64] What our data show, however, is that the shipping boom collapsed just as the war was declared. The inward and total index peaked in April 1854 and the outward index in the following month. The Black Sea and Mediterranean inward indices turned around already in November 1853. The high coal freights were sustained into the first part of 1854, no doubt helped by the government demand for shipping space in the buildup to the war; all coal freight indices to Southwestern Europe, Western and Eastern Mediterranean peaked in May 1854, to the Black Sea in June 1854. The fact that the inward freight markets collapsed before the outward markets seems to be a general feature of this cycle. Eight out of the fourteen inward indices reached their highest level before the war started, while nine of the outward indices peaked in the first half of 1854. These results may point to the interesting conclusion that the Crimean War itself may have been the factor that ended the boom rather than the factor that nourished it. On the other hand, the anticipations of war during 1853 may have played an important role in precipitating wheat imports from the Black Sea, thus contributing to the rising freight rates, but the basic underlying sources of the freight rate boom were such factors as the export boom from Britain ending in 1853, the Australian trade and, most fundamentally, the huge demand for wheat imports to Britain due to bad domestic harvests.[65]

The contraction period after the great boom was of fairly long duration, lasting until 1858 in most cases. In between there were short periods of moderately rising freight rates, particularly in 1855. Ten of the fourteen inward indices reached their lowest level during 1858, most of them in the final months of the year. The exceptions are three American import indices (all except wood) and the Far East index, which fell until September 1859 – trade disruptions following the Indian Mutiny may account for the latter case.[66] The American freight market for grain, cotton and general cargoes plunged in the spring and early summer of 1857 at the time of the onset of the business cycle recession.[67] The trough of the aggregate inward index is located to November, the outward index in September and the total index in October 1858. The outward indices show quite synchronized movements around the troughs in 1858. The exception are Australia (December 1856) and American Pacific (February 1857).

After the slump of 1858 freight rates rose fairly steady towards the end of the decade. The most visible disturbance refers to the Mediterranean freight market, which was affected by the Italian War in 1859. Whether the next peak occurred in 1860, which some evidence may suggest, or later, cannot be determined until indices beyond 1861 are constructed.

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[64]On the general history of the Crimean War, see for example Royle (2000) and Fletcher and Ishchenko (2004).

[65]In their circular of 20 January 1853 Goodliffe & Smart noted that 'It is seldom that at this season we are enabled to give so encouraging an account of the Freight Market, but irrespective of the extraordinary stimulus of the Australian trade, the general activity in Commerce, coupled with the great apprehension of injury to the Crops by the prolonged wet weather, has caused a very active demand for Tonnage, and led to a general improvement in the rates of Freight.'

[66]Cf. Hughes (1960, p. 46).

[67]See Evans (1859) and Thorp (1926) on the timing American business cycle events in 1857.

7.1.1 Trends in nominal and real freight rates

Fourteen years of data, from 1848 through 1861, may be too short a period to determine the long-run rate of growth of ocean freight rates with much confidence, but some suggestive evidence may nevertheless be presented. Because of the huge cyclical movements of freight rates in the 1850s it is vital to eliminate as far as possible the cyclical influences. One approach might be to calculate the rate of change of the indices between the two trough periods in late 1851 and 1858. The trend-cycle value of the total index increased from 91.6 in November 1851 to 102.1 in October 1858, which gives an annual rate of increase of 1.55 percent over these seven years. The inward index, on the other hand, was almost stationary over this period, rising from 89.1 to 90.5, merely 0.2 percent per year. The bulk of the increase is consequently due to the outward index, which increased by nearly 3 percent per year according to this calculation.

Alternatively, a linear time trend regression can be run over the whole period from 1848 to 1861 to estimate the trend rate of growth.[68] This gives estimates of the annual rate of change equalling 1.1 percent for the total index, 2.2 percent for the outward index and zero for the inward index. Hence, both ways of calculating the trend indicate that nominal freight rates rose by little over 1 percent per year in this period; the inward index was virtually stationary, while the outward index increased by somewhat more than 2 percent per year.

How these modest rates of increase in nominal freight rates translates into changes in real freight rates will depend totally on the choice of price deflator, because the various price indices diverge with respect to the course of prices during the 1850s. There are no obvious choice of price index in this case; the most likely candidate is perhaps the deflator for gross domestic product at market prices in the UK, which increased by 1.0 percent per year from 1848 to 1861.[69] Thus, according to our estimates real freight rates in general did not change at all over this period, while inward real rates decreased by 1 percent and the outward rates increased by 1 percent.

8 Some concluding remarks

The repeat sailings indices presented here provide a new and firmer basis for studying the cyclical movements of ocean freight rates in the 1850s. One conclusion that emerges from the preliminary findings presented here is how well integrated the ocean shipping markets were in this period. Although some trade routes show idiosyncratic movements, in most cases due to war, it is striking how synchronized the cycles of the various trade routes were. The peaks of the grand boom are mainly found in the period from October 1853 to May 1854; with few exceptions freight rates then fell towards a trough between March and November of 1858. The exact timing of the trough of the early years of the decade is more widely dispersed, but all trade routes were uniformly characterized by a rather long period low freight rates.

In the 1850s the use of the electric telegraph was still in its infancy, but as Kaukiainen (2001) points out, the improvements in the speed of communication in the three decades before the introduction

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[68]The estimated equation is $\ln x_t = \alpha + \beta t$, where x_t is the annual average of the freight rate indices and t is a linear time trend. The estimated percentage rate of change per year is then given as $100 \cdot \beta$.

[69]The data were computed from tables 5 (pp. 831-832) and 6 (pp. 837-838) of the national accounts section in Mitchell (1988).

of the telegraph after 1860 was greater than what was achieved after 1860. The regularity of mail transport increased and the dispatch time of mail fell significantly in the decades prior to 1860 as steam ships and faster overland routes for mail transport were introduced. In this process the speed gap between mail transport and sailing ships carrying cargoes widened, which certainly facilitated shipping management and encouraged market arbitrage. Our findings of various shipping routes being well integrated even as early as the 1850s is consistent with this development.

Regarding the longer run trend in freight rates our results tentatively suggest that nominal freight rates were virtually stationary between 1848 and 1861, implying only slightly declining real freight rates over the period. In view of the fact that the decade of the 1850s is characterized by rapid improvements in steam ship technology and a significantly more competitive environment in shipping markets following the repeal of the British Navigation laws it may be a bit surprising that freight rates did not show any marked tendency to decline. Towards the end of the decade steam ships were more widely used in some north European waters, particularly in the Mediterranean and Baltic trades. But steam ship technology was not yet sufficiently developed to put pressure on the general level of freight rates. The greater regularity and speed of steam affected the transport of passengers, mail and certain short distance freight routes, but sailing ships still ruled the waves on longer voyages with heavy cargoes.[70] The introduction of a novel general purpose technology does not automatically bring any substantial immediate productivity gains, as is well known from other cases in history.[71] Our results thus give some support to the view that the new steam ship technology may well have accounted for much of the decline in ocean freight rates, but such a development must have taken place later in the nineteenth century. The 1850s did not constitute the core of the transport revolution as far as ocean freight rates are concerned.[72]

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[70]Harley (1971).

[71]The cases of the computer and the dynamo are well known, see David (1990).

[72]This is the view expounded in Harley (1988).

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1 Appendix Further details on the construction of the indices

This appendix provides a more detailed description of how the 28 homeward and outward indices were constructed with regard to geographic areas, cargoes and other special features.

1.1 Homeward routes

1.1.1 BALTIC GRAIN

Geographic area of ports cleared

All ports in the Baltic Sea, also including grain shipments from all Danish and western Swedish ports.

Most frequent ports of call

UK, Holland, Belgium, Norway

Types of cargo

All cargoes except timber and wood, but heavily dominated by grains (wheat, oats, rye, barley), also including some oilseeds, oilseed cakes, flax and hemp, and, less frequently, tallow, bones, tar, zinc and general cargo.

Special remarks

Russian ports (Riga, Kronstadt, St Petersburg) were regularly blocked by ice during the winter months (December to April). Port closures due to ice usually also affected ports in the lower Baltic (Danzig, Königsberg, Memel, Stettin) to some extent, but in general for a shorter period. The index figures may exhibit seasonally high values during the winter season.

1.1.2 BALTIC WOOD

Geographic area of ports cleared

Ports in the Baltic Sea only, east of the Sound: Lower Baltic, Gulf of Riga, Gulf of Finland, Gulf of Bothnia. Note that western Swedish ports (Gothenburg) are not included here.

Most frequent ports of call

UK, Holland, Belgium, France, and a small fraction of long-distance voyages to Australia, South America and South Africa

Types of cargo

Deals, hewn timber (fir, oak), balks, sleepers (square, round) and barrel staves.

Special remarks

See remarks for Baltic Grain. Freight rates from ports in the Gulf of Bothnia, Finnish and Russian ports quoted in the period January to March/April were mainly for *f.o.w.* (*first open water*) or spring shipments.

1.1.3 NORTH SEA WOOD

Geographic area of ports cleared

Western Sweden (Gothenburg) and Norway (chiefly Christiania)

Most frequent ports of call

UK, France, Holland, Belgium and a small fraction of long-distance voyages to Australia, South America and South Africa

Types of cargo

Deals, also a few cargoes of balks, firewood and lathwood.

Special remarks

The port of Gothenburg might be closed for a relatively short period during the winter because of ice, but some chartering activity (for spring shipments) were often taking place in this period as well. Freight rates tended to rise seasonally towards the end of the year.

1.1.4 WHITE SEA

Geographic area of ports cleared

Russian White Sea ports of Archangel and Onega

Most frequent ports of call

UK, some voyages to France, Holland, Belgium, Italy

Types of cargo

Deals, tar, oats, flax

Special remarks

Freight rates are London charter rates. The chartering season often ended in September or earlier, hence there are few observations from the second half of the year. Rates quoted early in the year are for spring shipment. In 1855 there was considerable uncertainty whether the Russian White Sea ports would be blockaded as well (as was the case in the Crimea) and trading activity was severely restricted, but it is known that some fixtures were made for oats with a guarantee to shipowners from importers (Goodliffe & Smart Circular, April 19, 1855). Early in May 1855 it became known that a blockading squadron would indeed very soon sail for Archangel (Goodliffe & Smart Circular, May 5, 1855; The Economist, May 5, 1855, pp. 479 and 481) and new freight offers were no longer forthcoming shortly thereafter.

1.1.5 MEDITERRANEAN

Geographic area of ports cleared

Mediterranen Sea, not including the Sea of Marmara and the Black Sea, but also comprising all Portuguese, Spanish and French Atlantic ports south of Brest.

Most frequent ports of call

UK, some salt cargoes to South America, Newfoundland and Northern Europe, occasionally general cargo to the United States

Types of cargo

Wheat, beans, barley, maize, flour, salt, sulphur, oilcakes, valonia, olive oil, fruit, corkwood, wine, oak timber, ores, cotton

Special remarks

Little seasonal variation in freight rates. A distinction is made between freights chartered in London and those locally on the spot. Towards the end of the 1850s steamship rates began to be quoted in Alexandria for beans (same rate applied to wheat), cotton and flax.

1.1.6 BLACK SEA

Geographic area of ports cleared

Ports beyond the Narrows of the Dardanelles, thus including the Gallipoli, Sea of Marmara, Constantinople, Black Sea and the Sea of Azov.

Most frequent ports of call

UK, some voyages to Mediterranean (Trieste, Livorno, Genoa, Marseilles) and Continental European (Antwerp, Rotterdam, Hamburg) ports.

Types of cargo

To a large extent wheat, occasionally maize, rye, barley, olive oil (Gallipoli), tallow, wool (Odessa).

Special remarks

From Odessa and the Sea of Azov nearly all grain shipments to the UK and northern Europe were quoted according to a special scale, expressed per ton tallow. To Mediterranean ports various other weight measures were used: charge (Marseilles, Livorno), stajo (Trieste), sack (Livorno), mine (Genoa). From the Danube and elsewhere in the region grain rates were per quarter.

During the Crimean War (End of March 1854 to March 1856) grain shipments from Odessa and the Sea of Azov ceased due to the Russian export ban on grain exports and the blockade, but some trade in oilseed and tallow still seems to have taken place in the first months after war was declared. (London brokers did quote these routes as late as July 1854.) Wheat exports from Danubian ports and Constantinople continued largely undisturbed throughout the war.

1.1.7 NORTH AMERICA ATLANTIC WOOD

Geographic area of ports cleared

All north American ports (Canada and the United States) on the Atlantic seaboard.

Most frequent ports of call

UK, a few cargoes to Continental Europe and South America.

Types of cargo

Timber and deals from Canadian ports (chiefly to the UK), lumber from United States to the Caribbean and South America, staves to southern Europe.

Special remarks

Canadian wood and timber rates are a mixture of London and North American charters.

1.1.8 NORTH AMERICA ATLANTIC GRAIN

Geographic area of ports cleared

All United States ports on the Atlantic seaboard, also comprising Montreal (grain)

Most frequent ports of call

UK, Continental Europe, Caribbean, South America, American Pacific

Types of cargo

All cargoes except wood and cotton, being dominated by grain (wheat and maize) and flour freights except during seasons when exports to Europe dried up (1854 harvest season for wheat, 1858 and 1859 for all grain); otherwise a wide variety of products to many parts of the world, including tobacco, naval stores (rosin, crude turpentine, spirits of turpentine, tar), rum, oilseed cakes, coal, measurement goods and general cargo.

Special remarks

Relatively few observations before 1851 make the index values rather volatile and less reliable in these years.

1.1.9   NORTH AMERICA ATLANTIC BERTH

Geographic area of ports cleared

New York, with some additional observations from Philadelphia, Boston and Baltimore before 1854

Most frequent ports of call

Liverpool, London and Glasgow, and, with less frequency, Bristol, Havre, Bremen, Antwerp and some other Continental European ports

Types of cargo

Standard commodities nearly always quoted were: wheat (in bulk and in ship's bags), maize (in bulk and in ship's bags), flour and rosin; with somewhat less regularity, particularly in the early 1850s: bacon, pork, tallow, lard, cheese; more occasional commodities included the following: turpentine, whale oil, cloverseed, ashes, rice, quercitron bark, oilcakes, whalebones, coffee, sugar, heavy goods, and measurement goods. Note that cotton berth rates are not included here.

Special remarks

Daily observations from 1852 to Liverpool, and for most of the 1850s, also to London and Glasgow, with less frequency to other destinations. The vast majority of rates quoted are for sailing packets or part cargoes, but towards the end of the 1850s steam ship rates are sometimes quoted, most often applying to provisions (cheese, bacon, pork, lard). These were markedly higher than the sailing rates for the same commodities.

1.1.10   NORTH AMERICA ATLANTIC COTTON

Geographic area of ports cleared

New York (berth and some cargoes), New Orleans, Mobile, Charleston, Savannah, Apalachicola

Most frequent ports of call

Liverpool, Glasgow, Continental Europe (Havre, Bremen, Antwerp, Amsterdam, Hamburg, Rotterdam, Genoa, Trieste), Gothenburg, Kronstadt

Types of cargo

Cotton (compressed if not specified otherwise) quoted by weight (pound) in square bales, a few cargoes of cotton in round bales and Sea Island cotton (at a higher freight rate). When freight quotations fell to very low levels, say below 1/8 pence per lb in New York, rates were quoted per bale instead.

Special remarks

Berth and full cargo rates from New York to Liverpool were about the same level, and both have been included here. New York berth rates are recorded daily from January 1852.

1.1.11   CENTRAL AMERICA

Geographic area of ports cleared

All Atlantic ports from Mexico to Guyana, including islands in the Caribbean Sea

Most frequent ports of call

UK, New York, Continental Europe

Types of cargo

Sugar, coffee, mahogany, logwood, other tropical timber, rum, salt, molasses, melado

Special remarks

Freight rates reflect both London and local charters

1.1.12   SOUTH AMERICA ATLANTIC

Geographic area of ports cleared

All Atlantic ports from Brazil to Cape Horn, also comprising southern West Africa from Dakar to ports north of Cape Town (mainly Sierra Leone and River Gambia)

Most frequent ports of call

UK, Continental Europe, North America

Types of cargo

Sugar, coffee, hides, also cotton, bones and some cargoes of teak (Sierra Leone) and ground nuts (Gambia)

Special remarks

Freight rates reflect both London and local charters

1.1.13   FAR EAST

Geographic area of ports cleared

East India, China and other Asian countries, ports bordering Indian Sea and the Red Sea, also comprising and East and South African ports (chiefly Mauritus)

Most frequent ports of call

UK, Continental Europe, North America

Types of cargo

Rice, teak, sugar, coffee, jute, hides, tea, silk, tin, oilseeds, cotton, wool, saltpetre

Special remarks

Freight rates reflect both London and local charters

1.1.14 PACIFICS

Geographic area of ports cleared

Pacific coast of North and South America, islands in the Pacific ocean, Australia

Most frequent ports of call

UK, Continental Europe, Mauritius (guano)

Types of cargo

Guano, saltpetre, nitrate of soda, copper, metal ores, wheat

Special remarks

Freight rates mostly reflect London charters. The sample is dominated by freights from Peru and Chile throughout the period, in particular by guano cargoes from Chincha Islands (Peru), in the latter half of the 1850s also other fertilizers and metals from Chilean ports.

1.2 Outward coal freights

The majority of freight rate quotations are from the Tyne (primarily Newcastle, supplemented by some freight quotations from Sunderland). Wales is also quite well represented, except in the early years before 1851 In addtion there are some quotations from Hartlepool, Hull, Liverpool (Birkenhead), Troon, Ardrossan and other Scottish ports. A small fraction of cargoes consisted of coke (cinders), which commanded a somewhat lower freight. Coal cargoes from the north east (Newcastle, Sunderland and Hartlepool) were quoted in pounds per keel, except to some ports in South America. From all other port coal freights were quoted in shillings per ton.

The list below outlines the geographic areas comprised in each of the indices, also listing the major ports of call.

1.2.1 HAMBURG-BREST

This index covers the home trade, which is the traditional name of the the coasting limit extending from the river Elbe (in practice Hamburg) to Brest. The major ports include Hamburg, Havre, Calais, Boulogne, Rouen, Dieppe, Honfleur, Cherbourg, Brest and various other northern French ports, Amsterdam, Rotterdam and other Dutch ports, Antwerp and other Belgian ports.

1.2.2 NORTH SEA

All Danish and Norwegian ports and western Swedish North Sea ports north of the Sound, comprising Copenhagen, Elsinore, Gothenburg, Christiania, Bergen and numerous minor ports.

1.2.3 BALTIC

Ports in the Baltic Sea: Lower Baltic, Gulf of Riga, Gulf of Finland, Gulf of Bothnia, Swedish ports from the Sound and eastwards, including Malmö. Note that no Danish ports are included here. Major coal ports of the region are Stettin, Swinemünde, Rostock, Kiel, Lübeck, Danzig, Königsberg, Memel, Riga, Kronstadt, Stockholm, Malmö, Ystad.

1.2.4 SOUTH EUROPE ATLANTIC

The Atlantic seaboard of France south of Brest and northern Spain , Portugal, southern Spain west of Gibraltar, Spanish and Portuguese islands in the Atlantic (Azores, Canaries, Cape Verde), northwest Africa from Tangier to Dakar (chiefly Morocco). Major ports include Cadiz, Lisbon, Oporto, Sevilla, Bordeaux, Cape Verde, Teneriffe.

1.2.5 WESTERN MEDITERRANEAN

Spanish Mediterranean from Gibraltar, Mediterranean France and western Italy, Sicily, Malta, Sardinia, Corsica, Mallorca, North Africa from Tanger to Tunis. Major ports are Genoa, Naples, Leghorn, Messina, Palermo, Malta, Algiers, Gibraltar, Malaga, Cartagena, Valencia, Barcelona, Toulon, Marseilles.

1.2.6 EASTERN MEDITERRANEAN

Ports in the Adriatic and Ionian Sea east of Sicily and Malta and all ports further east, North Africa east of Tunis. Major ports: Alexandria, Smyrna, Venice, Trieste, Athens, Corfu, Beyrout.

1.2.7 BLACK SEA

Ports beyond the Narrows of the Dardanelles, thus including Gallipoli, Sea of Marmara, Constantinople, Black Sea and the Sea of Azov. Major ports: Constantinople, Galatz, Odessa.

1.2.8 NORTH AMERICA ATLANTIC

United States and Canadian Atlantic. Major ports: New York, Boston, New Haven, Philadelphia, Baltimore, Quebec.

1.2.9 CENTRAL AMERICA

All Atlantic ports from Mexico to Guyana, including islands in the Caribbean Sea. Major ports: Havana, St Thomas, Bermuda, Grenada, Jamaica, Puerto Rico, Barbados, Aspinwall (Colon).

1.2.10 SOUTH AMERICA ATLANTIC

All Atlantic ports of South America from Brazil to Cape Horn. Major ports: Rio de Janeiro, Buenos Ayres, Montevideo, Bahia, Pernambuco, Rio Grande.

1.2.11 FAR EAST

East India, China and other Asian countries, ports bordering Indian Sea and the Red Sea. Major ports: Suez, Aden, Calcutta, Bombay, Madras, Colombo, Point de Galle, Singapore, Manilla, Hong Kong, Shanghai.

1.2.12 SOUTH AFRICA

Africa south of Dakar and Gulf of Aden, also comprising islands in the Atlantic (Ascension, Saint Helena) and the Indian Ocean (Mauritius). Major ports: Cape Town, Mauritius; also some cargoes to Ascension, Saint Helena, Fernando Po, St Paul do Loando, Sierra Leone, Goree and other western African ports.

1.2.13 AUSTRALIA

Australia. Major ports: Sydney, Melbourne (Port Phillip), Adelaide, King George Sound.

1.2.14 AMERICA PACIFIC

Pacific coast of North and South America. Major ports: San Francisco, Panama, Callao, Coquimbo, Caldera, Valparaiso.

Table 1. Freight rate quotations in Goodliffe and Smart's circular of 5 May 1855.

From	To	Cargo	Freight	Unit
Danube	UK	wheat	15	quarter
Ancona	UK	wheat	6.5	quarter
Alexandria	UK	beans	6.25	quarter
Sicily	UK	sulphur	14	ton
Livorno	UK dockyard	oak timber	28	load
Marseilles	UK	flour	18	ton
Cadiz	Halifax	salt	12.75	ton
Oporto	UK	wine	25	ton
Sines	UK	corkwood	75	ton
Archangel	UK	oats	10	quarter
Danzig	East coast UK	wheat	3.875	quarter
Gothenburg	East coast UK	oats	2.125	quarter
Memel	East coast UK	timber	17.5	load
Memel	Valparaiso	timber	53.75	load
Gothenburg	East coast UK	deals	33.75	Pet.Std.
Sundsvall	London/East coast	deals	60	Pet.Std.
Kalix	London/East coast	deals	75	Pet.Std.
Olufsfors	Cherbourg	deals	73.5	Pet.Std.
Luleå	London/East coast	tar	4	barrel
Quebec	London, Hull, Grimsby	timber	33.75	load
Quebec	Southampton	timber	33.5	load
Quebec	Wexford	timber	34.5	load
St John NB	London/East coast	deals	78.75	Pet.Std.
Shediac	London/East coast	deals	80	Pet.Std.
Richibucto	London/East coast	deals	82.5	Pet.Std.
Miramichi	London/East coast	deals	82.5	Pet.Std.
Belize	UK	mahogany	73.75	ton
Manzanilla	UK	mahogany	72.5	ton
Coatzacoalcos	UK	mahogany	80	ton
Havana	UK	sugar	52.5	ton
Havana	UK round trip	coal/sugar	72.5	ton
Rio Janeiro	UK	coffee	41.25	ton
Rio Grande	UK	salted hides	45	ton
Chinchas Islands	UK	guano	80	ton
Chinchas Islands	Mauritius	guano	72.5	ton
Calcutta	UK	general cargo	92.5	ton
Bombay	London/Liverpool	cotton	63	ton
Akyab	UK/Continent	rice	84	ton
Moulmein	UK	teak	102.5	ton

NOTE: All freight rate quotations are the means of the range quoted in the circular in shillings and pence, converted to decimal figures. Pet.Std. is an abbreviation for St Petersburg Standard, equal to 165 cubic feet, which was the conventional measure in the sawn wood trade. The freight circular from which these quotations are drawn appeared in the Norwegian newspaper *Morgenbladet* 13 May 1855.

Table 2. Average annual inward freight rates

Trade routes	Cargoes	1848	1849	1850	1851	1852	1853	1854
1 Danzig/Königsberg - East Coast UK	wheat *s*/quarter	4.23	4.01	3.39	2.72	3.00	4.61	4.90
2 Danzig/Memel - London/East Coast	timber *s*/load	18.13	16.80	15.69	15.56	15.48	25.07	23.05
3 Kronstadt - London/East Coast	deals *s*/Pet.Std.	50.00	45.82	36.25	36.41	39.03	79.50	
4 Lower Bothnia - London/East Coast	deals *s*/Pet.Std.		46.85	45.00	51.46	51.87	89.97	89.86
5 Upper Bothnia - London/East Coast	deals *s*/Pet.Std.	61.95		50.00	57.06	57.32	95.31	102.93
6 Gothenburg - London	deals *s*/Pet.Std.	37.53	33.91	35.06	35.22	34.88	49.57	46.96
7 Gothenburg - Hull	deals *s*/Pet.Std.	31.39	30.74	31.01	31.61	33.11	46.42	40.00
8 Gothenburg - Calais	deals *fr*/Pet.Std.	54.50	51.39	52.12	53.66	53.74	83.04	84.00
9 Gothenburg - Bordeaux	deals *fr*/Pet.Std.	64.00	56.88	60.47	62.91	61.88	82.25	105.00
10 Archangel - London/East Coast	deals *s*/Pet.Std.	78.75	77.96	70.70	71.39	73.40	116.67	147.00
11 Archangel - London/East Coast	oats *s*/quarter		4.95	4.12	3.56	3.69	5.62	8.35
12 Lisbon - UK	wine *s*/tun		23.75	23.65	23.58	23.19	32.72	29.64
13 Cadiz - Rio Grande	salt *s*/ton			22.50	23.54	27.13	33.88	46.70
14 Sicily - UK	sulphur *s*/ton		22.00	19.25	20.35	23.00	32.37	23.00
15 Alexandria - UK	beans *s*/quarter		5.53	5.83	6.26	6.35	9.26	6.81
16 Smyrna - UK	valonia *s*/ton			40.63	41.27	40.00	58.25	42.57
17 Danube - UK	wheat *s*/quarter	9.25	10.41	9.33	10.31	10.90	17.41	22.02
18 Odessa - UK (London charter)	wheat *s*/ton tallow		48.61	47.43	49.70	53.53	84.00	102.91
19 Odessa - UK (local charter)	wheat *s*/ton tallow	57.24	50.14	45.12	53.37	55.58	101.33	115.66
20 Quebec - London/Hull/Grimsby	timber *s*/load	35.69	31.00	30.88	30.58	31.00	45.87	48.49
21 Quebec - Liverpool	timber *s*/load	32.00		28.00	29.81	33.00	44.92	43.06
22 Quebec - Bristol	timber *s*/load				30.33	36.00	43.24	49.30
23 Quebec - London/Hull/Grimsby	deals *s*/Pet.Std.		93.00		97.50	96.80	140.75	141.94
24 Miramichi - London/Hull/Grimsby	deals *s*/Pet.Std.				83.75	88.13	120.33	131.90
25 St John - London/Hull/Grimsby	deals *s*/Pet.Std.	94.17		82.19	74.50	77.78	112.90	116.73
26 St John - Liverpool	deals *s*/Pet.Std.			60.00		69.38	111.69	83.40
27 Miramichi - Belfast	deals *s*/Pet.Std.					85.00	114.03	128.77
28 New York - Liverpool	cotton *d*/lb	0.18	0.22	0.17	0.16	0.21	0.24	0.24
29 New Orleans - Liverpool	cotton *d*/lb		0.33	0.29	0.52	0.49	0.59	0.65
30 New Orleans - Havre	cotton *c*/lb		0.94	0.80	0.98	1.11	1.11	1.35
31 New York - Cork f/o	grain *d*/bushel					5.25	13.39	7.69
32 New York (B) - Liverpool	wheat *d*/bushel	5.82	4.99	4.00	3.95	5.32	8.77	7.48
33 New York (B) - London	wheat *d*/bushel					6.84	10.53	10.87
34 New York (B) - Liverpool	maize *d*/bushel		3.88	4.04	3.93	4.84	9.47	7.33
35 New York (B) - Liverpool	flour *s*/barrel	1.74	1.62	1.26	1.04	1.55	2.73	2.52
36 New York (B) - London	flour *s*/barrel	2.73	2.09	1.43	1.66	2.09	3.21	3.07
37 New York (B) - Glasgow	flour *s*/barrel				1.59	2.05	2.94	2.76
38 New York (B) - Liverpool	beef *s*/tierce	3.00				3.14	5.06	4.33
39 New York (B) - Liverpool	rosin *s*/barrel		1.38		1.04	1.44	2.94	2.31
40 Havana - UK	sugar *s*/ton	48.33	54.90	47.38	50.03	45.87	67.16	70.44
41 Puerto Rico - UK	sugar *s*/ton		58.37	49.27	48.04	47.50	50.42	70.04
42 South Cuba - UK	mahogany *s*/ton				61.30	61.15	76.41	81.27
43 Belize - UK	mahogany *s*/ton		59.93	53.75	52.34	54.19	75.68	81.45
44 Rio Janeiro - British Channel	coffee *s*/ton	59.88	37.69	51.88	50.64	36.08	61.61	66.58
45 Rio Grande - UK	hides *s*/ton	62.50	53.90	46.36	45.31	42.18	50.69	50.62
46 Moulmein - UK	teak *s*/ton		93.79	90.47	83.11	79.18	96.81	114.11
47 East India rice ports - UK/Cont.	rice *s*/ton		78.78	68.83	66.34	68.81	79.93	94.94
48 Calcutta - UK	general cargo *s*/ton		87.40	74.94	73.23	72.31	75.04	92.21
49 Bombay - UK	cotton *s*/ton		59.93	56.61	51.79	54.13	70.00	71.05
50 Shanghai - UK	tea *s*/ton		71.25	60.63	75.00	61.25		125.00
51 Mauritius - UK	sugar *s*/ton		60.42	56.88			59.33	
52 Chincha islands (Peru) - UK	guano *s*/ton		74.25	69.48	66.61	55.95	76.86	94.38

Table 2. Average annual inward freight rates

Trade routes	Cargoes	1855	1856	1857	1858	1859	1860	1861
1 Danzig/Königsberg - East Coast UK	wheat *s*/quarter	3.91	3.94	3.44	2.53	3.01	3.62	3.67
2 Danzig/Memel - London/East Coast	timber *s*/load	20.17	18.35	17.35	14.90	15.66	17.45	18.18
3 Kronstadt - London/East Coast	deals *s*/Pet.Std.		64.11	50.00	38.71	40.49	42.71	43.17
4 Lower Bothnia - London/East Coast	deals *s*/Pet.Std.	68.04	67.76	61.01	48.49	52.17	55.59	60.93
5 Upper Bothnia - London/East Coast	deals *s*/Pet.Std.	80.06	76.48	70.18	55.26	60.01	67.36	67.31
6 Gothenburg - London	deals *s*/Pet.Std.	41.19	39.25	31.50	31.79	31.59	38.45	35.65
7 Gothenburg - Hull	deals *s*/Pet.Std.	38.48	37.14	30.29	26.01	28.83	31.92	32.02
8 Gothenburg - Calais	deals *fr*/Pet.Std.	61.08	63.00	59.15	52.53	58.28	54.86	57.64
9 Gothenburg - Bordeaux	deals *fr*/Pet.Std.	80.25	82.59	79.13	66.94	77.00	75.99	75.63
10 Archangel - London/East Coast	deals *s*/Pet.Std.		96.39	85.47	71.22	72.95	81.09	82.92
11 Archangel - London/East Coast	oats *s*/quarter	9.95	4.94	4.22	3.59	3.83	4.02	4.23
12 Lisbon - UK	wine *s*/tun	26.44	23.85	20.48	18.06	17.98	20.42	23.00
13 Cadiz - Rio Grande	salt *s*/ton	39.25	30.63	27.12	29.16	33.36	38.73	43.75
14 Sicily - UK	sulphur *s*/ton	17.38	17.42	17.08	17.10	17.05	20.11	21.00
15 Alexandria - UK	beans *s*/quarter	6.15	6.04	5.61	5.28	4.69	5.03	5.45
16 Smyrna - UK	valonia *s*/ton	36.25	37.18	37.69	35.86	37.44	38.33	40.00
17 Danube - UK	wheat *s*/quarter	16.05	12.25	10.87	10.18	9.73	10.79	10.51
18 Odessa - UK (London charter)	wheat *s*/ton tallow	95.00	54.40	48.19	42.36	43.00	48.56	51.42
19 Odessa - UK (local charter)	wheat *s*/ton tallow		44.40	43.48	37.95	43.78	49.22	51.89
20 Quebec - London/Hull/Grimsby	timber *s*/load	35.40	39.08	34.85	29.04	30.51	33.95	32.91
21 Quebec - Liverpool	timber *s*/load	40.75	38.13	30.57	25.71	30.25	32.65	30.72
22 Quebec - Bristol	timber *s*/load	33.35	36.25	32.70	26.83	29.25	32.12	31.89
23 Quebec - London/Hull/Grimsby	deals *s*/Pet.Std.	92.08	115.11	101.70	80.95	95.84	103.93	94.21
24 Miramichi - London/Hull/Grimsby	deals *s*/Pet.Std.	90.00	95.31	84.52	74.88	78.39	82.98	87.36
25 St John - London/Hull/Grimsby	deals *s*/Pet.Std.	82.29	100.64	79.44	72.05	74.01	83.31	83.13
26 St John - Liverpool	deals *s*/Pet.Std.	75.09	89.83	65.75	69.00	64.36	86.67	81.47
27 Miramichi - Belfast	deals *s*/Pet.Std.	87.50	96.56	87.08	72.01	72.50	79.47	88.13
28 New York - Liverpool	cotton *d*/lb	0.21	0.19	0.16	0.18	0.20	0.22	0.25
29 New Orleans - Liverpool	cotton *d*/lb	0.47	0.51	0.47	0.50	0.45	0.53	0.81
30 New Orleans - Havre	cotton *c*/lb	1.04	1.08	0.89	1.04	0.92	1.13	1.28
31 New York - Cork f/o	grain *d*/bushel	9.40	11.51	9.85	9.89		12.29	12.56
32 New York (B) - Liverpool	wheat *d*/bushel	6.10	7.46	5.01	5.26	6.09	9.77	10.08
33 New York (B) - London	wheat *d*/bushel	11.02	9.30	7.05	7.55		12.06	11.07
34 New York (B) - Liverpool	maize *d*/bushel	4.83		2.58	4.29	3.00	8.52	9.61
35 New York (B) - Liverpool	flour *s*/barrel	2.09	2.14	1.35	1.63	1.51	2.61	2.67
36 New York (B) - London	flour *s*/barrel	3.09	2.83	2.10	2.10	2.38	3.14	3.30
37 New York (B) - Glasgow	flour *s*/barrel	3.09	2.80	2.14	2.30	2.15	3.12	3.24
38 New York (B) - Liverpool	beef *s*/tierce	3.62	4.30	2.38	3.40	2.81	3.64	5.58
39 New York (B) - Liverpool	rosin *s*/barrel	2.27	2.31	1.51	1.92	1.73	2.60	3.10
40 Havana - UK	sugar *s*/ton	54.62	52.29	48.80	45.16	45.28	48.46	57.21
41 Puerto Rico - UK	sugar *s*/ton	61.45	57.53	47.36	49.39	44.69	50.31	61.00
42 South Cuba - UK	mahogany *s*/ton	73.93	72.22	69.31	59.82	59.38	57.50	62.08
43 Belize - UK	mahogany *s*/ton	69.45	66.44	57.40	52.54	52.79	55.92	60.59
44 Rio Janeiro - British Channel	coffee *s*/ton	57.38	53.16	44.58	29.59	29.88	36.92	60.42
45 Rio Grande - UK	hides *s*/ton	44.07	51.43	48.72	47.04	39.14	39.86	42.50
46 Moulmein - UK	teak *s*/ton	109.38	109.99	109.44	81.02	64.86	80.69	92.00
47 East India rice ports - UK/Cont.	rice *s*/ton	95.79	90.51	83.10	66.18	48.54	64.16	74.18
48 Calcutta - UK	general cargo *s*/ton	95.80	83.00	82.32	67.04	52.78	58.73	66.12
49 Bombay - UK	cotton *s*/ton	62.60	65.08	67.38	52.86	36.30	50.42	61.25
50 Shanghai - UK	tea *s*/ton	93.95	59.51	54.58	55.19	39.09	52.81	66.56
51 Mauritius - UK	sugar *s*/ton	67.25	63.47	58.93	46.96	34.69	45.47	44.38
52 Chincha islands (Peru) - UK	guano *s*/ton	83.57	88.50	78.75	61.67	50.98	59.69	65.67

NOTE: All freight rates are for sailing ships. Any known primage is included in the rates. The annual data are computed from all available monthly average data, but in some cases data exist for only part of the year and the reported figures may not be wholly representative of the true annual averages. Lines 32-39: New York (B) refers to berth rates. Line 47: East India rice ports include Akyab, Moulmein, Bassein and Rangoon. Currency abbreviations: shillings (*s*), pence (*d*), US cents (*c*), French franc (*fr*).

Table 3. Average annual outward coal freight rates

	1848	1849	1850	1851	1852	1853	1854
1 Tyne - Hamburg	9.90	9.45	7.97	8.28	8.47	12.44	13.26
2 Tyne - Rotterdam	9.94			7.90	8.54	11.70	12.62
3 Tyne - Havre	11.30	9.90	9.25	8.86	9.25	12.76	12.91
4 Tyne - Rouen	15.10		11.75	10.68	11.70	15.12	16.06
5 Tyne - Kronstadt	9.14	12.33	10.95	10.43	10.57	16.57	18.50
6 Tyne - Riga		5.70	6.49	5.90	7.19	7.83	10.00
7 Tyne - Königsberg		8.13	6.78	6.46	10.24	11.18	12.25
8 Tyne - Stettin	11.25	10.44	9.72	8.97	10.34	12.10	12.20
9 Tyne - Swinemünde	9.74		6.75	6.99	8.86	10.55	10.83
10 Tyne - Kiel				7.58	9.00	9.50	11.50
11 Tyne - Copenhagen	8.33	8.28	8.76	7.72	8.92	11.34	11.89
12 Tyne - Gothenburg	7.25	5.73	5.75	5.20	5.22	7.47	8.69
13 Tyne - Stockholm		8.01	8.08	8.17	9.21	12.62	13.19
14 Tyne - Bordeaux	13.71	12.24	11.73	10.65	11.68	15.84	20.15
15 Tyne - Oporto	11.16	9.33	9.02	8.47	11.07	13.65	16.11
16 Tyne - Lisbon	11.87	11.25	11.38	11.33	11.38	17.78	16.02
17 Tyne - Cadiz	12.63	10.14	11.23	10.11	10.92	17.43	17.23
18 Tyne - Seville		14.00	14.00	13.88	11.43	14.95	18.50
19 Tyne - Gibraltar	15.16	14.79	14.54	13.11	12.81	17.67	23.97
20 Tyne - Algiers	20.51	21.36	19.00	16.60	15.76	21.19	31.71
21 Tyne - Malaga	14.72	14.25	14.17	13.57	13.93	17.54	25.25
22 Tyne - Barcelona	20.72	19.81	19.81	16.72	16.52	22.51	32.14
23 Tyne - Marseilles	15.63	14.70	14.93	14.59	14.42	19.45	28.91
24 Tyne - Genoa	20.30	18.97	18.48	16.05	15.65	22.66	33.15
25 Tyne - Leghorn	19.55	18.66	17.86	16.04	15.34	21.77	33.67
26 Tyne - Naples	21.19	19.26	18.60	15.46	15.32	21.58	34.16
27 Tyne - Messina	14.92	16.28	13.94	12.81	12.74	17.30	29.79
28 Tyne - Malta	16.68	15.19	15.50	13.02	12.39	16.52	31.68
29 Tyne - Venice	25.36	23.23	22.45	19.97	19.25	27.38	41.49
30 Tyne - Athens	17.63			14.29	13.63	18.34	34.94
31 Tyne - Alexandria	16.75	16.26	14.78	11.38	11.27	13.77	31.58
32 Tyne - Smyrna	17.67		16.65	14.91	12.59	16.97	34.23
33 Tyne - Constantinople	17.47	16.74	17.72	14.18	12.98	17.91	41.51
34 Tyne - Odessa	17.40	16.05	16.19	15.37	12.88	16.29	25.10
35 Tyne - Quebec	8.91			8.19	9.55	10.94	16.17
36 Tyne - New York	16.50	19.00	18.25	19.61	20.91	28.10	29.87
37 Tyne - Boston	18.00	20.00	18.25	18.41	20.03	25.04	29.33
38 Tyne - Havana	18.10		10.88	12.73	11.31	22.53	18.69
39 Tyne - Rio de Janeiro	20.71	19.81	19.86	19.02	22.97	37.15	43.46
40 Tyne - Montevideo	21.67		25.00	25.08	26.21	39.44	49.23
41 Tyne - Aden	40.63	39.75	33.03	34.13	36.02	57.45	53.74
42 Tyne - Bombay	25.67		22.33	24.00	27.29	46.98	43.11
43 Tyne - Calcutta	20.33		23.60	23.38	27.52	45.86	36.88
44 Tyne - Point de Galle	24.00		22.33	23.24	27.07	45.48	39.96
45 Tyne - Singapore	23.00	25.00	23.38	23.15	27.15	49.57	42.09
46 Tyne - Hong Kong	28.67		30.00	31.50	35.73	66.54	54.76
47 Tyne - Australia			28.75	30.00	32.10	63.51	59.84
48 Tyne - Cape Good Hope	24.67	25.50	22.25	24.01	26.86	46.27	41.99
49 Tyne - San Francisco			64.00	63.75	70.52	82.15	79.17
50 Tyne - Callao	25.00			30.00	32.17	45.49	41.73
51 Tyne - Coquimbo			25.13	25.48	30.50	40.09	42.81
52 Tyne - Valparaiso	24.33	24.50	24.83	25.80	29.03	43.39	41.66

Table 3. Average annual outward coal freight rates

	1848	1849	1850	1851	1852	1853	1854
1 Wales - Lisbon	10.50		9.17	9.35	9.81	14.17	13.93
2 Wales - Cadiz	12.50		9.67	8.94	9.95	14.26	14.58
3 Wales - Gibraltar	12.33		11.67	10.20	11.53	15.64	22.47
4 Wales - Barcelona	17.67		17.00	13.09	14.11	19.58	32.86
5 Wales - Genoa	18.00		14.00	10.25	11.00	13.20	27.50
6 Wales - Malta	13.88		10.75	8.79	10.88	14.86	30.51
7 Wales - Athens	13.00			11.00	12.63	13.52	33.92
8 Wales - Corfu			14.00	10.00	11.63	14.06	31.13
9 Wales - Alexandria	13.75		9.50	7.28	10.10	12.97	30.13
10 Wales - Smyrna	13.10		11.83	9.97	11.71	13.18	31.68
11 Wales - Constantinople	12.40		11.83	10.17	11.16	14.10	39.53
12 Wales - Cape Verde			14.50	16.34	18.18	25.08	26.17
13 Wales - St Thomas	15.33		14.33	16.18	17.52	26.53	24.39
14 Wales - Havana	15.50		8.00	12.10	14.85	22.39	14.60
15 Wales - Jamaica	19.50		14.83	17.23	18.19	27.75	24.63
16 Wales - Bahia				16.33	17.17	24.58	32.05
17 Wales - Rio de Janeiro	16.00		18.50	18.91	25.91	37.40	42.23
18 Wales - Rio Grande			22.50	24.00	25.90	31.98	43.47
19 Wales - Montevideo	25.50			23.20	27.00	37.11	51.29
20 Wales - Aden	33.33		31.00	31.75	32.80	53.68	48.73
21 Wales - Bombay	21.00			23.69	24.90	41.76	38.10
22 Wales - Point de Galle	22.17		20.00	20.00	23.56	40.71	47.61
23 Wales - Singapore	22.00		20.00	21.27	25.75	46.01	41.47
24 Wales - Hong Kong	26.00		30.00	31.00	36.31	63.18	63.85
25 Wales - Sierra Leone			19.50	21.35	18.61	23.85	26.83
26 Wales - Cape Good Hope	25.83		21.17	23.27	27.43	45.92	39.98
27 Wales - San Francisco			60.78	56.60	69.01	84.64	85.44
28 Wales - Panama			41.25	39.38	55.26	68.80	65.00
29 Wales - Callao	24.17		25.00	24.83	34.30	45.83	40.39
30 Wales - Valparaiso	22.00		22.92	23.88	32.00	44.56	39.43

Table 3. Average annual outward coal freight rates

	1855	1856	1857	1858	1859	1860	1861
1 Tyne - Hamburg	12.11	11.46	10.20	8.22	9.00	8.80	9.83
2 Tyne - Rotterdam	11.42	9.71	8.95	7.00	8.71	8.88	9.50
3 Tyne - Havre	11.95	11.34	10.07	8.57	9.71	10.32	10.59
4 Tyne - Rouen	15.46	13.98	12.41	10.50	12.33	13.08	12.67
5 Tyne - Kronstadt		12.00	13.10	8.78	12.75	13.13	13.67
6 Tyne - Riga		9.14	8.25	6.17	6.72	6.57	7.31
7 Tyne - Königsberg	13.83	15.09	10.69	8.23	9.67	7.82	8.38
8 Tyne - Stettin	13.81	14.97	12.16	9.97	10.43	10.17	10.60
9 Tyne - Swinemünde	12.42	13.28	9.93	8.28	8.63	8.14	8.94
10 Tyne - Kiel	13.22	13.71	10.26	8.13	9.08	8.53	10.00
11 Tyne - Copenhagen	12.79	13.04	10.60	8.14	8.86	8.61	9.77
12 Tyne - Gothenburg	9.34	9.57	8.19	6.81	7.02	7.25	7.76
13 Tyne - Stockholm	13.28	14.95	12.87	10.43	9.75	10.08	11.50
14 Tyne - Bordeaux	20.28	19.15	16.69	13.83	15.48	15.76	15.49
15 Tyne - Oporto	18.22	19.30	20.27	17.28	18.92	18.81	19.73
16 Tyne - Lisbon	16.96	20.38	18.08	14.31	15.85	16.55	15.99
17 Tyne - Cadiz	17.39	19.52	17.35	13.83	16.28	15.57	16.17
18 Tyne - Seville	17.33	18.48	20.33	17.07	19.50	19.97	19.72
19 Tyne - Gibraltar	22.45	22.60	19.84	16.46	18.35	18.30	17.73
20 Tyne - Algiers	30.92	29.69	26.02	20.09	22.41	22.15	21.36
21 Tyne - Malaga	21.70	22.77	21.34	16.68	19.83	19.81	20.22
22 Tyne - Barcelona	32.64	31.19	27.00	21.46	24.41	24.74	24.40
23 Tyne - Marseilles	30.20	29.73	25.38	19.89	21.99	20.52	19.36
24 Tyne - Genoa	32.78	32.34	26.70	20.72	23.71	23.59	22.86
25 Tyne - Leghorn	34.01	31.01	26.21	19.47	22.37	22.73	21.65
26 Tyne - Naples	33.94	32.34	26.59	20.29	23.26	23.70	22.75
27 Tyne - Messina	31.21	28.58	23.73	17.35	21.02	20.65	19.10
28 Tyne - Malta	31.57	28.96	25.28	17.64	21.35	19.58	18.83
29 Tyne - Venice	38.83	37.07	30.69	22.68	27.88	26.10	24.94
30 Tyne - Athens	35.15	31.40	25.80	18.51	22.96	20.27	20.00
31 Tyne - Alexandria	29.29	29.31	27.42	18.46	23.59	22.97	21.56
32 Tyne - Smyrna	35.07	29.82	25.33	18.46	22.50	20.40	19.76
33 Tyne - Constantinople	42.19	33.76	26.04	18.99	22.51	20.72	20.66
34 Tyne - Odessa		26.78	26.23	18.70	21.76	19.11	18.56
35 Tyne - Quebec	14.90	15.90	15.38	9.48	10.00	9.15	9.06
36 Tyne - New York	22.08	21.73	21.89	17.98	21.09	19.80	13.68
37 Tyne - Boston	23.45	21.83	21.37	17.10	19.00	18.17	13.86
38 Tyne - Havana	18.94	18.00	19.93	16.64	20.08	21.38	17.68
39 Tyne - Rio de Janeiro	30.54	30.37	30.37	31.93	35.12	37.26	32.70
40 Tyne - Montevideo	37.63	35.52	38.10	35.03	36.44	40.87	39.52
41 Tyne - Aden	34.88	35.97	36.32	38.46	54.38	52.05	39.19
42 Tyne - Bombay	23.71	21.53	29.40	28.83	44.51	41.30	28.43
43 Tyne - Calcutta	23.71	24.11	32.52	34.05	48.17	45.81	33.76
44 Tyne - Point de Galle	22.49	23.74	29.87	28.34	44.66	41.20	29.78
45 Tyne - Singapore	24.91	24.17	29.30	27.35	44.15	44.52	29.72
46 Tyne - Hong Kong	30.74	32.67	45.14	39.45	54.14	58.88	45.56
47 Tyne - Australia	59.93	37.44	38.17	40.49	47.29	47.42	44.50
48 Tyne - Cape Good Hope	26.49	24.03	28.55	28.21	37.49	39.62	32.60
49 Tyne - San Francisco	65.32	54.03	56.03	52.99	51.98	58.73	57.04
50 Tyne - Callao	31.57	33.00	28.71	34.67	45.00	36.79	42.00
51 Tyne - Coquimbo	33.67	30.67	31.12	34.57	40.00	39.38	38.75
52 Tyne - Valparaiso	33.54	30.75	30.59	34.15	41.04	37.50	34.92

Table 3. Average annual outward coal freight rates

	1855	1856	1857	1858	1859	1860	1861
1 Wales - Lisbon	14.44	17.81	15.93	12.89	12.98	13.96	13.75
2 Wales - Cadiz	15.19	17.43	15.06	11.97	13.44	13.40	14.54
3 Wales - Gibraltar	21.81	22.21	17.54	14.32	16.97	16.17	16.48
4 Wales - Barcelona	31.42	29.09	23.19	19.52	23.02	22.65	22.25
5 Wales - Genoa	27.50	29.08	24.67	16.65	20.85	18.99	19.11
6 Wales - Malta	30.19	26.85	21.88	16.02	20.74	17.72	17.24
7 Wales - Athens	34.50	25.63	22.42	17.88	20.25	18.34	17.29
8 Wales - Corfu	34.50	24.49	21.72	16.53	21.20	17.77	17.79
9 Wales - Alexandria	28.53	26.19	22.70	16.43	21.16	20.43	19.02
10 Wales - Smyrna	33.94	27.88	22.00	16.73	19.79	18.40	17.73
11 Wales - Constantinople	40.89	31.86	20.65	17.19	21.13	17.78	17.93
12 Wales - Cape Verde	20.86	21.15	19.58	16.95	17.66	17.81	16.90
13 Wales - St Thomas	21.49	22.10	20.72	17.25	17.49	18.85	16.42
14 Wales - Havana	18.54	16.14	17.01	16.20	17.04	17.18	15.04
15 Wales - Jamaica	22.61	21.01	20.45	17.26	17.49	18.32	16.29
16 Wales - Bahia	25.62	25.63	26.50	26.55	28.63	32.40	27.75
17 Wales - Rio de Janeiro	31.22	28.85	30.13	30.53	33.49	33.42	28.67
18 Wales - Rio Grande	42.26		33.33	30.16	37.50	39.67	40.31
19 Wales - Montevideo	37.69	33.13	32.51	33.27	33.02	37.48	37.29
20 Wales - Aden	31.83	30.40	33.65	35.70	50.36	46.18	
21 Wales - Bombay	23.00	20.72	27.60	26.81	38.17	37.46	24.81
22 Wales - Point de Galle	20.67	22.03	28.27	25.39	37.97	40.29	23.00
23 Wales - Singapore	25.42	21.67	31.19	24.56	41.08	41.00	25.50
24 Wales - Hong Kong	32.30	28.10	47.35	38.92	51.04	56.49	43.33
25 Wales - Sierra Leone	25.53	24.00	23.65	21.86	22.94	22.48	20.35
26 Wales - Cape Good Hope	28.83	22.00	28.11	26.55	35.40	37.31	29.21
27 Wales - San Francisco	68.81	51.04	49.63	50.05	52.50	56.04	47.73
28 Wales - Panama		40.00	41.00	42.37	48.50	46.67	46.67
29 Wales - Callao	33.59	25.00	28.95	32.39	36.94	36.39	30.50
30 Wales - Valparaiso	33.79	25.00	29.08	31.64	39.43	36.08	33.42

NOTE: Freight rates from the Tyne were mainly quoted in pounds per keel, with some exceptions regarding South American ports. One keel of coal equals 21.2 tons. Coal freights from Wales were always in shillings per ton.

Table 4. Selected freight rate quotations from North America March - August 1856

Month	Voyage	Freight rate	Cargo	Unit
March	New Orleans - Liverpool	12.75 *d.*	wheat	bushel
	New York - Bremen	11.00 *d.*	rye	bushel
	New York - Rotterdam	12.00 *d.*	rye	bushel
April	New Orleans - Liverpool	9.00 *d.*	wheat	bushel
	New York - Rotterdam	10.00 *d.*	rye	bushel
	New York - Bristol	2.75 *s.*	flour	barrel
May	New Orleans - Liverpool	8.75 *d.*	wheat	bushel
	New York - Glasgow	2.00 *s.*	flour	barrel
	New York - Bristol	3.00 *s.*	rosin	barrel
	New York - London	5.50 *s.*	spirits of turpentine	barrel
June	New York - Bremen	8.00 *d.*	rye	bushel
	New York - Glasgow	2.50 *s.*	flour	barrel
	New York - London	2.50 *s.*	flour	barrel
	New York - Bristol	2.38 *s.*	flour	barrel
	New York - Bristol	3.00 *s.*	rosin	barrel
July	New York - Cork f/o	9.00 *d.*	wheat	bushel
	New York - Liverpool	7.00 *d.*	wheat	bushel
	New York - Lisbon	16.00 *c.*	wheat	bushel
	New York - London	2.75 *s.*	flour	barrel
	New York - Bristol	2.50 *s.*	flour	barrel
	New York - London	6.00 *s.*	spirits of turpentine	barrel
	New York - Bristol	3.00 *s.*	rosin	barrel
August	New York - Cork f/o	9.50 *d.*	wheat	bushel
	New Orleans - Liverpool	9.00 *d.*	wheat	bushel
	New York - Liverpool	6.75 *d.*	wheat	bushel
	New York - Lisbon	18.00 *c.*	wheat	bushel
	New York - London	2.69 *s.*	flour	barrel
	City Point - Bremen	25.00 *s.*	tobacco	ton

NOTE: Freight rates were quoted in shillings converted to decimal figures (*s.*), pence (*d.*) or US cents (*c.*). All rates are for charters by sailing ships.

Table 5. The relative distribution of shipping freights by cargoes in 1857.

Cargoes	Weights
Timber and wood	27.3
Grain and flour	18.7
Oil seeds	4.5
Sugar and beverages	18.2
Animal foodstuffs and fats	0.8
Cotton	9.7
Non-cotton textile materials	2.8
Fertilizers	9.3
Metals, ores and chemicals	3.2
Oils and resinous products	2.8
Miscellaneous non-foods	2.7

NOTE: The estimates are derived on the basis of freight rates prevailing in 1857 and the distribution of imports to the UK in 1857 by commodity and ports of clearance. Rice is included in the grain and flour category. Items included in miscellaneous non-foods are hides, tobacco, valonia, madder roots, cork, bark, clover seed and whalefins.

Table 6. Weights of subindices.

Inward routes	Weights	Outward routes	Weights
Baltic grain	7.4	Home waters	13.6
Baltic wood	4.0	Baltic	7.1
North Sea wood	1.8	North Sea	3.1
White Sea	1.8	South Europe Atlantic	8.7
Mediterranean	4.6	Western Mediterranean	16.0
Black Sea	5.0	Eastern Mediterranean	6.0
North America wood	16.3	Black Sea	4.0
North America cotton	6.0	North America Atlantic	5.4
North America cargoes	3.7	Central America	3.4
North America berth	3.7	South America Atlantic	7.0
Central America	9.7	Far East	20.5
South America Atlantic	3.4	South Africa	1.6
Far East	22.4	Australia	0.7
Pacific	10.2	America Pacific	2.9

NOTE: Weights for the inward routes are derived on the basis of freight rates prevailing in 1857 and the geographic distribution of the volume of imports to the UK in 1857. Weights for outward routes are computed from coal freights from Tyne to three representative ports within each area in 1860 and detailed information on coal exports from the UK to individual ports in 1860.

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1848													
Inward													
Baltic grain		112	97	100	101	100	96	91	108	112	136	121	* 107
Baltic wood	106	122	100	103	112	115	119	108	113	116	129	123	114
North Sea wood	120	111	110	106	105	94	92	99	104	105	111	123	107
White sea					109	105		116					* 110
Mediterranen			127				86	112		97	154		* 115
Black sea	155		119	121		99	92	134		123	122	124	* 121
N Am Atl wood				116	118	120							* 118
N Am Atl berth	146	149	120	123		131	142	88	151	149	144	135	* 134
N Am Atl cotton	64	97	72	113	88	80	80	80	97	104	128	88	91
Central America					139				121		92		* 117
S America Atl		129	170	228	196		209	148	185	169	127	117	* 168
Far East	142	130	156	162	135	120		116	136	114			* 135
Outward													
Hamburg-Brest	149	142	123	122	116	113	106	112	117	123	120	126	122
North Sea	206	208	137	126	114	110	106	104	101	101	96		* 128
Baltic	103	111	89	93	95	87	84	92	106	123	129	106	101
S Europe Atlant	139	130	116	113	115	113	108	110	111	113	121	118	117
W Mediterranean	103	101	101	102	105	107	107	107	94	96	93	98	101
E Mediterranean	99	100	100	99	98	100	104	109	91	99	93	94	99
Black Sea	97	100	99	99	100	101	111	108	102	107	99	103	102
N America Atlant	115	115	115	115	122	121	117	133	131	129	114		* 121
Central America	139	140	133	137	138	146						123	* 137
S America Atlant	97	96	97	96	96	96		106					* 98
Far East	99	98	98	99	98	98	107	109					* 101
South Africa	117	114	114	114	117	117							* 116
America Pacific	87	87	87	87	81	82							* 85
Aggregate													
Inward	126	121	126	135	123	118	116	113	123	114	117	115	120
Outward	118	117	108	107	107	106	107	110	108	111	109	109	110
Total	122	119	117	121	115	112	111	111	115	112	113	112	115

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1849													
Inward													
Baltic grain	127	110	105	108	107	100	95	102	98	95	98	130	106
Baltic wood	112	112	111	96	95	102	105	102	102	104	109		* 104
North Sea wood	102	100	98	97	96	97	95	98	100	107	111		* 100
White sea	97	97	97	95	96	98	115	117	119				* 104
Mediterranen	114	114	114	111	111	111	108	108	108	94	98	96	107
Black sea	121	125	89	88	96	104	112	106	101	91	86	92	101
N Am Atl wood	102	102	102	109	109	109	111	111	111	104			* 107
N Am Atl grain	97				111			89	116		110	104	* 104
N Am Atl berth	139	122	121	94	124	112	105	81	61	79	105	123	106
N Am Atl cotton	125	153	158	124	110	66	77	89	79	117	132	124	113
Central America	136	135	143	134	128	109	107	104	106	100	102	105	117
S America Atl	98	100	103	99	101	111	115	109	111	107	99	71	102
Far East	118	118	118	115	115	115	118	118	116	114	109	108	115
Pacifics	121	121	121	119	119	119	113	113	113	103	103	103	114
Outward													
Hamburg-Brest	122	119	91	90	101	102	105	105	106	106	106	105	105
North Sea	113	123	108	101	104	102	91	101	104	100	108	103	105
Baltic	95	94	92	87	95	91	95	101	105	110	110	112	99
S Europe Atlant	111	102	105	103	101	98	102	99	101	105	99	99	102
W Mediterranean	96	96	96	97	98	99	103	102	98	95	94	93	97
E Mediterranean	99	100	99	100	96	103	96	102	101	102	100	98	100
Black Sea	94	89	91	94	90	101	99	88	88	88	91	91	92
N America Atlant	118		122		120	121						100	* 117
S America Atlant	92	97	99	103	107	111	124	131	119	112	100	94	108
Far East	110	112	115	117	119	107	107	107	113	113	113	114	112
South Africa						119							* 119
America Pacific	86	87	87	88	88	89	90	90	91	99	100	101	91
Aggregate													
Inward	116	116	115	111	112	108	109	107	107	104	105	106	110
Outward	107	107	103	103	105	104	105	106	106	105	104	103	105
Total	111	111	109	107	109	106	107	106	107	105	105	105	107

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1850													
Inward													
Baltic grain	107	100	97	90	90	83	90	92	100	107	120	124	100
Baltic wood	101	97	97	91	92	89	89	96	99	112		137	* 100
North Sea wood	98	98	96	96	97	98	98	100	101	107	110		* 100
White sea	108	109	111	94	94	95	93	96	100				* 100
Mediterranen	97	95	100	93	97	97	98	94	105	107	107	110	100
Black sea		92	93	91	95	103	106	112	109	107	99	94	* 100
N Am Atl wood	106	99	102	103	100	84	98	98	104	100	104		* 100
N Am Atl grain			124	115	96	77	77		101	124	96	89	* 100
N Am Atl berth	109	110	109	95	78	75	73	71	137	108	116	120	100
N Am Atl cotton	101	121	114	115	73	69	74	100	106	116	112	101	100
Central America		119	115	100	95	87	91	97		96	99	103	* 100
S America Atl		57	69	78	91	115	111	113	105	118	120	122	* 100
Far East	106	118	105	98	95	96	99	108	92	97	94	92	100
Pacifics	104	103	101	103	101	104	101	98	96	93	100	96	100
Outward													
Hamburg-Brest	105	105	102	102	100	102	98	92	92	99	102	101	100
North Sea	114	114	97	95	101	103	103	92	92	93	95	102	100
Baltic	114	105	100	101	99	100	102	98	94	92	94	99	100
S Europe Atlant	102	101	101	100	100	100	98	97	99	100	103	100	100
W Mediterranean	90	92	93	94	96	102	108	112	111	106	99	97	100
E Mediterranean	97	98	98	98	99	99	100	112	109	103	96	91	100
Black Sea	88	88	88	94	94	96	105	110	117	113	104	102	100
N America Atlant	99	103	98	99	97	96	96	96	99	103	105	110	100
Central America						73			97	119	107	104	* 100
S America Atlant	93	92	91	115	94	95	100	105	105	102	105	104	100
Far East	114	99	99	99	99	98	98	98	101	97	98	99	100
South Africa									111	97	95	97	* 100
Australia									104	104	87	104	* 100
America Pacific	102	102	103	104	107	103	100	98	96	92	96	98	100
Aggregate													
Inward	104	106	104	99	95	91	95	99	100	103	103	102	100
Outward	103	100	98	100	98	99	101	101	102	101	100	100	100
Total	103	103	101	99	96	95	98	100	101	102	102	101	100

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1851													
Inward													
Baltic grain	113	94	89	89	87	88	90	87	76	75	74		* 87
Baltic wood	104	98	98	97	94	93	95	101	99	95	94	91	97
North Sea wood	101	99	101	103	100	100	103	106	105	107	104	107	103
White sea	85	91	93	92	91	93	94	94	91				* 92
Mediterranen	110	107	105	103	104	106	109	109	109	111	113	109	108
Black sea	93	96	101	100	108	126	134	137	130	119	113	120	115
N Am Atl wood	98	102	103	106	106	105	106	104	102	104	100	83	102
N Am Atl grain	111	99	112	99		77	106	93	88	86	103	107	* 98
N Am Atl berth	118	104	118	110	106	113	108	99	85	92	97	97	104
N Am Atl cotton	125	139	150	119	66	84	94	86	101	108	100	118	107
Central America	102	104	108	108	106	99	95	101	101	102	105	99	102
S America Atl	127	133	135	126	121	129	126	110	104	96	104	115	119
Far East	93	93	94	96	99	98	95	83	81	82	69	76	88
Pacifics	94	96	96	91	97	88	76	69	83	48		66	* 82
Outward													
Hamburg-Brest	103	95	86	85	86	83	82	83	84	97	97	110	91
North Sea	101	91	91	93	94	94	91	93	92	97	99	100	95
Baltic	100	100	98	96	96	97	98	99	98	101	100	100	99
S Europe Atlant	99	98	97	94	97	99	100	97	92	89	92	91	95
W Mediterranean	96	95	93	93	94	93	93	92	91	89	87	85	92
E Mediterranean	88	86	85	84	83	83	81	80	79	80	78	76	82
Black Sea	99	98	96	97	91	84	83	76	74	79	80	76	86
N America Atlant	108	107	109	107	105	98	102	102	100	98	95	97	102
Central America	110	111	107	111	108	118	119	111	119	107	103	97	110
S America Atlant	101	98	101	97	97	105	99	98	100	98	98	95	99
Far East	99	99	98	101	101	100	101	101	100	101	100	101	100
South Africa	99	100	102	108	115	116	111	114	113	110	108	104	108
Australia					90	90	108	92	92	92	92	90	* 94
America Pacific	99	98	99	100	101	101	104	102	101	99	105	112	102
Aggregate													
Inward	102	101	103	101	99	99	99	95	93	90	88	89	97
Outward	100	98	96	96	96	96	96	95	94	95	95	96	96
Total	101	99	99	98	98	97	97	95	94	93	92	93	96

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1852													
Inward													
Baltic grain	83	85	87	80	71	72	71	85	92	102	134	125	91
Baltic wood	90	87	87	85	85	85	87	92	104	116	134		* 96
North Sea wood	100	100	101	99	99	101	103	105	108	112	118	113	105
White sea		90	89	86	86	88	94	94	118			90	* 93
Mediterranen	93	102	112	113	110	111	114	115	114	109	113	122	111
Black sea	120	123	119	109	100	107	114	123	133	138	151	158	125
N Am Atl wood		104	105	103	104	103	102	111	115	111		113	* 107
N Am Atl grain	121	149	109	113	105	92	81	79	95	110	128	141	110
N Am Atl berth	86	103	141	96	88	84	79	80	94	101	147	181	107
N Am Atl cotton	116	132	146	127	96	96	93	86	93	103	176	206	123
Central America	106	101	106	105	103	100	87	88	90	92	91	91	97
S America Atl	104	104	122	90	84	97	101	109	106	99	108	122	104
Far East	80	91	101	84	86	96	93	95	91	91	93	98	92
Pacifics	69	78	89	93	88	84	89	91	94	96	108	117	91
Outward													
Hamburg-Brest	102	93	93	92	92	89	92	92	93	98	117	124	98
North Sea	86	92	94	96	111	131	106	104	99	96	98	93	101
Baltic	90	100	108	109	126	128	125	125	116	120	126	131	117
S Europe Atlant	91	89	87	86	88	88	87	91	91	92	95	98	90
W Mediterranean	85	84	84	87	90	90	91	97	96	98	97	100	92
E Mediterranean	76	79	82	83	87	88	88	92	91	90	91	92	87
Black Sea	76	74	76	77	81	82	84	86	88	88	88	84	82
N America Atlant	97	94	91	89	92	97	102	108	109	108	111	109	100
Central America	93	94	93	96	105	99	94	116	112	123	115	130	106
S America Atlant	97	96	97	103	103	102	108	112	117	115	111	115	106
Far East	101	99	99	99	100	103	105	107	113	115	115	133	107
South Africa	104	103	99	99	99	104	112	110	112	112	114	115	107
Australia	90	93	96	100	105		113	112	113	120	131	157	* 112
America Pacific	114	114	114	113	117	120	122	125	125	125	134	142	122
Aggregate													
Inward	92	100	105	97	93	95	93	97	100	103	114	119	101
Outward	94	92	93	94	97	99	99	102	103	105	108	115	100
Total	93	96	99	95	95	97	96	100	102	104	111	117	100

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1853													
Inward													
Baltic grain	117	109	111	114	113	116	133	154	177	191	191	200	144
Baltic wood	115	122	126	129	137	145	155	186	227	231	208	168	162
North Sea wood	103	104	104	113	127	145	158	180	204	202	187	182	151
White sea	111	107	110	116	122	132	144	170	184	187			* 138
Mediterranen	129	130	132	135	135	142	146	154	166	176	180	177	150
Black sea	157	160	155	159	170	202	236	270	284	313	318	307	228
N Am Atl wood	130	136	142	141	141	140	142	154	169	180	160	159	149
N Am Atl grain	164	156	154	133	92	99	115	126	163	187	209	197	150
N Am Atl berth	169	151	143	139	121	111	116	141	165	207	212	197	156
N Am Atl cotton	172	142	149	152	138	121	76	124	141	173	158	130	140
Central America	107	115	125	131	130	135	139	143	154	150	136	135	133
S America Atl	130	138	160	159	164	159	145	112	128	147	153	197	149
Far East	100	102	107	105	108	111	114	113	112	115	125	132	112
Pacifics	115	119	133	126	119	116	120	124	124	124	124	123	122
Outward													
Hamburg-Brest	115	110	113	118	116	115	113	130	159	166	164	166	132
North Sea	98	95	94	100	107	110	113	117	140	143	169	173	121
Baltic	126	119	122	137	139	143	146	153	163	176	182	171	148
S Europe Atlant	99	98	101	107	111	116	120	128	135	146	152	153	122
W Mediterranean	100	100	104	111	116	123	126	127	130	137	141	141	121
E Mediterranean	92	93	96	101	103	110	114	119	121	124	133	133	112
Black Sea	84	84	86	84	88	93	99	100	99	102	104	111	94
N America Atlant	120	121	116	118	123	142	139	145	145	158	171	171	139
Central America	135	134	146	157	168	178	183	210	195	182	172	161	168
S America Atlant	118	128	134	139	145	157	172	173	165	182	191	196	158
Far East	143	163	176	175	177	182	191	193	192	189	189	196	180
South Africa	128	131	131	130	142	143	137	150	154	152	150	148	141
Australia	177	211	205	219	210	207	197	202	208	202	208	214	205
America Pacific	146	144	170	153	154	155	146	150	136	141	145	150	149
Aggregate													
Inward	123	124	129	128	126	129	133	143	157	167	164	163	140
Outward	117	121	127	130	134	139	143	149	155	159	164	166	142
Total	120	122	128	129	130	134	138	146	156	163	164	164	141

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1854													
Inward													
Baltic grain	157	176	170	157	141	129	115	102	117	140	167	197	147
Baltic wood	162	185	191	199	183	161	129	120	130	141	158	123	157
North Sea wood	166	169	159	158	169	160	150	144	137	140	157	145	154
White sea	138	138	169	198	211	190							* 174
Mediterranen	179	188	169	145	117	112	116	119	125	127	133	132	139
Black sea	282	279	235	231	223	198	198	181	184	184	198	215	217
N Am Atl wood	159	168	178	174	171	167	152	150	129	122	124	122	151
N Am Atl grain	185	204	186	175	163	130	123	133	145	115	124	107	149
N Am Atl berth	201	202	209	177	142	111	112	84	75	86	102	107	134
N Am Atl cotton	174	165	209	180	158	125	140	100	91	85	93	120	137
Central America	147	165	180	174	155	156	143	142	132	138	128	125	149
S America Atl	196	188	175	165	152	136	127	129	129	125	125	131	148
Far East	145	154	156	159	173	168	155	140	131	132	130	137	148
Pacifics	126	128	142	149	170	184	180	175	158	154	143	139	154
Outward													
Hamburg-Brest	167	167	149	140	131	131	129	132	132	134	139	146	141
North Sea	162	151	163	164	147	114	105	109	115	112	138	154	136
Baltic	167	168	184	192	170	149	131	129	134	143	148	155	156
S Europe Atlant	141	145	152	155	158	158	148	145	142	136	139	150	147
W Mediterranean	139	146	191	220	227	212	181	168	165	159	166	182	180
E Mediterranean	139	151	222	274	271	255	207	183	171	168	179	211	203
Black Sea	123	136	230	301	278	283	232	209	205	218	253	292	230
N America Atlant	156	165	169	166	171	168	156	144	137	131	135	158	155
Central America	188	173	174	174	178	167	165	161	130	123	125	120	157
S America Atlant	192	200	203	215	224	225	212	205	205	179	173	171	200
Far East	199	199	197	207	214	208	150	142	130	124	120	117	167
South Africa	132	148	156	168	171	157	140	115	109	111	114		* 138
Australia	215	210	188	187	188	183	180	169	159	168	167	152	181
America Pacific	157	154	159	185	211	198	164	160	127	127	124	130	158
Aggregate													
Inward	163	172	174	170	166	157	148	139	133	133	136	138	152
Outward	165	168	183	196	197	189	162	154	148	143	148	158	168
Total	164	170	178	183	182	173	155	147	140	138	142	148	160

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1855													
Inward													
Baltic grain	166	165	136	122	108	109	105	107	111	136	143	172	132
Baltic wood	118	120	124	119	112	111	120	126	141	151	141		* 126
North Sea wood	133	122	112	115	112	116	119	130	132	145	157	156	129
White sea	193	198	209	209	235								* 209
Mediterranen	123	124	124	119	112	110	108	110	115	122	128	126	118
Black sea	203	186	177	168	159	170	175	179	181	177	164	172	176
N Am Atl wood	109	112	110	112	106	103	109	120	128	146	122	120	116
N Am Atl grain	112	110	108	114	101	91	111	132	156	201	191	186	134
N Am Atl berth	111	106	96	88	74	83	64	81	157	218	181	202	122
N Am Atl cotton	116	106	108	132	111	111	113	119	197	229	155	173	139
Central America	122	122	123	123	123	123	118	114	132	129	136	137	125
S America Atl	126	117	107	115	119	121	121	129	149	145	141	158	129
Far East	151	151	132	129	131	131	131	127	129	130	139	140	135
Pacifics	140	132	138	137	134	129	128	129	130	137	139	141	134
Outward													
Hamburg-Brest	142	141	134	128	124	122	122	122	135	147	144	143	134
North Sea	149	131	125	129	130	127	127	129	133	154	154	174	139
Baltic	149	144	148	151	155	144	132	129	142	162	162	186	150
S Europe Atlant	146	147	151	150	150	146	145	139	141	144	148	157	147
W Mediterranean	187	192	196	195	192	183	173	165	167	172	183	189	183
E Mediterranean	219	228	233	224	222	192	175	167	170	183	192	200	200
Black Sea	276	293	280	272	270	247	224	216	248	282	288	299	266
N America Atlant	150	150	142	129	120	123	116	113	128	117	119	121	127
Central America	131	133	138	152	167	170	168	162	180	148	144	131	152
S America Atlant	178	178	185	182	178	170	163	147	149	145	148	139	164
Far East	116	121	125	118	115	113	108	98	96	94	102	105	109
South Africa	119	126	124	121	126	139	128	109	115	119	115	127	122
Australia	158		186	184	179	205				166			* 180
America Pacific	130	134	133	130	131	130	123	120	121	115	115	122	125
Aggregate													
Inward	136	134	126	125	121	120	121	125	137	149	143	147	132
Outward	157	160	160	157	155	149	143	136	142	146	150	155	151
Total	147	147	143	141	138	135	132	130	139	147	147	151	141

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1856													
Inward													
Baltic grain	175	134	110	121	111	107	119	118	121	125	149	147	128
Baltic wood	116	117	121	114	112	113	116	123	126	131	124	122	120
North Sea wood	132	129	125	120	122	121	124	123	128	131	139	121	126
White sea		126	117	116	114	109	117	126	148				* 121
Mediterranen	120	116	120	115	119	121	116	113	111	108	102	105	114
Black sea	165	154	132	120	107	117	132	134	128	110	100	97	125
N Am Atl wood	120	138	125	123	119	119	127	133	141	151	139	120	130
N Am Atl grain	180	151	155	123	107	123	131	127	130	149	147	148	139
N Am Atl berth	181	171	172	124	121	149	157	128	147	163	174	150	153
N Am Atl cotton	157	159	176	109	113	130	104	89	92	95	109	108	120
Central America	139	129	126	127	127	125	121	116	123	124	121	122	125
S America Atl	147	118	144	133	144	155	149	130	130	134	133	131	137
Far East	141	140	141	135	122	119	111	115	114	117	126	116	125
Pacifics	141	145	144	143	144	146	145	142	140	140	137	143	143
Outward													
Hamburg-Brest	146	128	116	114	114	114	115	120	130	135	138	135	125
North Sea	171	147	138	136	131	130	133	135	136	142	135	127	138
Baltic	185	158	156	151	148	150	153	159	152	167	158	159	158
S Europe Atlant	156	152	144	145	145	149	155	169	159	156	153	157	153
W Mediterranean	189	182	177	174	181	186	183	173	170	168	165	170	176
E Mediterranean	205	196	186	189	198	192	182	162	157	162	170	178	181
Black Sea	301	277	268	231	205	205	190	174	164	184	194	204	216
N America Atlant	118	113	108	116	123	126	122	119	122	128	129	123	121
Central America	142	142	154	173	163	166	174	170	164	141	133	137	155
S America Atlant	141	154	158	162	163	162	158	156	154	147	141	139	153
Far East	112	110	110	114	113	110	106	103	103	102	95	100	106
South Africa	117	121	117	120	128	125	111	110	105	102	102	103	113
Australia					114		137	118	118	123	111	118	* 120
America Pacific	123	126	127	124	118	108	103	99	101	100	104	98	111
Aggregate													
Inward	143	138	135	127	121	124	124	123	126	130	131	125	129
Outward	157	149	145	145	145	145	143	140	139	140	138	140	144
Total	150	144	140	136	133	135	134	132	133	135	134	132	136

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1857													
Inward													
Baltic grain	142	120	98	97	97	102	101	98	101	101	101	97	105
Baltic wood	112	114	108	106	105	105	109	115	115	119	118	109	111
North Sea wood	110	112	110	110	113	116	116	119	117	117	112		* 114
White sea	109	105	100	99	101	103	108	117	131				* 108
Mediterranen	102	99	98	97	96	96	101	103	105	103	102	102	100
Black sea	90	91	94	100	109	117	124	134	127	114	110	104	109
N Am Atl wood	112	118	113	113	111	110	110	110	120	114	111	111	113
N Am Atl grain	150	139	132	136	140	98	78	100	116	132	141	111	123
N Am Atl berth	163	154	129	103	48	48	50	58	106	131	157	132	107
N Am Atl cotton	158	145	90	82	76	79	73	79	111	114	102	108	101
Central America	122	125	125	120	116	116	119	122	121	117	118	115	120
S America Atl	130	126	127	126	125	124	127	120	119	108	96	91	118
Far East	117	111	116	110	109	111	113	112	108	106	98	101	109
Pacifics	144	146	144	136	134	132	132	134	120	121	121	120	132
Outward													
Hamburg-Brest	137	119	103	103	104	104	107	106	107	109	118	115	111
North Sea	137	120	113	119	115	119	124	125	115	123	124	114	121
Baltic	165	136	130	136	136	130	129	130	141	148	135	129	137
S Europe Atlant	154	150	137	141	146	148	152	147	144	131	130	120	142
W Mediterranean	169	167	166	163	162	162	160	160	152	146	141	130	156
E Mediterranean	178	178	179	171	166	160	151	150	136	123	120	111	152
Black Sea	201	194	187	180	191	186	176	168	150	133	131	126	169
N America Atlant	125	113	112	111	113	112	114	116	116	124	126	125	117
Central America	139	148	153	155	165	179	199	208	173	160	151	147	165
S America Atlant	137	137	147	150	157	157	153	159	156	148	145	144	149
Far East	102	120	138	143	137	135	130	123	137	147	146	137	133
South Africa	101	99	99	101	98	95	88	85	92	92	90	88	94
Australia	118	118	127	130	132	135	137	141	141	139			* 132
America Pacific	98	103	107	108	107	109	107	108	103	107	110	106	106
Aggregate													
Inward	124	121	116	112	110	108	108	111	114	114	111	108	113
Outward	141	139	139	140	140	140	139	137	136	135	134	127	137
Total	133	130	128	126	125	124	124	124	125	124	122	117	125

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1858													
Inward													
Baltic grain	120	93	79	79	78	76	72	80	85	83	99	111	88
Baltic wood	102	98	91	86	84	82	83	85	90	94	124	108	94
North Sea wood		100	99	98	98	95	91	91	96	109	103	102	* 98
White sea		98	88	86	85	83	85	92					* 88
Mediterranen	100	97	97	95	97	96	99	98	100	98	99	108	99
Black sea	94	92	91	89	99	106	105	98	88	95	93	96	95
N Am Atl wood	108	105	98	99	98	100	106	106	107	106	104	107	104
N Am Atl grain	114	120	120	116	125	108	120	118	127	130	132	130	122
N Am Atl berth	127	121	113	101	145	108	110	96	94	103	112	126	113
N Am Atl cotton	116	122	129	110	134	130	127	116	115	124	142	136	125
Central America	113	108	105	106	107	105	111	110	110	108	107	108	108
S America Atl	97	95	98	86	83	71	61	105	102	102	110	103	93
Far East	94	99	91	92	83	85	70	68	70	64	54	49	77
Pacifics	120	106	101	100	95	93	98	85	77	68	82	85	93
Outward													
Hamburg-Brest		90	87	86	85	79	77	77	82	83	94	93	* 85
North Sea	119	114	100	94	107	106	93	93	91	88	93	94	99
Baltic	106	120	113	105	114	117	113	109	98	98	105	110	109
S Europe Atlant	115	107	103	110	118	121	117	116	112	109	114	116	113
W Mediterranean	122	117	118	124	134	132	124	122	119	117	118	120	122
E Mediterranean	106	102	101	108	114	116	109	103	100	99	103	108	106
Black Sea	114	112	110	113	118	116	111	109	109	114	117	127	114
N America Atlant	110	103	98	95	97	93	89	86	85	84	88	102	94
Central America	130	131	141	154	159	163	163	161	146	134	130	129	145
S America Atlant	141	143	151	155	157	155	155	150	151	154	155	152	152
Far East	127	136	141	136	117	118	116	118	116	112	121	138	125
South Africa	89	87	89	88	88	88	88	87	84	78	83	90	87
Australia				140	137	134	133	131	129	123	133	141	* 134
America Pacific	107	110	112	110	108	109	114	117	118	112	114	123	113
Aggregate													
Inward	107	103	98	96	97	94	93	92	92	91	94	94	96
Outward	118	117	117	117	118	117	113	112	110	108	114	119	115
Total	113	110	107	107	107	106	103	102	101	100	104	107	106

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1859													
Inward													
Baltic grain	101	90	79	75	102	103	80	83	94	110	120	112	96
Baltic wood	88	84	84	82	94	98	99	99	102	109	107	110	96
North Sea wood	97	97	95	96	105	115	112	111	110	112	112	112	106
White sea	86	83	79	79	91	97	101	105					* 90
Mediterranen	100	95	97	93	101	101	102	96	95	95	95	92	97
Black sea	93	94	96	104	138	136	105	104	96	97	104	108	106
N Am Atl wood	108	107	104	106	103	105	104	108	109	113	114	111	108
N Am Atl grain	111	121	120	118	110	103	109	111	129	135	139	132	120
N Am Atl berth	122	113	104	96	92	72	69	93	105	120	129	135	104
N Am Atl cotton	132	118	124	113	99	91	98	121	131	133	130	147	120
Central America	109	112	110	112	115	112	105	108	114	108	110	112	111
S America Atl	108	102	103	110	100	115	102	89	84	86	89	87	98
Far East	61	67	67	62	64	67	60	60	55	52	50	57	60
Pacifics	77	81	78	87	87	92	107	100	101	106	111	110	95
Outward													
Hamburg-Brest	94	91	83	84	110	105	97	88	91	91	96	97	94
North Sea	94	90	88	91	120	111	109	100	102	96	97	93	99
Baltic	105	103	113	118	157	137	128	121	124	113	115	111	120
S Europe Atlant	115	107	107	112	128	139	144	129	120	119	126	134	123
W Mediterranean	123	123	128	135	173	168	163	132	124	121	123	128	137
E Mediterranean	110	113	122	124	171	162	162	123	119	123	126	136	133
Black Sea	125	126	131	135	171	155	159	127	125	127	132	141	138
N America Atlant	102	93	86	87	90	99	101	97	98	95	96	101	95
Central America	129	136	152	169	188	202	209	157	148	147	141	141	160
S America Atlant	152	152	154	156	162	165	162	166	163	162	162	162	160
Far East	161	171	179	177	167	164	166	169	179	180	193	197	175
South Africa	95	101	106	109	100	104	108	107	105	108	111	112	106
Australia	159	165	157	161	155	166	133	133	134	154	141	139	150
America Pacific	133	131	128	132	126	129	123	127	123	122	125	127	127
Aggregate													
Inward	93	93	91	91	94	95	91	93	95	97	99	100	94
Outward	125	126	128	131	149	147	145	132	131	131	135	139	135
Total	109	109	110	111	122	121	118	112	113	114	117	119	115

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1860													
Inward													
Baltic grain	116	102	97	99	103	99	93	90	89	117	144	149	108
Baltic wood	91	91	94	97	100	103	108	110	109	127	145	167	112
North Sea wood	109	96	101	100	104	107	111	112	117	123	135	135	112
White sea		90	91	96	98	90	99	110				104	* 97
Mediterranen	86	92	100	96	94	94	100	108	118	120	119	111	103
Black sea	103	101	103	104	100	112	121	135	147	154	151	123	121
N Am Atl wood	109	109	110	113	115	117	120	129	137	139	130	122	121
N Am Atl grain	137	125	115	127	118	132	131	151	177	164	181	178	144
N Am Atl berth	121	134	135	121	125	125	141	173	203	193	220	196	157
N Am Atl cotton	137	147	161	140	103	105	114	123	137	140	160	183	137
Central America	112	111	115	118	116	115	118	118	118	119	118	110	116
S America Atl	77	89	95	86	89			80	107	103	111	127	* 96
Far East	70	87	92	99	98	94	96	91	88	94	98	100	92
Pacifics	105	116	117	118	119	121	123	119	111	114	111	114	116
Outward													
Hamburg-Brest	96	96	96	95	94	96	105	103	104	104	111	107	100
North Sea	91	92	92	96	98	100	102	97	102	105	109	102	99
Baltic	110	106	101	107	111	110	110	107	108	112	122	124	111
S Europe Atlant	129	120	118	122	129	131	130	133	131	132	133	129	128
W Mediterranean	133	130	129	132	135	140	141	136	130	126	127	126	132
E Mediterranean	135	128	128	129	134	135	130	130	126	123	120	120	128
Black Sea	138	130	132	134	139	147	134	134	127	124	122	113	131
N America Atlant	101	99	96	96	100	97	97	93	91	91	90	94	95
Central America	154	156	158	164	175	177	163	156	152	148	150	143	158
S America Atlant	172	178	178	182	183	185	181	185	178	181	179	174	180
Far East	198	201	198	182	179	180	178	176	177	184	186	180	185
South Africa	113	114	111	112	109	111	113	113	103	96	103	105	109
Australia	156	170	162	160	152	154	154	153	152	150	152	153	156
America Pacific	128	127	125	122	127	123	121	125	124	130	131	130	126
Aggregate													
Inward	100	104	107	108	107	108	110	114	119	123	128	127	113
Outward	140	139	138	136	138	140	139	138	135	137	138	135	138
Total	120	122	122	122	123	124	125	126	127	130	133	131	125

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

Table 7. Ocean freight rate indices monthly 1848 - 1862

1850 average = 100

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1861													
Inward													
Baltic grain	114	116	100	98	93	90	79	86	105	110	127	124	103
Baltic wood	108	107	107	107	108	108	110	108	111	123	135		* 112
North Sea wood	119	107	105	107	112	115	110	108	112	118	115	124	113
White sea	107	104	101	101	98	97	98		107	107			* 102
Mediterranen	105	105	110	114	124	108	89	90	106	108	125	118	108
Black sea	119	117	108	102	112	118	118	126	143	147	144	141	125
N Am Atl wood	129	124	125	123	118	118	117	124	122	128	124	133	124
N Am Atl grain	165	168	165	146	135	136	142	155	169	178	161	151	156
N Am Atl berth	192	204	196	168	143	136	160	157	180	199	172	156	172
N Am Atl cotton	224	218	178	125	145	120	150			80	183	214	* 164
Central America	112	117	120	121	127	142	106	104	110	107	110	118	116
S America Atl	129	142	166	126	130	142	147	121	104	118	125	123	131
Far East	97	97	98	99	103	101	92	93	86	87	97	103	96
Pacifics	110	118	108	117	125	128	135	134	131	132	126	121	124
Outward													
Hamburg-Brest	122	124	116	111	107	105	100	102	101	106	113	119	111
North Sea	113	105	103	102	107	108	105	103	103	106	113	114	107
Baltic	121	122	119	115	115	120	116	115	117	118	120	120	118
S Europe Atlant	127	126	123	122	123	124	123	120	115	116	118	120	121
W Mediterranean	125	125	124	126	131	133	132	127	126	127	129	131	128
E Mediterranean	118	117	117	117	119	122	120	116	115	115	114	118	117
Black Sea	117	116	116	118	124	134	135	127	128	132	135	138	127
N America Atlant	90	90	96	90	88	83	74	75	66	67	65	66	79
Central America	140	139	138	137	141	146	149	146	146	151	155	159	146
S America Atlant	172	176	169	172	171	166	162	153	147	138	133	134	158
Far East	184	174	162	151	147	138	125	120	112	111	108	109	137
South Africa	104	102	96	97	99	92	89	86	80	74	73	74	89
Australia	165	146									90		* 133
America Pacific	127	128	126	128	125	120	116	108	103	99	100	98	115
Aggregate													
Inward	120	122	120	117	117	119	113	115	118	122	124	125	119
Outward	138	135	131	128	128	126	122	118	114	115	116	118	124
Total	129	128	125	122	123	122	117	116	116	118	120	122	122

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

Table 8. Cyclical turning points of freight rate indices in the 1850s

Index	First trough	The 1853/54 peak	Second trough
Inward			
Baltic grain	1851:11	1853:10	1858:10
Baltic wood	1852:1	1853:11	1858:7
North Sea wood	1850:10	1853:10	1858:9
White Sea	1851:10	1855:5	1858:10
Mediterranean	1850:1	1853:11	1859:11
Black Sea	1849:11	1853:11	1858:10
North America wood	1850:6	1854:4	1858:9
North America cotton	1850:4	1854:4	1857:5
North America grain	1851:2	1853:12	1857:11
North America berth	1850:6	1853:10	1857:7
Central America	1852:9	1854:4	1858:4
South America Atlantic	1850:2	1854:1	1858:6
Far East	1851:12	1854:5	1859:9
Pacific	1851:11	1854:7	1858:11
Outward			
Hamburg-Brest	1851:6	1853:12	1858:9
North Sea	1852:1	1854:2	1858:11
Baltic	1850:10	1854:1	1858:11
South Europe Atlantic	1852:5	1854:5	1858:10
Western Mediterranean	1852:4	1854:5	1858:8
Eastern Mediterranean	1851:8	1854:5	1858:3
Black Sea	1852:3	1854:6	1858:3
North America Atlantic	1852:3	1854:4	1858:9
Central America	1852:2	1853:10	1858:12
South America Atlantic	1851:8	1854:5	1858:2
Far East	1852:4	1853:11	1858:6
South Africa	1852:4	1853:11	1858:4
Australia	1852:1	1853:11	1856:12
America Pacific	1850:12	1854:5	1857:2
Aggregate			
Inward	1851:11	1854:4	1858:11
Outward	1852:3	1854:5	1858:9
Total	1851:11	1854:4	1858:10

NOTE: The dates of the turning points are entered as year:month. These are determined from the trendcyclical curve applied to data series seasonally adjusted by the X12 method.

Inward freight rate series 1848 - 1861

Figure 1. BALTIC GRAIN

Legend: Index — — — Danzig/Konigsberg - London/East Coast UK: wheat

Figure 2. BALTIC WOOD

Legend: Index — — — Danzig/Memel - London/East Coast UK: timber
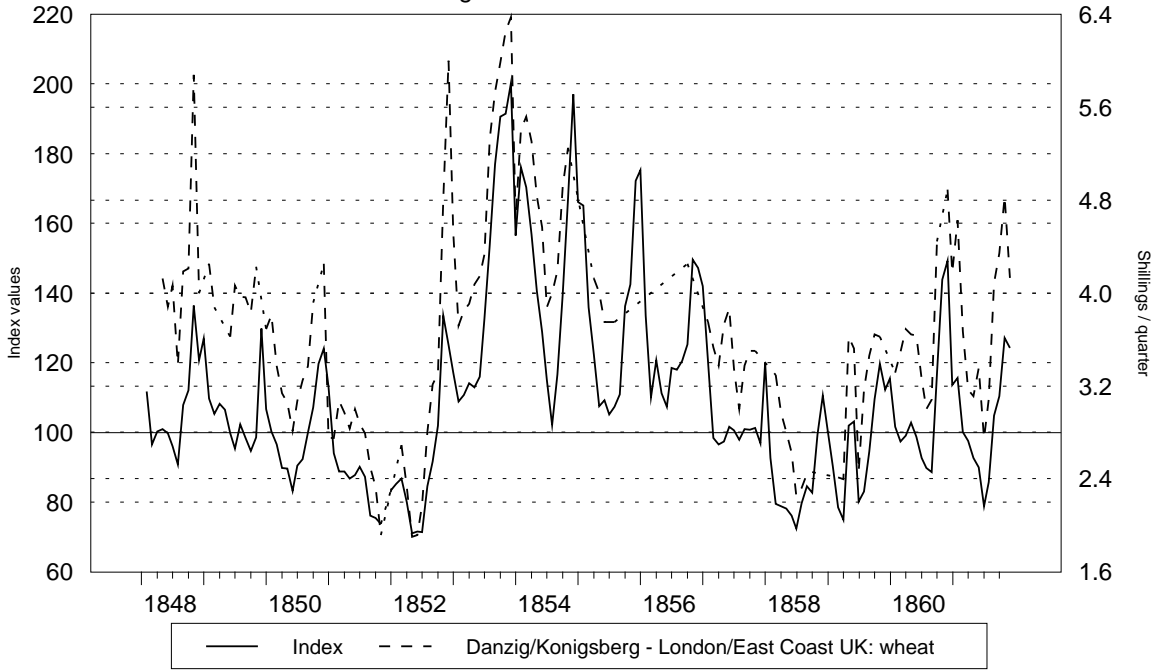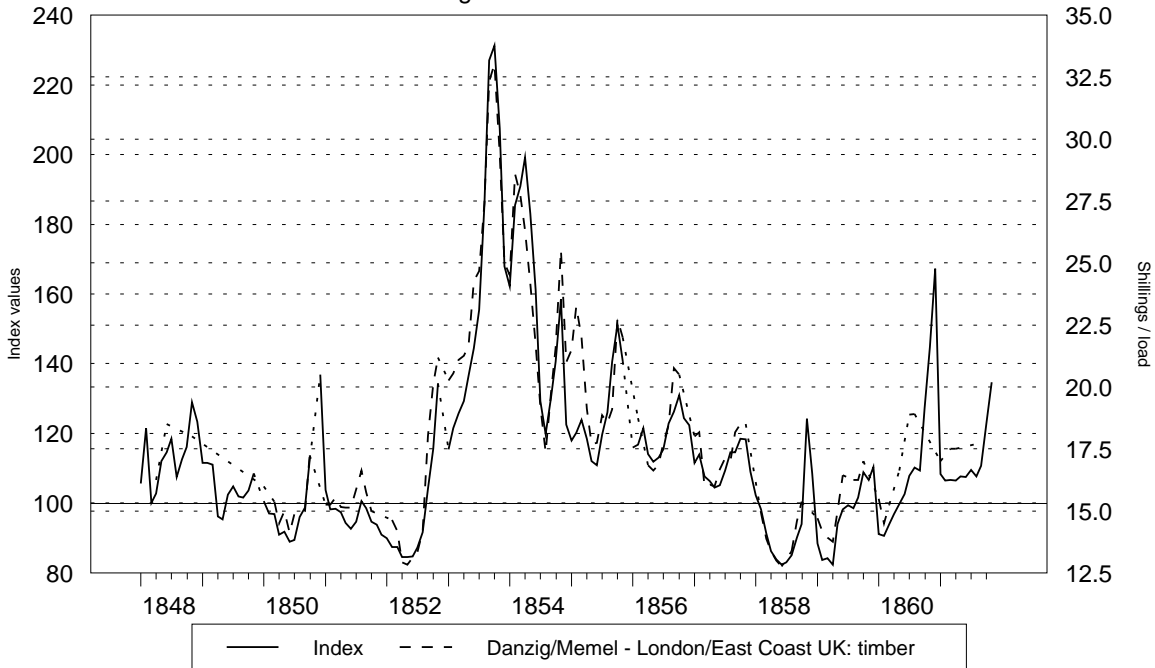
Inward freight rate series 1848 - 1861

Figure 3. NORTH SEA WOOD

Legend: Index — — — Gothenburg - Hull: deals

Figure 4. WHITESEA

Legend: Index — — — Archangel - East Coast UK: deals
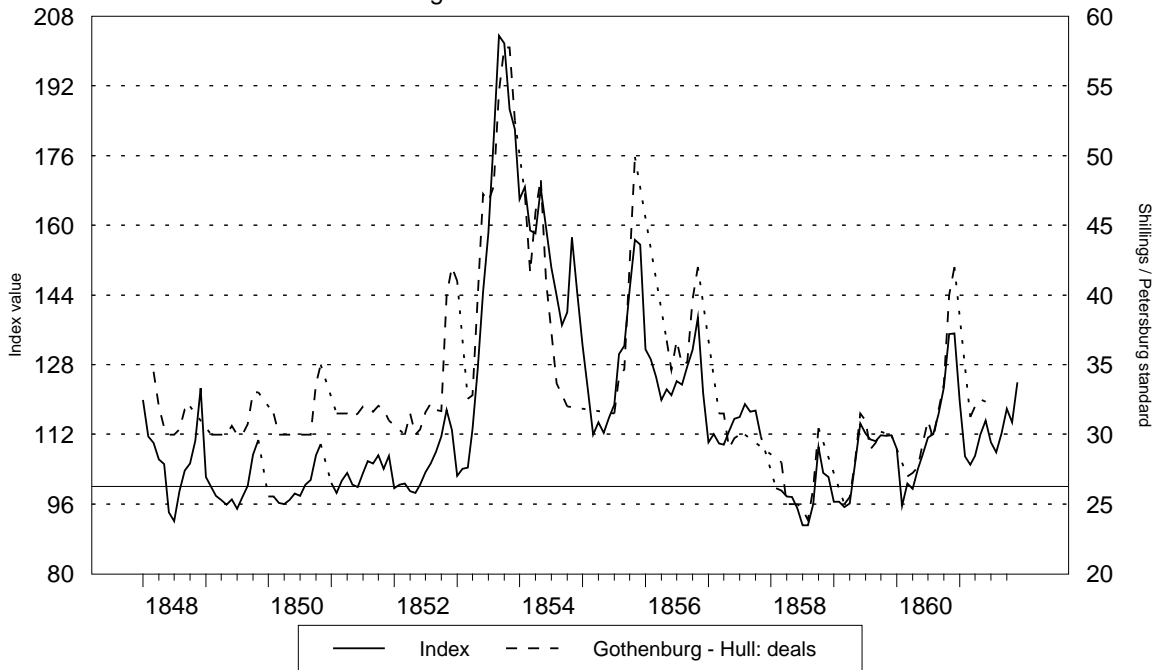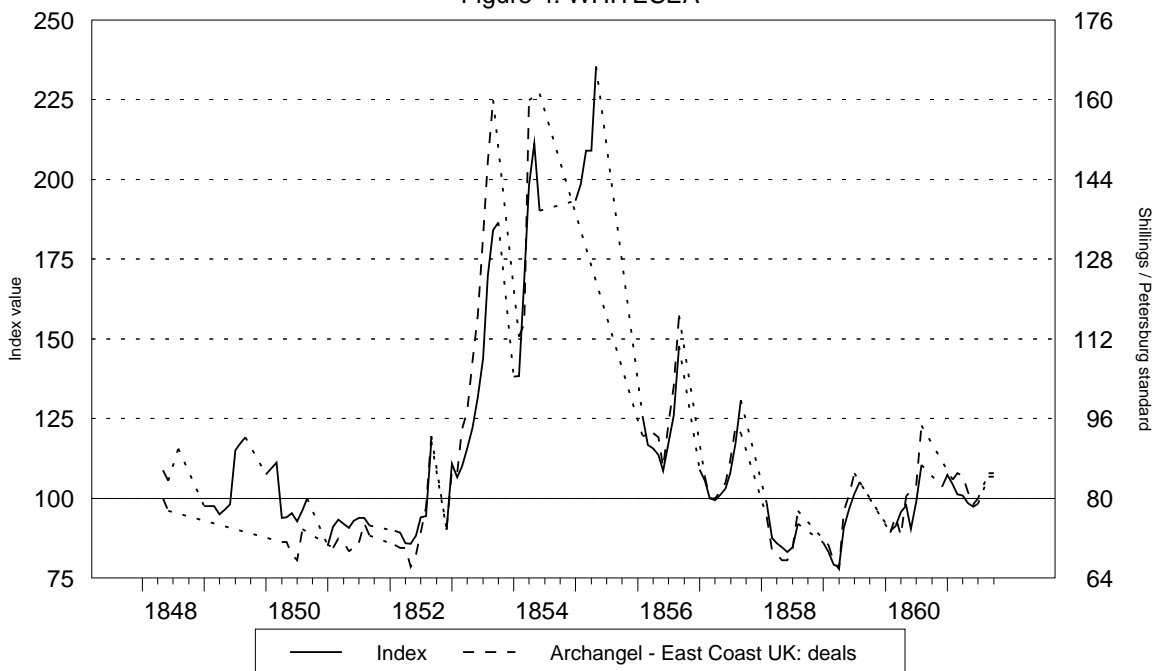
Inward freight rate series 1848 - 1861

Figure 5. MEDITERRANEAN

Index value (left axis), Shillings / quarter (right axis)

Legend: —— Index   – – – Alexandria - UK: beans

Figure 6. BLACKSEA

Index value (left axis), Shillings / quarter (right axis)

Legend: —— Index   – – – Danube - UK: wheat
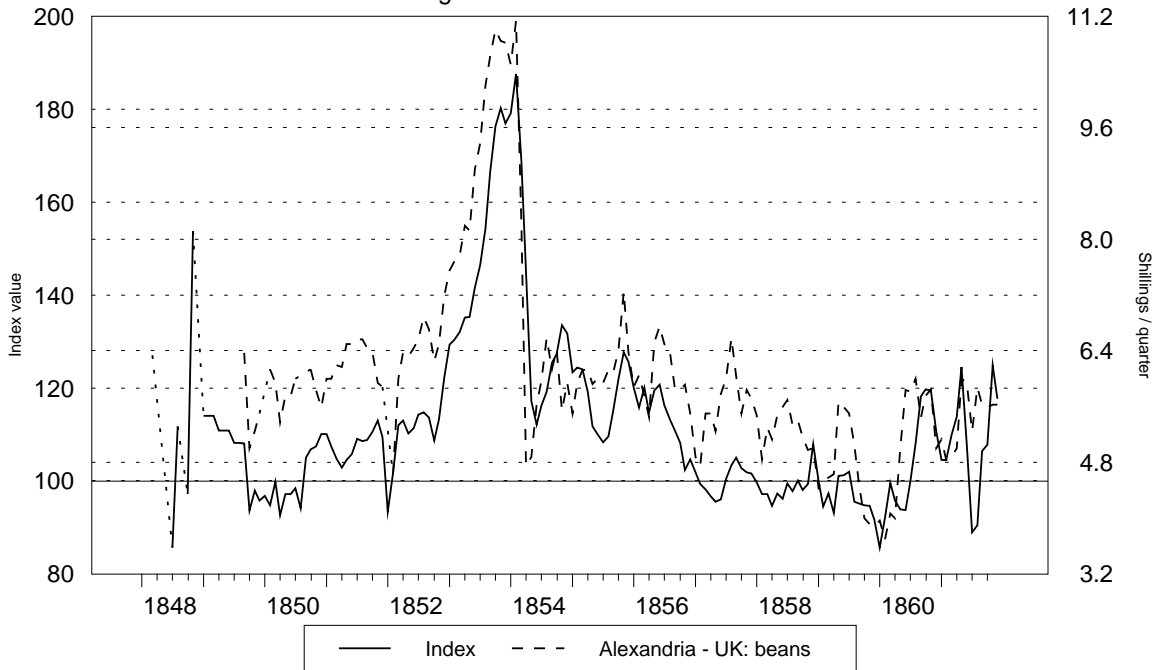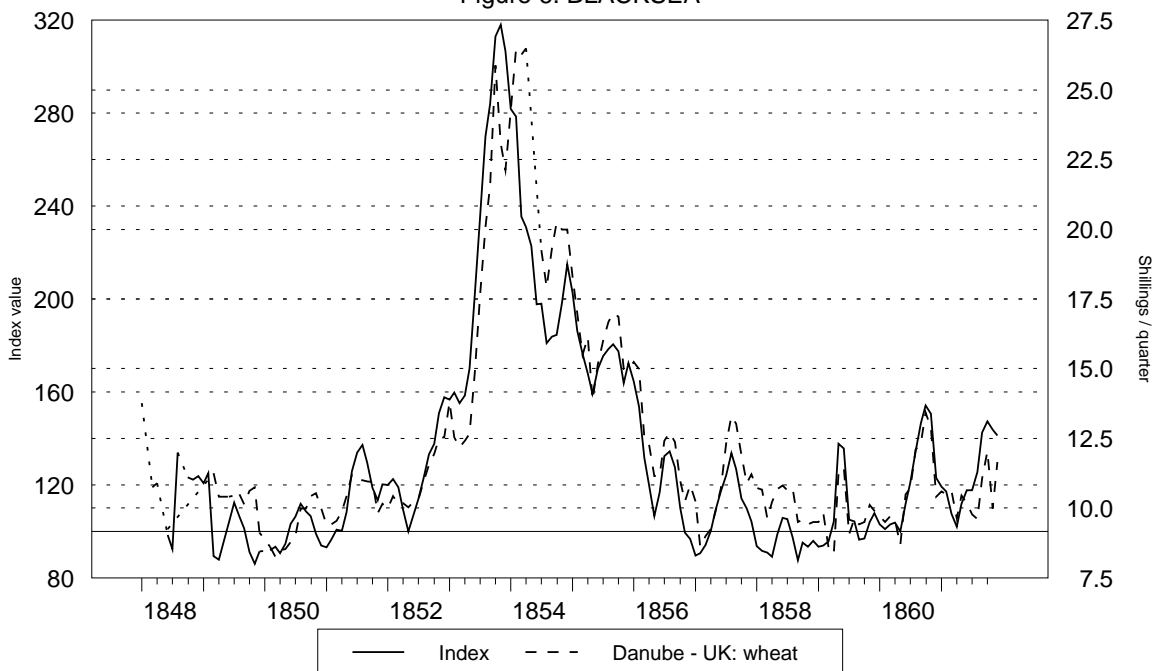
Inward freight rate series 1848 - 1861

Figure 7. NORTH AMERICA ATLANTIC WOOD

Index — — — Quebec - London/Hull/Grimsby: timber
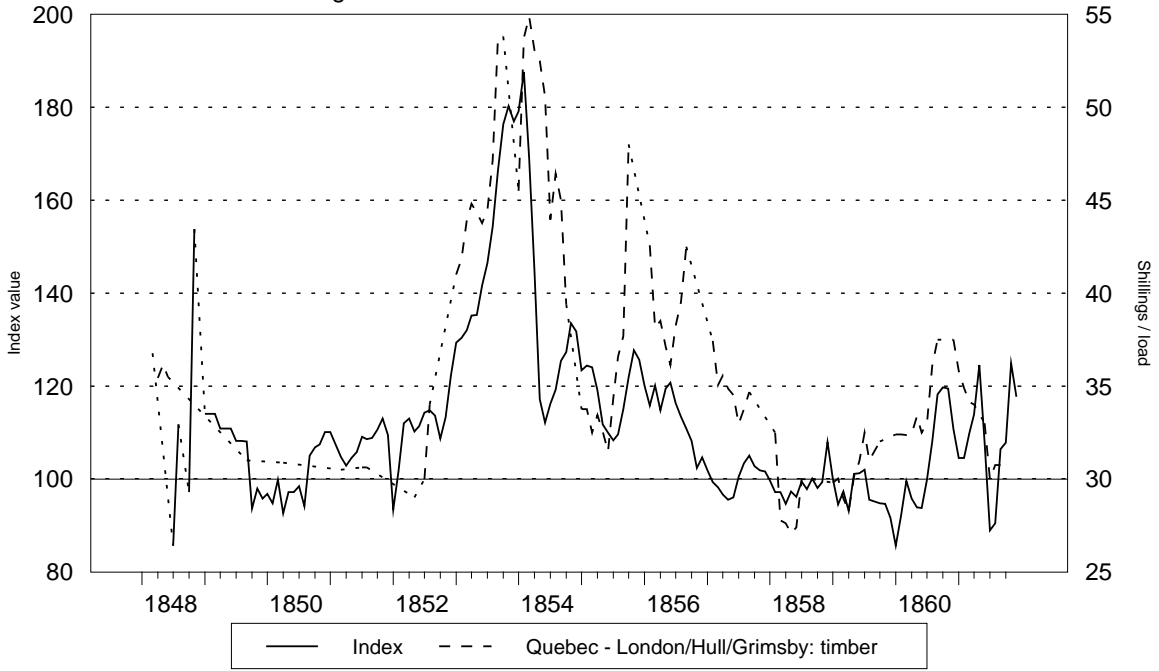
Figure 8. NORTH AMERICA COTTON

Index — — — New York - Liverpool: cotton
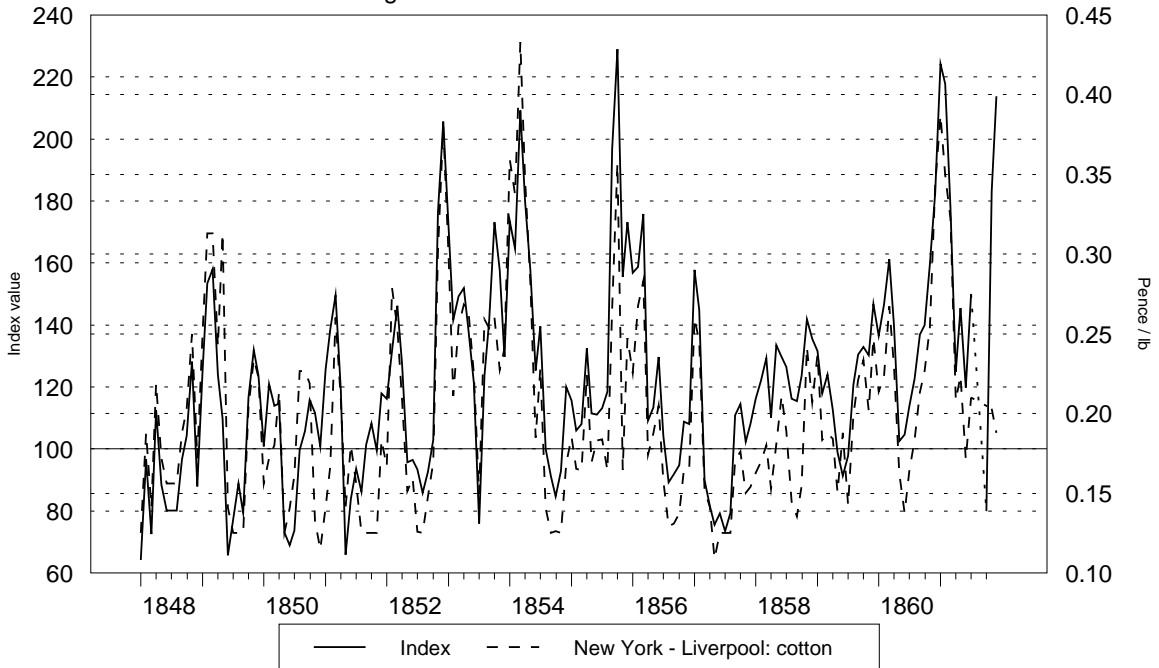
Inward freight rate series 1848 - 1861

Figure 9. NORTH AMERICA ATLANTIC CARGOES

Index — — — New York - Cork f/o: grain
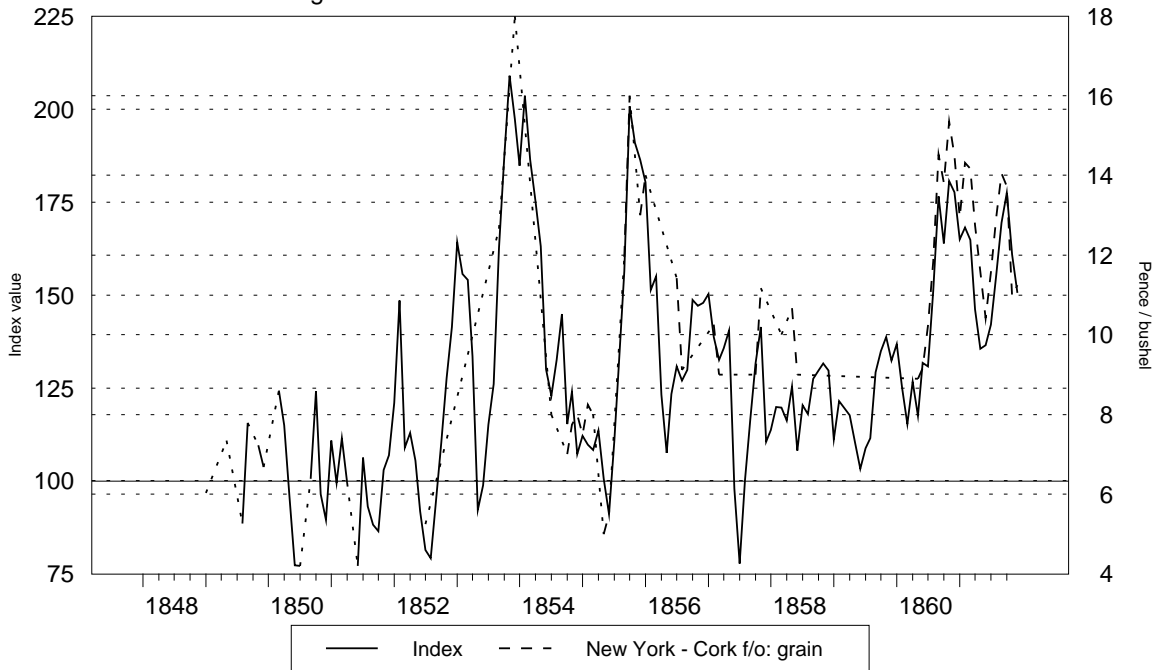
Figure 10. NORTH AMERICA ATLANTIC BERTH

Index — — — New York - Liverpool: flour
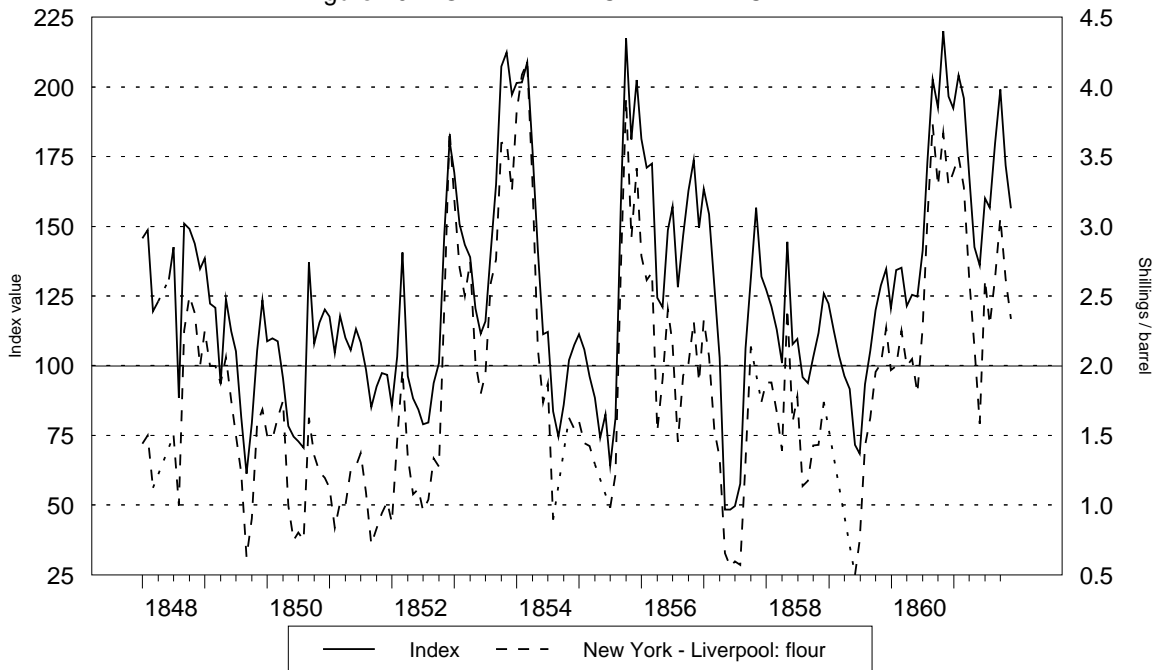
Inward freight rate series 1848 - 1861

Figure 11. CENTRAL AMERICA

Index   – – – Beilze - UK: mahogany
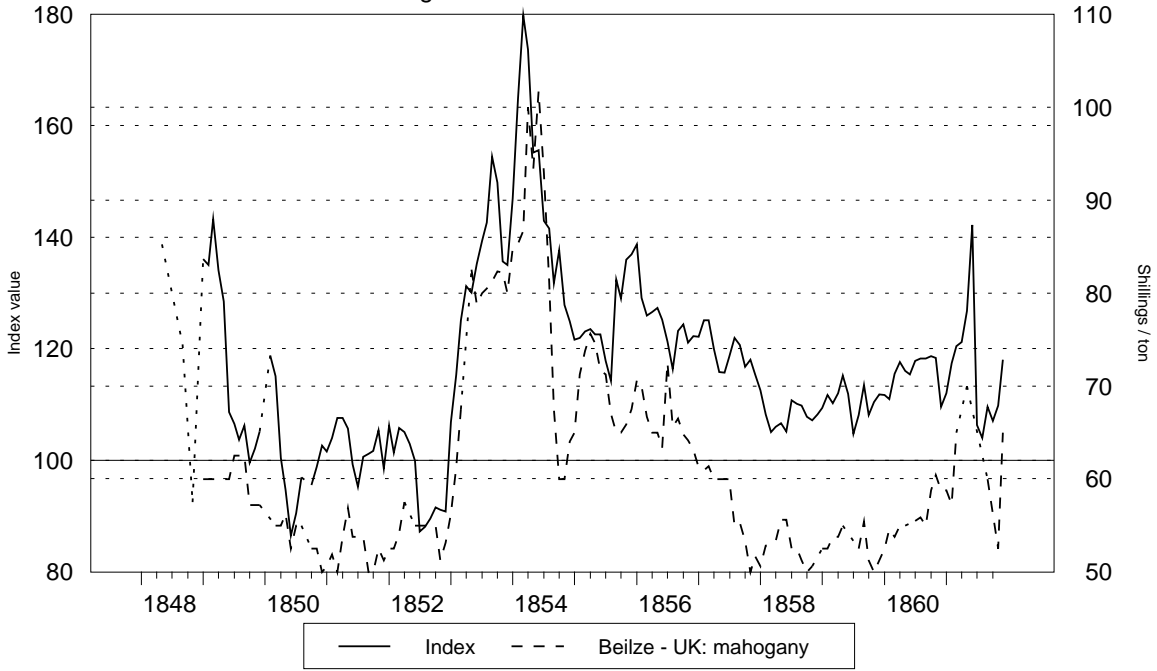
Figure 12. SOUTH AMERICA ATLANTIC

Index   – – – Rio de Janeiro - British Channel: coffee
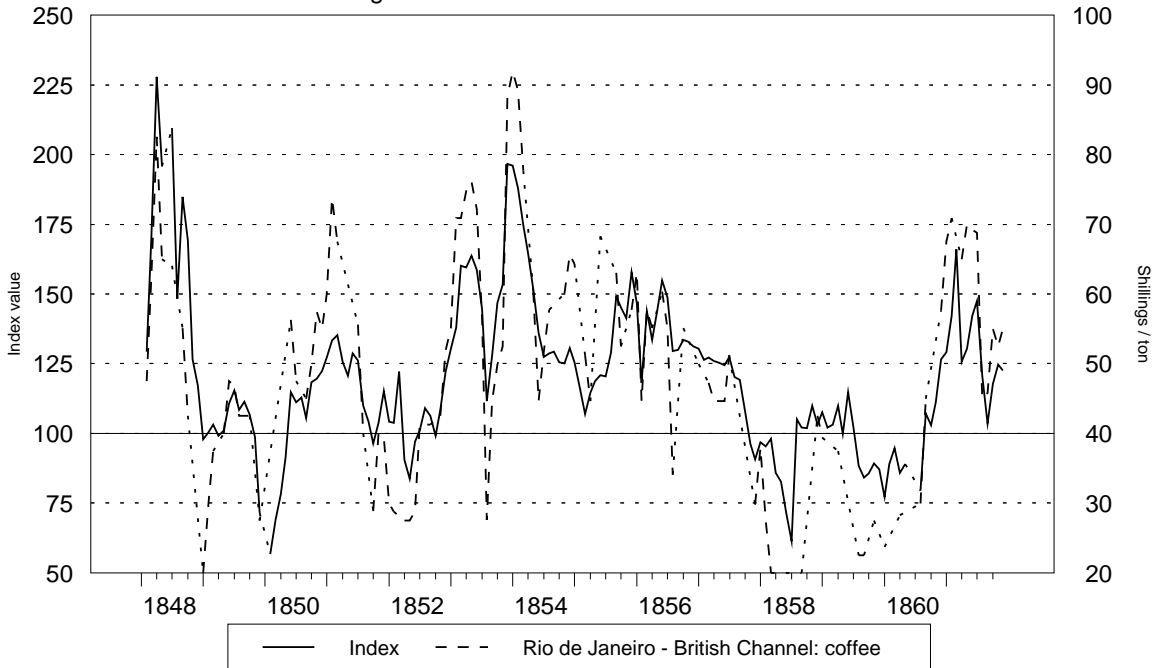
Inward freight rate series 1848 - 1861

Figure 13. FAR EAST

Index value (left axis) / Shillings / ton (right axis)

Legend: Index —— Moulmein - UK: teak - - -

Figure 14. PACIFICS

Index value (left axis) / Shillings / ton (right axis)

Legend: Index —— Chincha Islands - UK: guano - - -
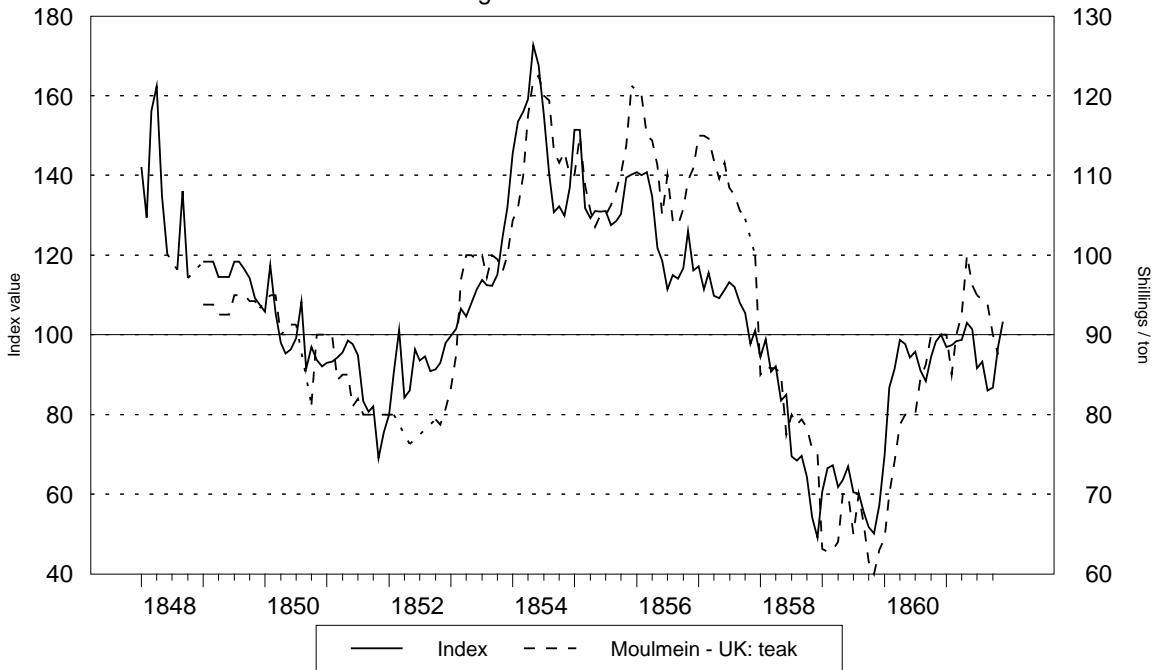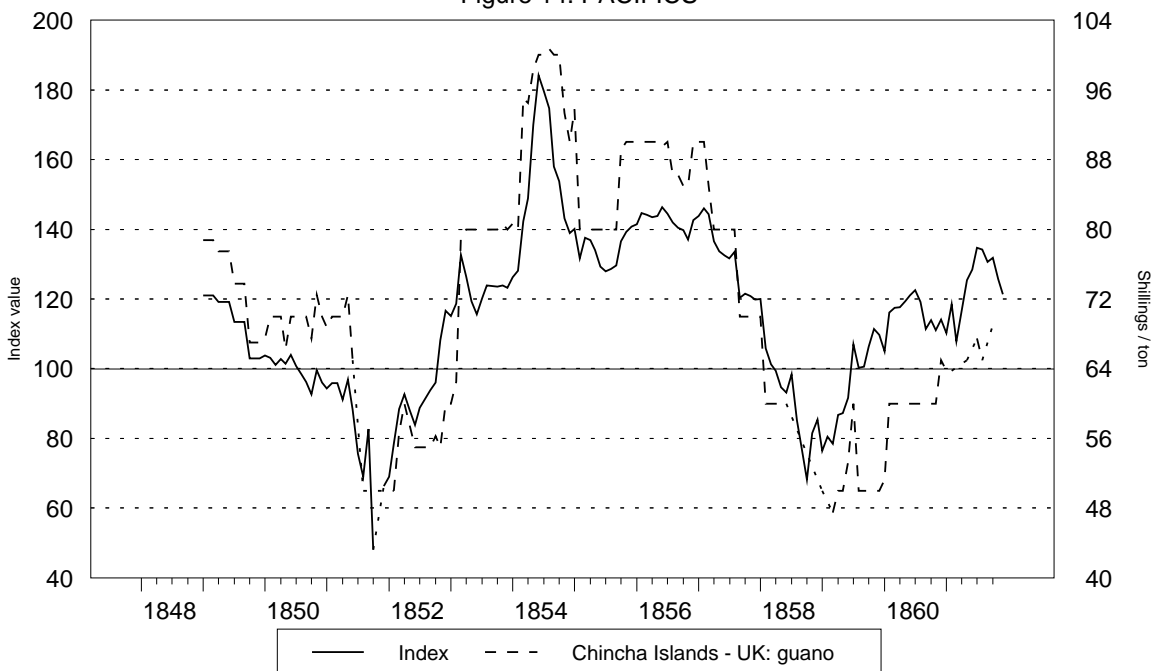
Outward coal freights 1848 - 1861

Figure 15. HOME WATERS

Legend: Index — — — Tyne - Hamburg

Figure 16. NORTH SEA

Legend: Index — — — Tyne - Copenhagen
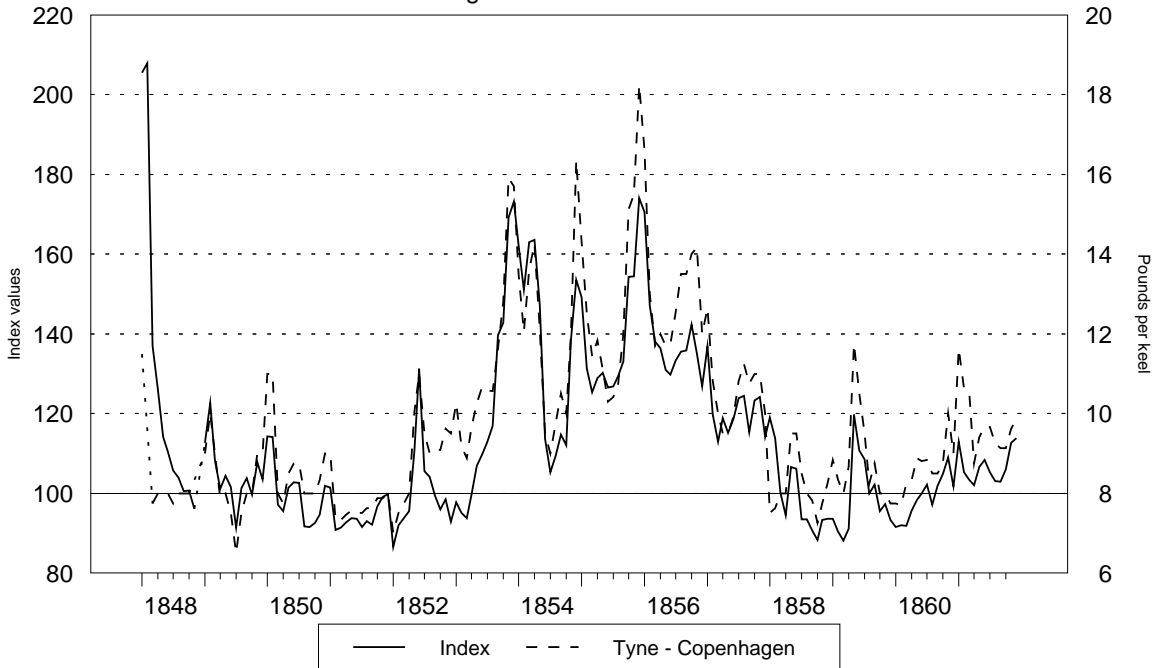
Outward coal freights 1848 - 1861

Figure 17. BALTIC

Legend: Index — — — Tyne - Stettin
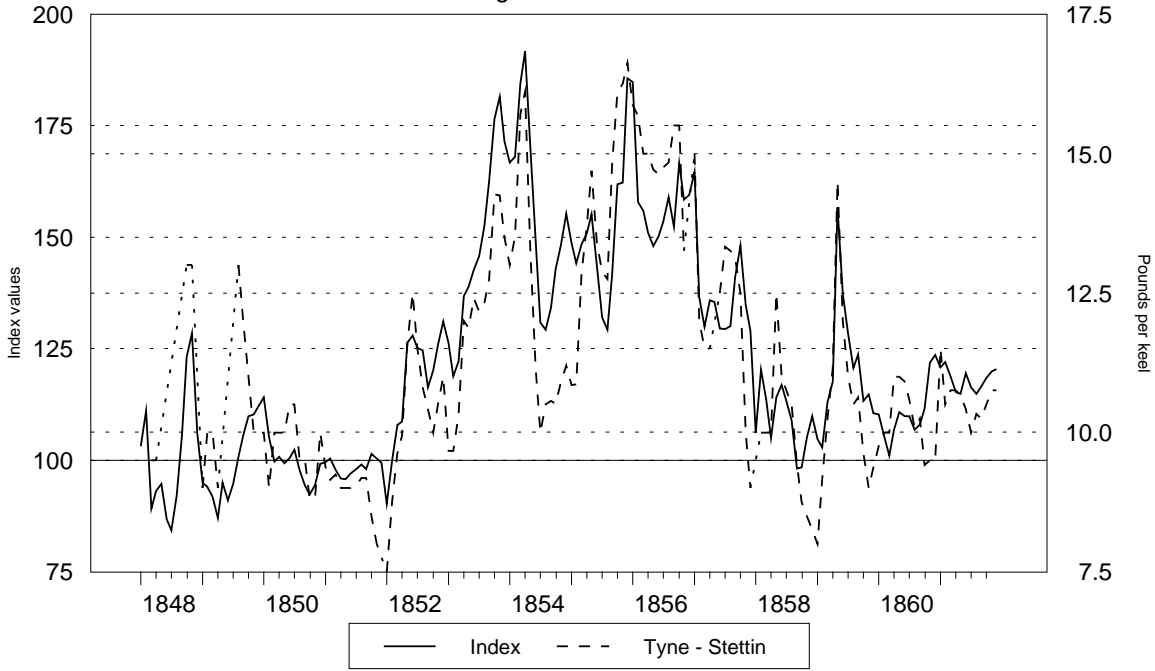
Figure 18. SOUTH EUROPE ATLANTIC

Legend: Index — — — Tyne - Lisbon
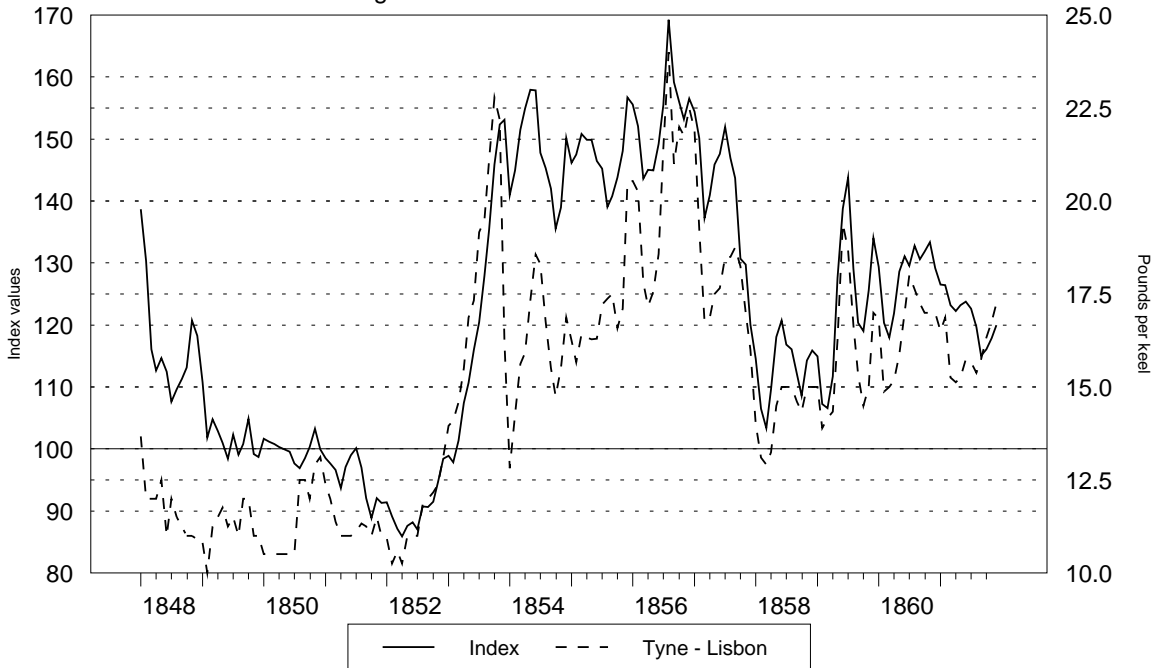
Outward coal freights 1848 - 1861

Figure 19. WESTERN MEDITERRANEAN

Index values / Pounds per keel

Index — — — Tyne - Genoa
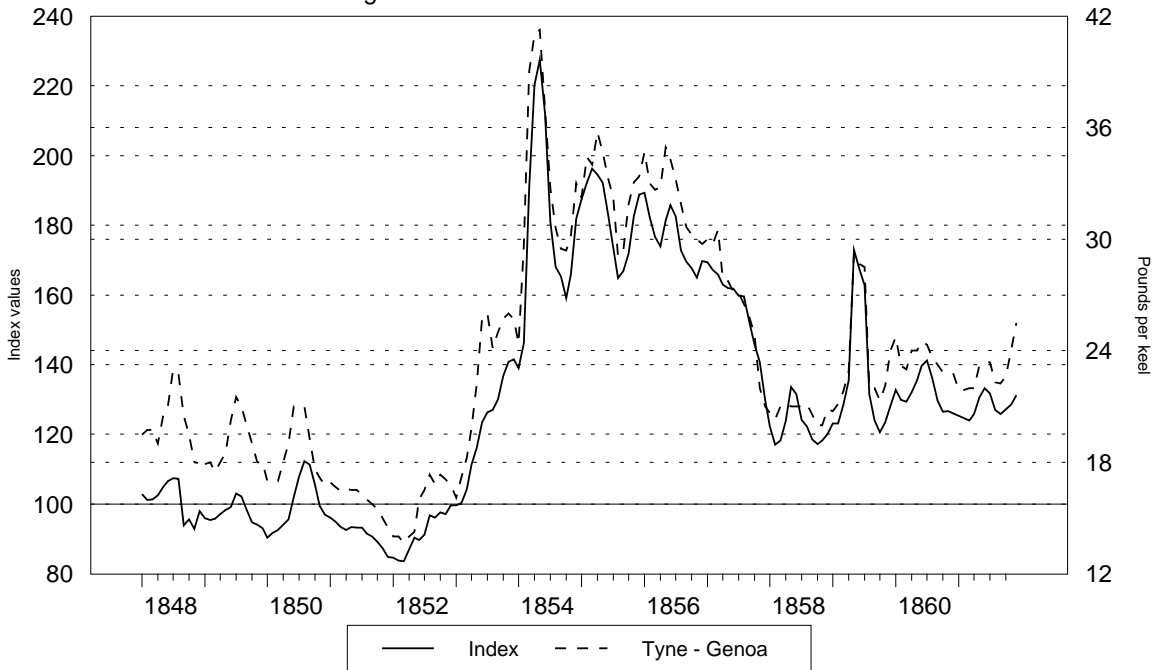
Figure 20. EASTERN MEDITERRANEAN

Index values / Pounds per keel

Index — — — Tyne - Alexandria
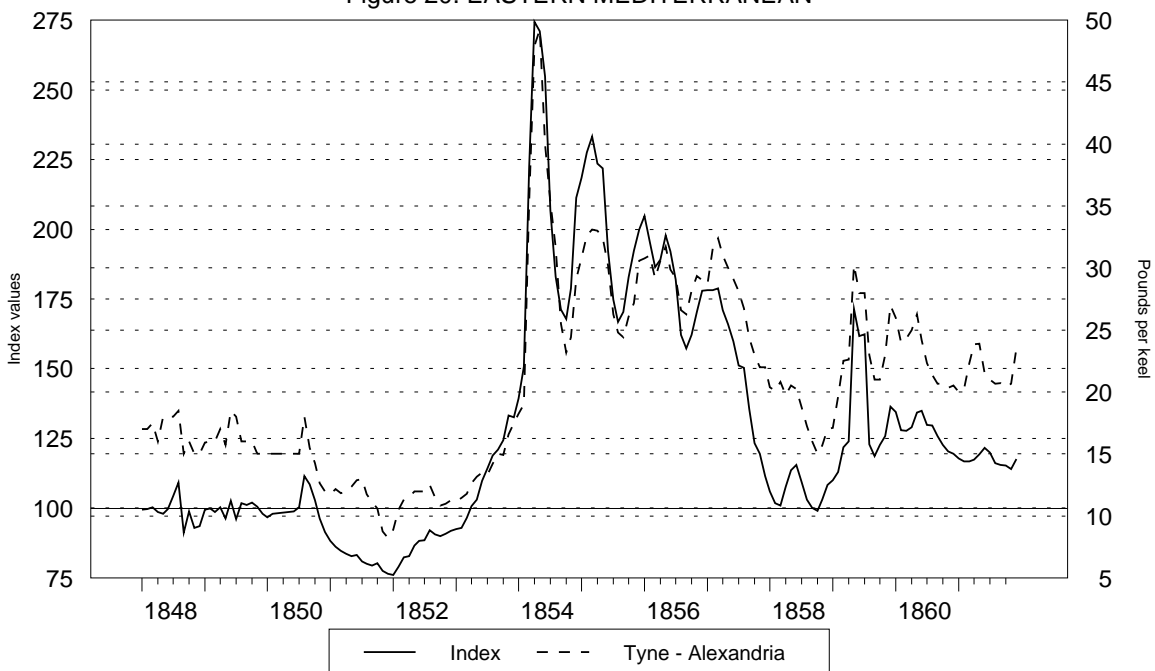
Outward coal freights 1848 - 1861

Figure 21. BLACK SEA

Legend: Index — — — Tyne - Constantinople
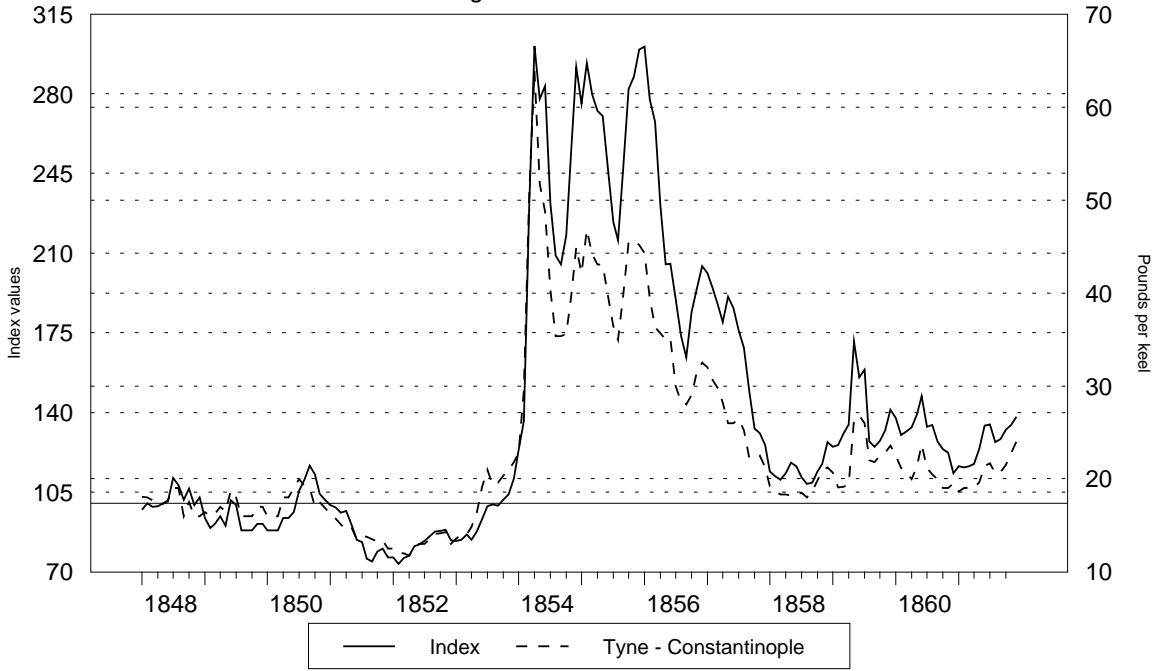
Figure 22. NORTH AMERICA ATLANTIC

Legend: Index — — — Tyne - New York
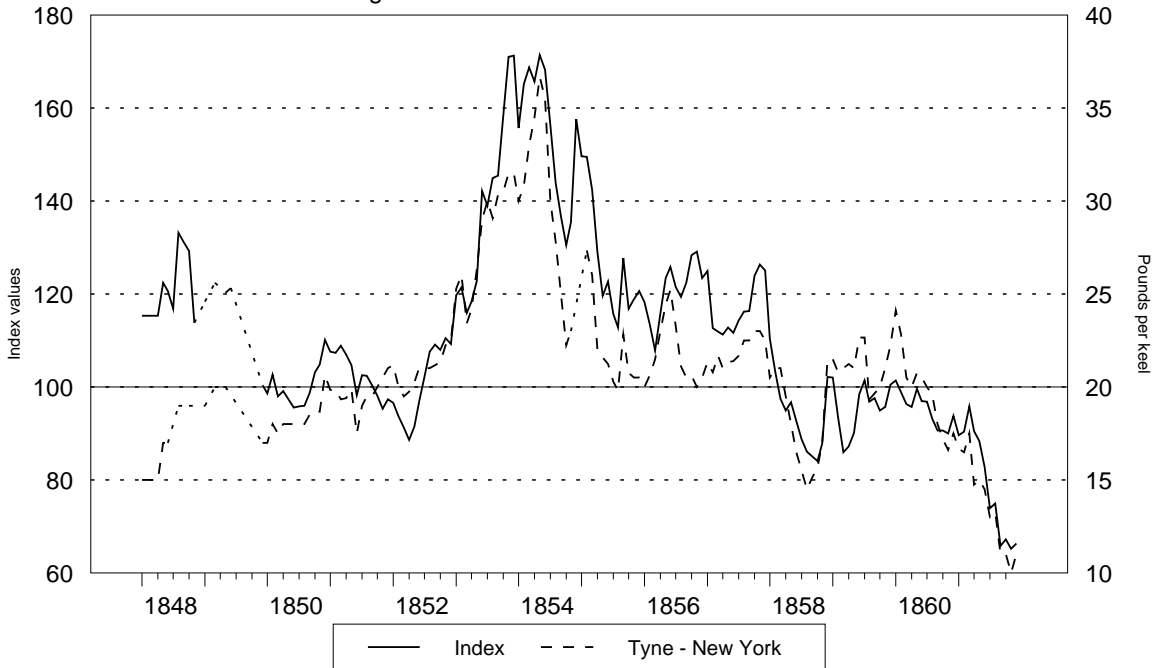
Outward coal freights 1848 - 1861

Figure 23. CENTRAL AMERICA

Index — — — Tyne - Havana
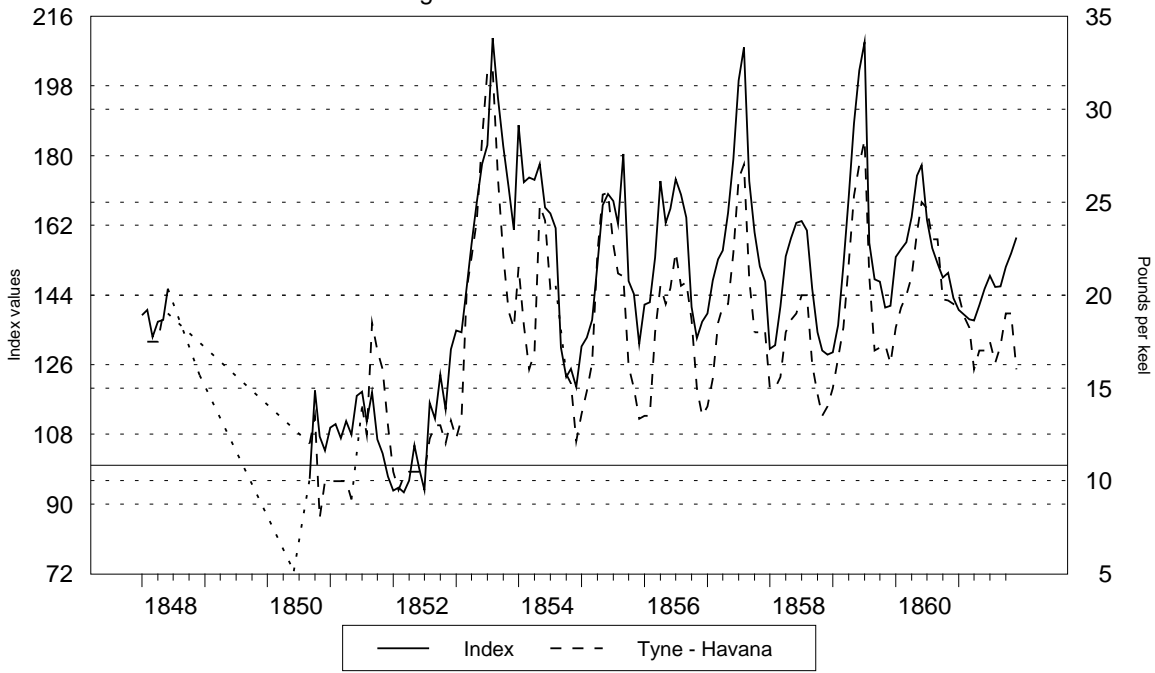
Figure 24. SOUTH AMERICA ATLANTIC

Index — — — Tyne - Rio de Janeiro
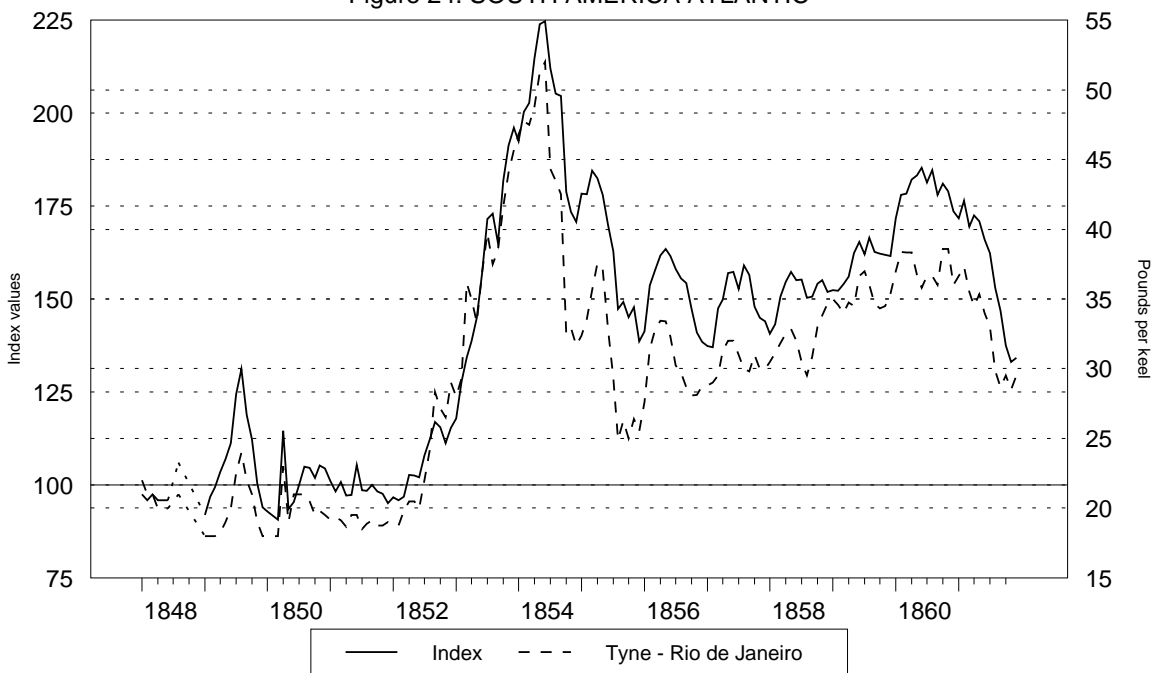
Outward coal freights 1848 - 1861

Figure 25. FAR EAST

Index values — Index | Tyne - Calcutta

Figure 26. SOUTH AFRICA

Index values — Index | Tyne - Cape Good Hope
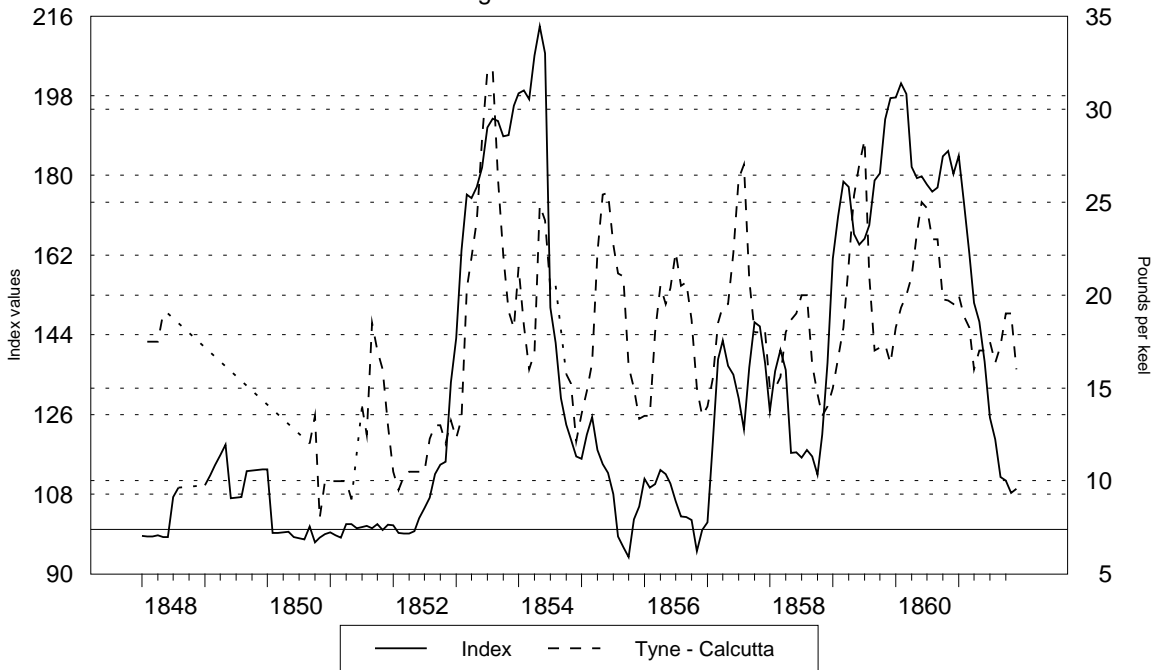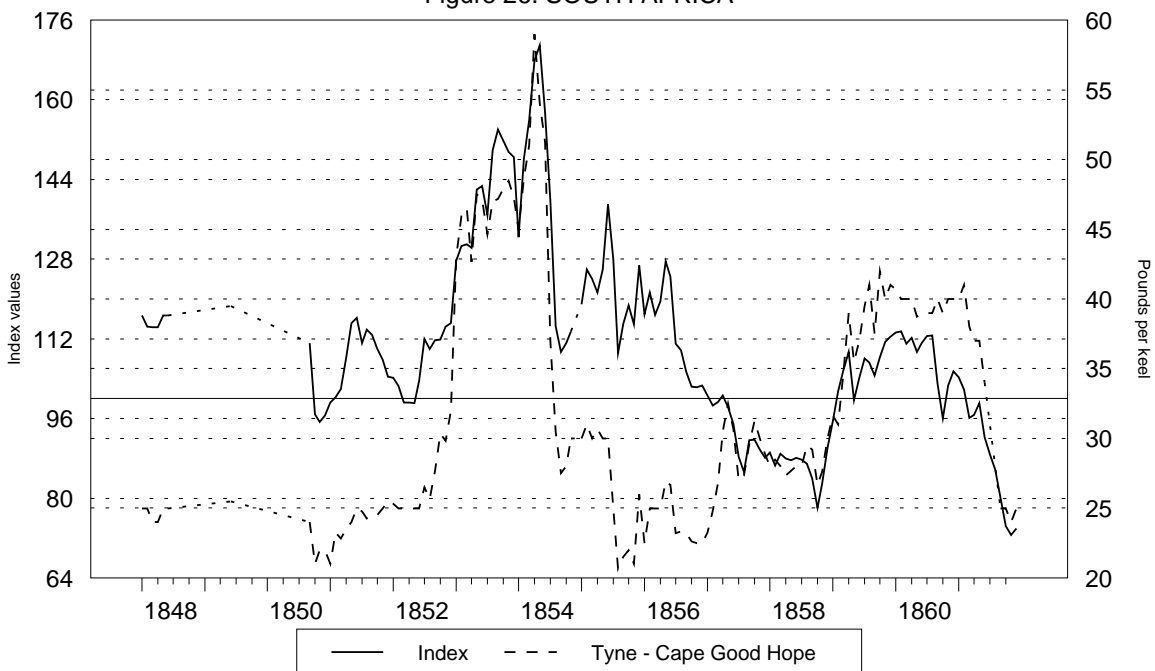
Outward coal freights 1848 - 1861

Figure 27. AUSTRALIA

Index — — — Tyne - Sydney/Melbourne/Adelaide/King George Sound
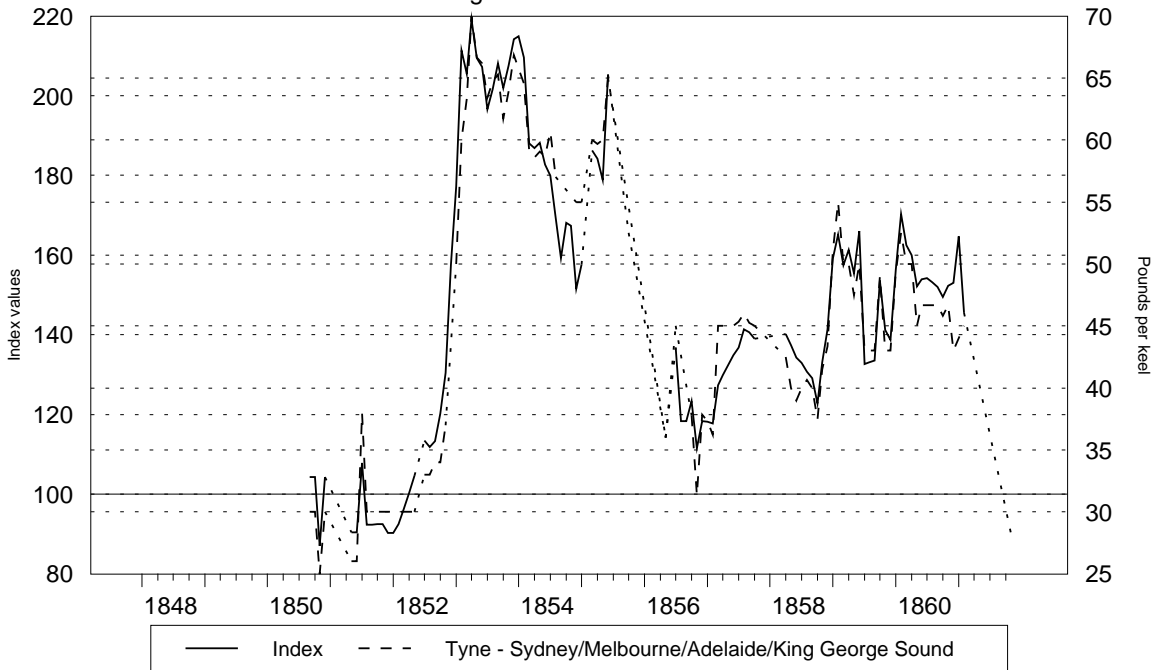
Figure 28. AMERICA PACIFIC

Index — — — Tyne - Coquimbo
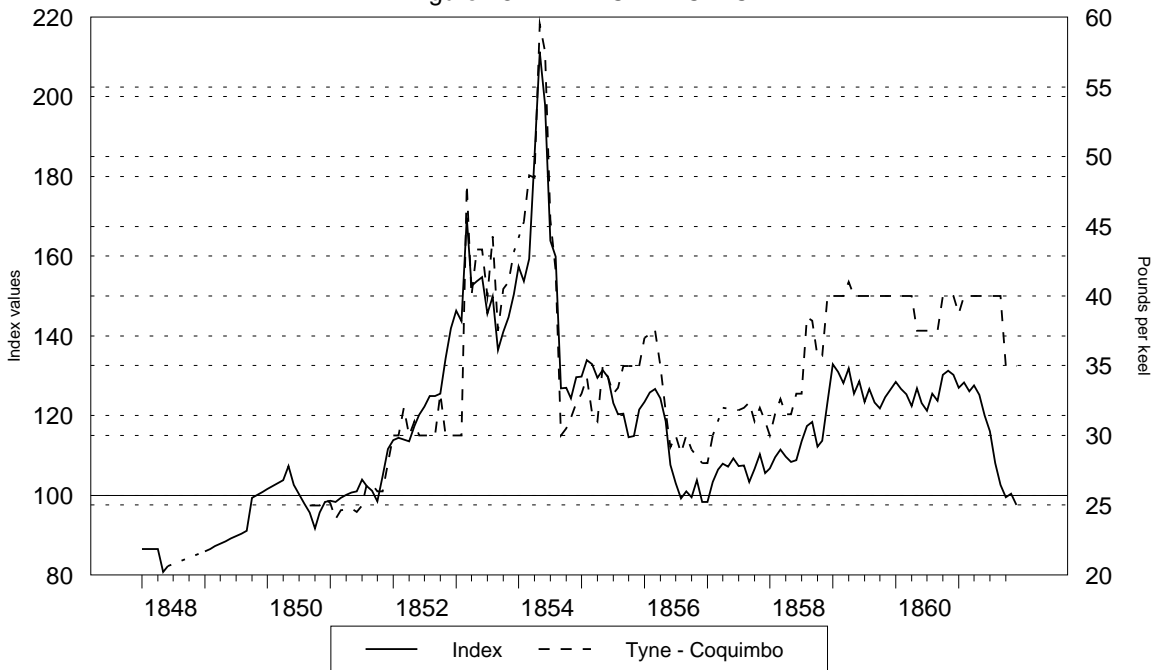
Aggregate freight rate indices 1848 - 1861

Figure 29. Inward and outward freight rate indices
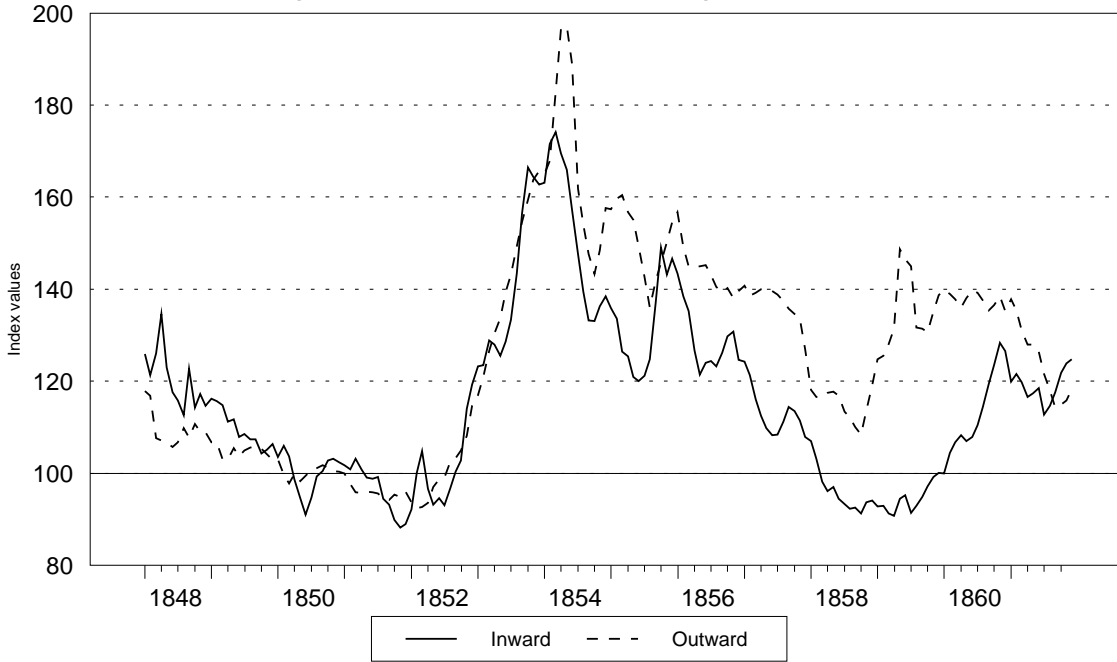

Figure 29. Inward and outward freight rate indices

Figure 30. Aggregate freight rate index

Figure 30. Aggregate freight rate index