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ISSN: 2365-9793

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ABSTRACT

Time on the Crossing: Emigrant Voyages across the Atlantic, 1853 to 1913

From 1860 to 1913 the six colonies that became states of Australia strove to attract migrants from the UK with a variety of assisted passages. The colonies/states shared a common culture and sought migrants from a common source, the UK, but set policy independently of each other. This experience provides a unique opportunity to examine the formation of assisted immigration policies. Using a panel of colonies/states over the years 1862 to 1913 I investigate the association between measures of policy activism and a range of economic and political variables. Assisted migration policies were positively linked with government budget surpluses and local economic prosperity. They were also associated with political participation including the widening of the franchise and remuneration of members of parliament. While the reduction in travel time to Australia reduced the need for assisted migration, slumps in the UK increased the take-up of assisted passages.

JEL Classification: F22, O33, N73

Keywords: transatlantic migration, steam ships, voyage times

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Introduction

From 1853 to 1913 more than ten million British citizens travelled across the Atlantic to the United States and Canada and many other European emigrants departed from British ports. The literature on the determinants of this mass migration has focused on the economic incentives but much less on the costs. And those studies that do consider the costs focus on ticket prices rather than income forgone in the passage. In this paper I provide the first annual index of the average duration of emigrant voyages from Liverpool to New York from 1853 to 1913. Over these six decades the average time on the crossing fell by 80 percent—from around 40 days to 8 days. Perhaps equally important, uncertainty about the length of voyage also diminished—the standard deviation of voyage durations fell from 7.6 days in 1853 to just 1.5 days in 1913. It seems very likely that the upward trend in outward migration from Europe to the United States and Canada, and especially the growth in return migration (Bandiera et al. 2013), owes something to the steep decline in the time component of the costs of migration and the increase in reliability.

Most of the literature on improvements in ocean shipping focuses on the fall in merchant shipping freight rates. These studies have emphasised improvements shipping technology and organisation as key component of the decline in unit costs, which underpinned the expansion of international trade (North 1958; Harley 1970; 1988). More recent studies have shifted attention to the speed of ships, focusing on the effects of changing technology on the fall in voyage times as a key component of trade costs. For example, Pascali (2017) estimates that the transition from sail to steam accounted for half of the increase in world trade between 1850 and 1905, and contributed to economic divergence between rich and poor countries. A number of studies have also identified gradual improvements in voyage times under sail that preceded the transition to steam. For slave ships on the Middle Passage, Rönnbäck (2012) found that, from 1625 to 1861, average speeds increased by 0.3-0.5 percent per year. Up to the 1830s, increasing speeds have been attributed to the advent of the marine chronometer (Miotto and Pascali, 2022), coppering of hulls (Solar and Hens 2016; Kelly and Ó Gráda 2019) and a host of other improvements in ship technology, navigation and organisation. However, existing studies do not provide comprehensive data on voyage

durations for the second half of the nineteenth century and they do not focus on passenger shipping in the age of mass migration.[1]

In parallel with the earlier work on freight rates, a number of studies have examined passenger ticket prices. Killick (2014) found that westward fares across the Atlantic on Cope's shipping line fell steeply from the 1830s to the 1850s, suggesting that this contributed to the surge in emigration. On the other hand, Cohn and Wegge (2017) found no decline in fares on sailing ships from German ports from 1846 to 1857. And examining average passage costs for major steam shipping companies, Keeling (1999, p. 44) finds no downward trend from 1850 to 1913. However, he goes on to note that "The replacement of sail by steam cut transit times by two thirds, from about five weeks by sailing ship in the 1840s, to about 12 days by steamer in the late 1860s. Thereafter, more gradual increases in the speed of steam-powered liners brought average transit times down to about 9 days by 1913". However, there is no consistent annual index of average time on the crossing over these years.

Traditional accounts of developments in transatlantic passenger shipping often focused on their pioneering technology and design and the crossing times of record-breaking steam ships, which are unrepresentative of average crossing times (Tyler 1939; Smith 1947; Bonsor 1955; Kludas, 2000).[2] The famous East-West crossings of the *Sirius* and the *Great Western* in 1838 took 18 and 16 days respectively, but by my calculation, the average duration of westward passenger voyages did not fall to 16 days until 1869. I find that from 1857 to 1869 the gap between sail and steam remained large and declined only slightly so that most of the decline in average voyage time during those years is accounted for by the transition from sail to steam. The transition on emigrant voyages began as new ships with iron hulls, compound engines and screw propellers replaced old (Cohn 2005, 2009). And the initially higher ticket prices on steamships were gradually reduced as their steerage capacity increased.

How much difference did the opportunity cost of time on the crossing make to the costs of travel across the Atlantic? An index of ticket prices constructed from existing sources exhibits

[1] Pascali (2017), Kelly and Ó Gráda (2019) and Miotto and Pascali use the CLIWOC data which provides details of over 3000 voyages on a range of routes from 1742 and 1854.

[2] There was fierce competition for the fastest crossing by steam, an unofficial accolade that became known as the Blue Riband. The original speed set by the Sirius in 1838 (8.03 knots) was broken more than 40 times between then and 1913. In 1909 the *Mauretania* crossed at 26.06 knots, a threefold increase in speed (Bonsor 1955, p. 590).

an uneven downward trend until the early 1890s followed by an increase to 1913. In 1853 the opportunity cost of the emigrant's time, valued at average UK earnings for all wage earners, was approximately equal to the cost of a ticket but by 1913 it was just a fifth of the fare.[3] Adding these two components together produces a steeper decline in the total voyage cost to the mid-1890s and a milder increase thereafter. If instead, the cost is evaluated in terms of the number of weeks' work (based on UK earnings) then it falls from 11 weeks in the early 1850s to around seven weeks before 1914, or by one third.

Emigrant passages from Liverpool to New York

In this paper I focus on passages from Liverpool to New York in order to create a consistent series. Other destinations on the east coast included Boston, Philadelphia and New Orleans as well as the Canadian ports of Halifax and Quebec. New York became the predominant US destination from the 1840s and arrivals at Castle Garden/Ellis Island formed the overwhelming majority in the following six decades (Cohn 2009, p. 128; Feys, 2012, p. 35). Among British ports, Liverpool was the most important followed by London and Glasgow, until the large ocean liners shifted to Southampton at the end of the period.[4] Once cleared from the British Isles, ships from Liverpool travelled directly to the US destination. However, it became common for steamships to call at Queenstown (now Cobh), the port for Cork in Ireland. A stop at Queenstown added less than a day to the average voyage. Not surprisingly many of the passengers on ships originating from Liverpool were Irish, some of whom embarked at Queenstown but most of whom crossed the Irish sea to embark at Liverpool.[5] The ships also carried an increasing number of passengers from continental Europe, notably Germans and Scandinavians.

Westward voyages were a particular challenge for sailing ships due to the south westerly winds of the jet stream, averaging around 10 knots, and the gulf stream currents. As a result, sailing ships often headed south to pass between the Azores and Madeira at around 35° N, then to pick up the north easterly trade winds that prevailed in the southern part of the North

[3] Leunig (2006) uses this approach to re-evaluate social savings from UK railways, which by 1865, had reduced travel times by 80 percent.

[4] The White Star Line shifted its traffic to Southampton in 1907. Later, Cunard also moved its flagship service from Liverpool to Southampton from which the Mauretania first sailed in 1919.

[5] In 1869 18 percent of passengers on steamships from Liverpool to New York embarked at Queenstown (UK Emigration Commissioners, 30th Report, 1870, p.100).

Atlantic Oscillation. With more favourable winds, the return voyage was shorter, faster and often took little more than half as long (Hubbard and Winter, 1988, p. 1). In contrast, steamships could cross more directly, southing to 42-46° before turning due west. Thus, not only were steamships faster against the wind, they also took a more direct route.[6] In the era of sail, a wide range of ships plied the emigrant trade, most of which were American owned but they were displaced mainly by British and European steamship lines, which became increasingly concentrated. This gave rise to shipping cartels, which were sometimes unstable and where competition focused on providing improved quality of service in ever larger ships (Keeling, 2012, Chs. 3, 4).

Emigrant Voyages from 1853 to 1869 and the Transition from Sail to Steam

In order to calculate crossing times, departure and arrival dates must be matched from different sources.[7] Information on departures comes from the annual reports of the UK Emigration Commissioners which include tables of the departure dates of ships sailing to North American destinations, principally from Liverpool to New York.[8] The main purpose of the tables was to record the number of deaths on each voyage as a proportion of the number of passengers. These figures were systematically presented in the reports from 1854 onwards, following a spate of deaths and shipwrecks in the preceding years, which had sparked public attention and led to a parliamentary enquiry (Emigration Commissioners 14th Report pp. 13-21; MacDonagh 1961, Ch. 12).[9] [10] The reported departures covered voyages that came under the passenger acts and that were therefore under the superintendence of the

[6] In plotting the most favourable route ship captains were guided by charts of winds and currents and the logs of past voyages, for example by Maury (1851) and later recommended routes for both sail and steam, for example, by Jackson (1995) [1895].

[7] It is worth stressing that the length of voyages is measured from port-to-port to reflect the emigrant journey rather than from land-to-land as in much of the literature that focuses on the speed of ships on the open sea, e.g. from Queenstown to Sandy Point (Albion 1938, p. 317). As voyage times are measured as differences between dates they are integers of days. Disembarkation normally took place during daylight hours so that, for a ship arriving in the evening, the arrival date would be the following day.

[8] From its beginning in 1840 to 1854 this body was known as the Land and Emigration Commission. In 1855 it became the Emigration Commission. Among its responsibilities was the administration of the passenger acts of 1842, 1849, 1852, 1853, 1855, 1863 and 1870. In 1873 the administration of the Passenger Acts was transferred to the Board of Trade.

[9] See the debate in the House of Commons on 2nd March 1854.

[10] On the voyages in 1853 recorded by the Commissioners, deaths amounted to 2.1 percent of passengers. The largest number of deaths was 101 on the Constellation, which arrived in New York on 26th November after 37 days at sea. A diary of one of the passengers, which recounts the hardships and frictions on board the ship was reproduced in the *Liverpool Mercury* 1913: http://www.old-merseytimes.co.uk/constellationmain.html.

Commissioners.[11] The last year for which this table was published was 1869 by which time steam was in the ascendant over sail.

In order to calculate the number of days' passage, the ship names and departure dates were matched with arrival dates from passenger lists of ships arriving in New York. These were accessed from the compilation *New York, U.S., Arriving Passenger and Crew Lists (including Castle Garden and Ellis Island), 1820-1957* in Ancestry.co.uk. The day of arrival was matched to the departure date by searching by ship name and year.[12] Over the years from 1853 to 1869 a total of 2832 departures from Liverpool were reported by the Commissioners of which 2399, or 85 percent, could be matched to an arrival date in New York. The number of days from Liverpool to New York includes any stop at Queenstown.[13] Departures not matched were typically where the ship name could not be found or where there was no plausible arrival date.[14]

As Table 1 shows, the average voyage duration fell dramatically, from more than 40 days in 1853-4 to just 16 days in 1869, a fall of 60 percent. It also shows that the maximum duration sometimes exceeded 60 days, although there were only 13 among those for which departures and arrivals could be matched. While these may seem excessively long passages they were not unknown and all durations longer that 50 days were carefully checked. An alternative indicator is the median voyage length which fell from 41 days to 14 days over these years. It is notable that the median falls sharply from 30 days in 1863 to just 17 in 1864. This reflects that the median voyage in 1863 was by sail, while the median in 1864 was by steam.

[11] As deaths occurred in transit (and therefore beyond the immediate purview of the Commissioners), this information was obtained from the ship owners or agents and the tables always included the phrase 'so far as reports have been received'.

[12] In order to limit the number of pages to be examined in the search for arrival dates, filters such as age, sex and month of arrival were also used, sometimes in multiple searches.

[13] A few voyages that were listed in the arrival lists as putting into other ports on the east coast were excluded.

[14] The ships that could not be found at all typically appear very rarely in the Commissioners' tables. In some cases, the failure to match may be due to different rendering of the name of the ship or mis-spelling. Some that could be resolved are: Westerwell vs Westervelt; Nesmyth vs Nesmith; Vanguard vs Vanguara. Passages of less than a week or more than ten weeks were ruled out as implausible although some of the latter could be due to running into distress of one kind or another. For example, in 1853, the Marathon ran into a gale in mid-Atlantic, lost the foremain and mizzentopgallant masts, a whole suite of sails; stove bulwarks and boats and was without sail for seven days; she also had 64 deaths from cholera (*New York Herald,* 30th November 1853). She departed Liverpool on 23rd September 1853 and arrived at New York on 29th November, after 67 days. The De Witt Clinton (named after a former US Senator and Presidential candidate) departed Liverpool on 17th January 1860 and is recorded as arriving in New York on 28th March, 71 days later. In fact, she ran aground on the New Jersey coast and all the passengers were taken off by a pilot boat (*New York Times*, 10th March 1860). She was re-floated on 26th March and towed into New York.

Table 1: Crossing Times for Emigrant Voyages from Liverpool to New York, 1853 to 1869

Departure year	Number of voyages	Average days	Median days	Std. Dev days	Max days	Min days
1853	109	41.7	41.0	7.5	67.0	28.0
1854	149	40.3	40.0	7.6	62.0	23.0
1855	90	36.7	36.0	7.3	61.0	24.0
1856	133	38.3	38.0	7.3	60.0	17.0
1857	106	32.7	33.0	11.9	64.0	12.0
1858	105	33.5	35.0	11.2	58.0	12.0
1859	112	36.4	38.0	12.6	69.0	12.0
1860	133	30.2	33.0	11.4	51.0	12.0
1861	110	29.0	30.0	12.5	58.0	12.0
1862	124	28.9	31.0	12.8	66.0	11.0
1863	193	28.6	30.0	13.7	64.0	9.0
1864	151	24.7	17.0	12.7	59.0	10.0
1865	179	23.2	17.0	11.5	53.0	12.0
1866	162	18.7	15.5	9.4	56.0	9.0
1867	162	15.5	14.0	6.1	53.0	10.0
1868	168	17.1	14.0	9.3	66.0	10.0
1869	213	16.0	14.0	8.1	67.0	10.0

Notes: For sources and construction, see text. These departures cover the whole year except for 1853 (1st July to 31st December only) and 1855 (1st January to 30th September only).

The steep decline in crossing times largely reflects the transition from sail to steam and so it is worth distinguishing these. In From 1863 to 1869 the Emigration Commissioners separately identified sailing ships and steam ships and this classification has been carried back to the 1850s.[15] Table 2 reports mean and median durations separately for passages by sail and by steam. Over these years the passage by steam ship averaged 14.9 days while that for sail was 38.8 days, or more that two and a half times longer, and this despite the fact that steam ships sometimes called at Queenstown. For voyages on sailing ships there is little evidence of a downward trend in either the mean or the median voyage length. This reflects the fact that emigrant sailing ships had reached their peak of efficiency before the 1850s. But there were large variations in the speed of different ships and in the crossing time of a given ship by season and by year due to variations in winds and ocean currents.[16]

[15] The Commissioners' classification of ships as sail or steam for 1863 was exactly matched by a classification based on *American Lloyd's Register of American and Foreign Shipping* (1859-1862) and the *New-York Marine Register* (1858), which are available online at: https://research.mysticseaport.org/indexes/ship-registers/. For earlier years I use the 1863 classification where the same ship reappears and the Registers for others.

[16] Sailing ships that departed in the spring, the favoured time for departures, averaged 36.8 days compared with 40.1, 38.4 and 42.6 for departures in the summer, autumn and winter respectively.

Table 2: Crossing Times and Passengers for Sailing Ships and Steam Ships 1853-1869

	Sailing ships			Steam ships		
Departure year	Number of voyages	Average days	Average passengers	Number of voyages	Average days	Average passengers
1853	109	41.7	493.4			
1854	149	40.3	499.4			
1855	90	36.7	397.5			
1856	132	38.5	379.0	1	19.0	96.0
1857	85	37.1	469.9	21	14.9	329.4
1858	85	37.9	286.2	20	15.0	207.8
1859	91	41.0	336.5	21	16.2	193.7
1860	92	36.8	346.5	41	15.4	118.9
1861	66	37.9	267.5	44	15.6	85.2
1862	77	37.5	257.9	47	14.8	128.2
1863	105	39.8	489.1	88	15.2	218.3
1864	64	37.5	533.5	87	15.3	452.9
1865	59	38.2	433.8	120	15.8	391.3
1866	25	38.8	388.5	137	15.1	527.1
1867	7	40.0	272.6	155	14.4	430.1
1868	13	46.8	382.5	155	14.6	602.4
1869	16	41.2	402.4	197	14.0	649.0

Notes: For sources and construction, see text. These departures cover the whole year except for 1853 (1st July to 31st December only) and 1855 (1st January to 30th September only).

Screw-propelled steam ships first appear on the list of Liverpool departures in 1856 with the Inman Line ship, *City of Washington*, which cleared Liverpool on 31st December 1856.[17] Although it was one of the first screw ships it also carried three masts of rigging. In the following year it was joined by other Inman Line ships: *City of Baltimore*, *City of Manchester* and *Kangaroo*.[18] Owing to their speed and reliability, steam ships were able to complete the round trip six or seven times a year compared with the two or three times typical of sailing ships.[19] For example, in the list of departures for 1863 the average steam ship departed from Liverpool twice as often as the average sailing ship. The number of passengers per voyage

[17] Steam ships might have appeared on the list earlier if not for the fact that mail ships were initially exempted from the passenger acts and that some ships were diverted as troop carriers during the Crimean War.

[18] The *City of Manchester* was built 1851 but entered the Liverpool-New York service only after serving as a transport during the Crimean War; the *City of Baltimore* and the *City of Washington* were both built in 1855 and the *Kangaroo* in 1854.

[19] Partly because of shorter voyages, travel by steam was also safer. From 1863 to 1869 the Emigration Commissioners' reports record passenger deaths on board as 0.33 percent for sail and 0.07 percent for steam. Both these figures are considerably lower than Cohn's (2003, pp, 7, 9) estimate of 1.15 percent for ships arriving in New York from 1820 to 1860. The losses of passengers and crew due to shipwrecks of emigrant ships departing the UK (sail and steam, to all destinations) also fell, from 0.19 percent in 1853-62 to 0.06 percent in 1863-72 (Emigration Commissioners 33rd Report, 1873, p. 82).

also increased as steam ships overcame their initially limited capacity for steerage passengers. As Table 2 shows, the number of passengers per voyage in steam vessels increased in comparison with sail although both fell early in the US civil war and recovered strongly in 1863.[20] Thus the ascendency of steam over sail was partly due to the increase in the number of voyages and partly to increased passengers per voyage.

Emigrant Voyages from 1870 to 1913

From 1890 it is possible to compare departure and arrival dates using the same source for arrivals but a different source for departures. As before, arrivals come from: *New York, U.S., Arriving Passenger and Crew Lists (including Castle Garden and Ellis Island), 1820-1957* in Ancestry.co.uk. A sample of about 100 arrivals to New York from Liverpool in each year was then matched with departures using the database *UK and Ireland, Outward Passenger Lists, 1890-1960,* also from Ancestry.co.uk.[21] Durations of more than two weeks and less than one week (6 days after 1900) were double checked.[22] Of the 2852 arrivals over the 24 years from 1890 to 1913, 2620 or 92 percent were successfully matched to a departure date.

Table 3 shows that from 1890 to 1913 the average number of days' passage from Liverpool to New York fell modestly from ten days to eight and the median fell from nine to eight. This reflects the gradual replacement of older ships on the route and the increasing domination of fewer, larger and faster ships crossing around 15 times a year. Although the White Star Line's *Majestic* (launched in 1889) crossed in 6 days in 1891 and after the turn of the century the Cunard ships *Mauretania* (1906) and *Lusitania* (1907) sometimes made the crossing in 5 days, the average was significantly higher. The National Line's ships *England* and *The Queen*, both launched in 1865 were still plying the route in the early 1890s, averaging around two weeks

[20] The decline and recovery in passengers per voyage is consistent with that of total emigration to the United States but there is no parallel with UK emigration to other destinations. This fluctuation was probably due to Britain's declaration of neutrality which was seen as *de facto* recognition of the Confederacy. This initially raised the prospect of war with the United States, which faded after the resolution of the *Trent* affair. The recovery may also have been due to the pressure to emigrate caused by the cotton famine.

[21] The sample of arrivals was generated by using an age/sex/initial filter and then extracting the set of unique departures for the first 500 passengers listed so the number of voyages varies from year to year. Departures were matched to a base of arrivals rather than the other way around because it is not possible to filter departures by UK port.

[22] The arrival and departure dates were checked against the manuscript ships' lists to correct transcription errors.

from Liverpool to New York. Even so, the standard deviation of voyage length was much lower than four decades earlier.

Table 3: Crossing Times for Emigrant Voyages from Liverpool to New York, 1890 to 1913

Departure year	Number of voyages	Average days	Median days	Std Dev days	Max days	Min days
1890	155	10.1	9.0	1.9	16.0	7.0
1891	160	9.8	9.0	2.1	19.0	6.0
1892	140	9.6	9.0	2.2	23.0	7.0
1893	103	8.8	9.0	1.6	16.0	6.0
1894	83	8.3	8.0	1.2	12.0	6.0
1895	97	8.2	8.0	1.2	12.0	6.0
1896	94	8.1	8.0	1.1	12.0	6.0
1897	99	8.2	8.0	1.2	12.0	6.0
1898	90	8.1	8.0	1.2	14.0	6.0
1899	89	8.2	8.0	1.1	12.0	6.0
1900	90	8.0	8.0	1.0	11.0	7.0
1901	101	8.0	8.0	1.1	11.0	6.0
1902	89	8.3	8.0	1.1	12.0	7.0
1903	128	8.6	9.0	1.2	11.0	6.0
1904	126	8.4	8.0	1.1	12.0	6.0
1905	123	8.3	8.0	1.0	12.0	6.0
1906	111	8.3	8.0	0.9	11.0	6.0
1907	110	8.4	8.5	0.9	11.0	7.0
1908	115	8.0	8.0	1.2	11.0	6.0
1909	109	7.8	8.0	1.3	12.0	5.0
1910	105	7.9	8.0	1.4	11.0	5.0
1911	105	7.8	8.0	1.4	11.0	5.0
1912	100	8.3	9.0	1.3	11.0	5.0
1913	98	8.4	9.0	1.4	11.0	6.0

Notes: For sources and construction, see text.

For the years from 1870 to 1890 there is no convenient database for departure dates from Liverpool. However, *Saints by Sea* provides details of the departure and arrival dates of Mormon emigrants travelling from Liverpool for New York.[23] Although there are very few voyages per year, which could be unrepresentative, the average voyage lengths are nevertheless consistent with those reviewed above. As Table 4 shows, the mean and median voyage length fell from a little over 13 days in 1870 to a little over ten in 1889.

[23] See: https://saintsbysea.lib.byu.edu/.

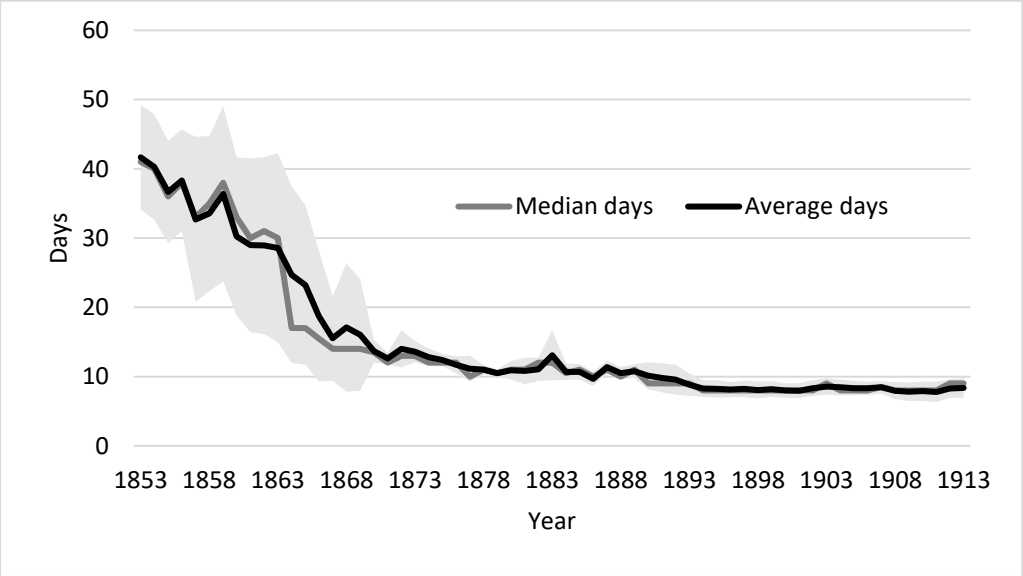
Table 4: Crossing Times for Mormons from Liverpool to New York, 1870 to 1889

Departure year	No of voyages	Average days	Median days	Departure year	No. of voyages	Average days	Median days
1870	6	13.7	13.5	1880	10	10.9	11
1871	10	12.6	12	1881	10	10.8	11
1872	6	14.0	13	1882	15	11.1	12
1873	5	13.6	13	1883	11	13.1	12
1874	5	12.8	12	1884	10	10.7	10.5
1875	5	12.4	12	1885	9	10.7	11
1876	7	11.7	12	1886	6	9.7	10
1877	7	11.1	10	1887	8	11.4	11
1878	6	11.0	11	1888	14	10.5	10
1879	6	10.5	10.5	1889	13	10.8	11

Notes: For sources and construction, see text.

Figure 1 provides an overview of the long-term trend in passage durations by putting together the three series. In particular, it puts into perspective the steep decline in voyage times from 1853 to 1869 averaging 1.65 days per year, which contrasts with the gentler decline from 1870 to 1913 averaging just 0.13 days per year. Indeed, from the early 1890s to 1913, there is almost no downward trend. The shaded area, which is one standard deviation either side of the mean, is particularly wide up to 1870, reflecting the gap in average durations between sail and steam.

Figure 1: Mean and median crossing times from Liverpool to New York, 1853-1913

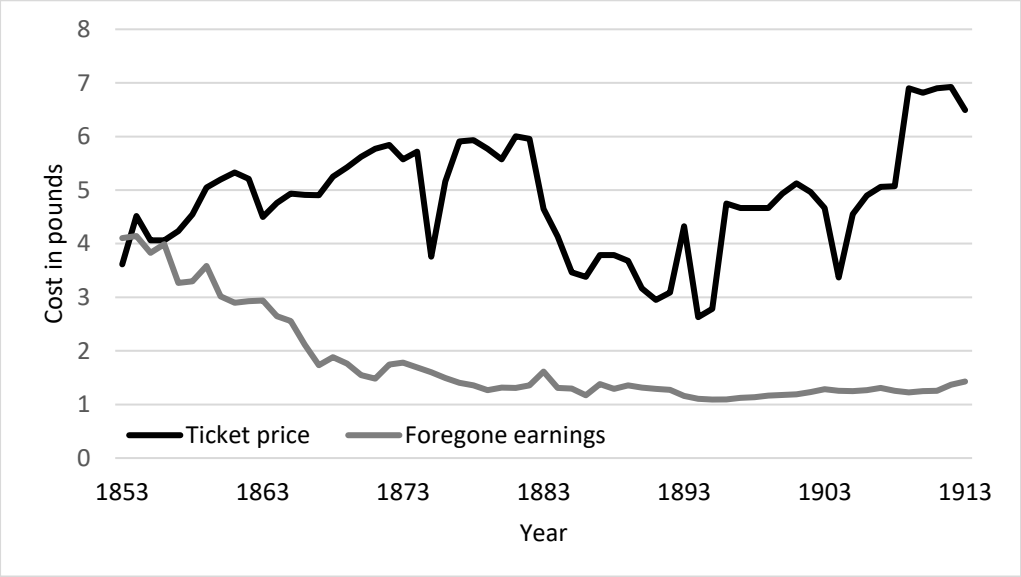


Sources: see text.

Ticket costs and foregone earnings

As previously noted, less attention has been paid to passenger fares than to ocean freight rates although several studies have provided passenger fares for different routes and periods. It is possible to combine three of these to form a consistent series that covers the six decades from 1853 to 1913. This is based on the series provided by Killick (2014) for voyages by sail and by Dupont et al. (2017) and Keeling (2008) for voyages by steam, with additional fare quotes for the years before 1866. During the transition from sail to steam the steerage rates for the latter were considerably higher than for the former. For example, in our estimate for 1863 the westward steerage fare is £3.50 for sail and £6.0, or 71 percent higher, for steam, figures that are consistent with other estimates.[24] For the years that they overlap an average of ticket prices for travel by sail and steam is calculated using as weights the share of passenger arrivals by sail and by steam in New York. The resulting annual series is reported in the Appendix together with details of its construction.

Figure 2: Ticket cost and foregone earnings cost 1853-1913



Notes: For sources, see text and appendix.

As Figure 2 shows, the average steerage fare (the darker line) increases up to the early 1870s, with the shift from sail to steam, and then declines to the mid-1890s before rising again to

[24] The Emigration Commissioners 24th Report (1864, p. 16) quotes steerage fares for Liverpool to New York for 1863 in the range £3 5s to £3 15s by sail and £5 5s to £6 6s by steam, which at the mid-points implies a difference of (£5.775-£3.5) /£3.5 = 65 percent. Cohn and Wegge (2017, p. 401) report that steerage fares by steam from Hamburg to New York in 1846-55 were 75 percent higher than by sail.

the 1910s (partly due to the US head tax). While there are substantial ups and downs in fare prices, some of which were due to the successes and failures of the shipping cartels (as in 1904: Keeling 2012, Ch. 4), there is no overall downward trend. It should be noted, however, that there were many other migration costs that include travel to and from the ports of departure and arrival as well as board and lodging. Although these costs are diverse and hard to measure,[25] at least we can be more certain about one key cost—the cost of earnings foregone during the voyage.

In order to place a value on foregone earnings during passage across the Atlantic I use the series for weekly earnings for all wage earners from Feinstein (1990) extended back to 1853. This is multiplied by the average number of weeks in transit (Figure 1) to give the cost in terms of earnings foregone.[26] As shown in Figure 2 (the lighter line), in the mid-1850s the foregone earnings cost was about equal to the ticket price but by the few years before 1914 this had fallen to just one fifth of the ticket price. Not surprisingly most of the decline comes before 1870 and the subsequent flattening of the curve reflects the countervailing effects of falling travel times and rising earnings.[27] It is worth noting in passing that the difference in foregone earnings of travelling by sail as compared with steam in 1863 (Table 2) is 3.51 weeks, which when valued at average earnings of £0.72 per week gives a difference in foregone earnings of £2.53. Comparing this with the average fare difference of £2.5 calculated here, suggests that those who chose to travel by steam valued their time at a close to average earnings. This supports the idea that time in transit can be valued at the average wage.[28]

Figure 3 shows the effect of combining these two components of the cost. The cost in money terms (the darker line, left scale) exhibits a mild downward trend as the nominal value falls from around £8 in the mid-1850s to an average of £5 in the two decades from the mid-1880s

[25] Keeling (2007, p. 168) estimates that in 1900-14 these costs for a single migrant would amount to around $27, which is equal to the average transatlantic ticket cost for these years presented in Fig 2.

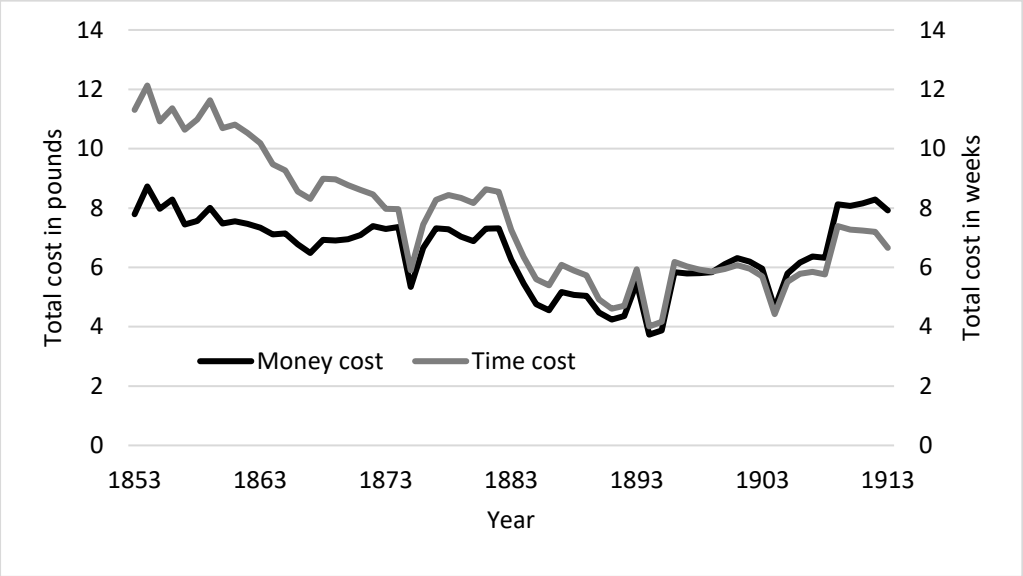
[26] I have not deducted from earnings forgone any allowance for the value of subsistence which was provided as part of the ticket price, but neither have I added other voyage costs that would include 'ship kit', sea chest, additional clothing etc.

[27] The decline in the foregone earnings cost between 1853 and 1913 (evaluated at the midpoint, 1883), can be decomposed into the fall in voyage time, accounting for a decrease of £4.10, and the rise in average earnings, accounting for an increase of £0.94.

[28] Leunig (2006) uses this approach to evaluate the time-saving value of UK railways and Wardman et al. (2016) provide a survey of travel-time valuation for more recent times. Interestingly, a contemporary emigrant guidebook noted that: "The rates of passage are generally lower on sailing than on steam vessels, but the difference is not great enough to compensate for the loss of time and the hardships of a long voyage." (American Social Science Association, 1871, p. 5).

before rising back to about £8 at the end of the period. Following Killick (2014) an alternative way of thinking about the combined cost is to express it in terms of the number of weeks' labour. This is calculated as weeks on the voyage plus the number of weeks' earnings required to purchase a ticket. Not surprisingly, as Figure 3 shows, the cost in terms of time (the lighter line, right scale) exhibits a somewhat steeper decline from 11 weeks in the early 1850s to around seven weeks in 1913.[29]

Figure 3: Cost of ticket plus foregone earnings in money and time equivalent



Notes: For sources, see text.

Conclusion

In this paper I provide a new index of voyage durations, which focuses on the average rather than on the fastest times or those of a single ship or line. From 1853 to 1913 the average voyage duration fell by 80 percent and most of that decline occurred with the transition from sail to steam in the 1860s. The variation in passage times also fell dramatically and steam ship lines increasingly adopted regular schedules. Although fares did not decline in nominal terms (if anything they increased), when the cost of foregone earnings is added there is an overall

[29] The money or nominal cost is (ticket price + voyage weeks × weekly earnings), while the cost in terms of weeks is (ticket price + voyage weeks × weekly earnings)/weekly earnings = ticket price/weekly earnings + voyage weeks. So in Figure 3, the difference in trend between these two simply reflects the rise in nominal weekly earnings.

decline in the costs of emigration over the five decades from 1853. And, if measured in terms of weeks worked, over the full six decades, the cost fell by about one third.

This may have helped stimulate and sustain the flow of emigrants from Europe, but its effects would have varied between different groups. For example, the total cost would have declined more for a single migrant than for a family with one breadwinner, as foregone earnings would be a larger share of the total. Also, the decline in the passage costs relative to earnings, probably helped to stimulate emigration from continental Europe (Cohn and Wegge, 2017), especially when the improved efficiency and decreasing costs of overland travel are taken into account. In this context it is worth remembering that travel, board and lodging before and after the Atlantic crossing could cost as much as voyage itself (Keeling 2007, p. 135).

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Appendix: An Index of Steerage Fares from the UK to the US from 1853 to 1913

As noted in the text, the index of fares for the voyage is constructed from three series and is a combination of prices by sail and by steam. For the years 1853 to 1868, the series from Killick (2014, p. 191) for average steerage fares by sail on the Cope Line is raised slightly to allow for agents' fees and benchmarked at £3.5 in 1863 which is consistent with the average of £3 5s and £3 15s quoted by the UK Emigration Commissioners (24th Report, 1864, p. 16). It is assumed constant at £3.3 from 1869 to 1873 (after which there are no emigrant sailing ships arriving in New York). For the years 1866 to 1882 the dollar values of steerage fares by steam from Dupont et al. (2017, p. 52) are adjusted to pounds using exchange rates from Officer (2022). This index is extended back to 1853 with a series of average fare quotes, mainly from Liverpool newspapers, kindly provided by Drew Keeling. The weighted average for sail and steam is calculated using as weights the shares of steerage passengers arriving by sail and steam in New York, based on the Annual Reports of the New York Commissioners of Emigration, also kindly supplied by Drew Keeling. From 1883 to 1913 the series is the average of quarterly westward steerage fares from Keeling (2008, Appendix 1), based on Cunard's revenue per adult equivalent, and this is raised by 7.5 percent to account for agents' fees. The United States head tax, levied on non-US citizen arrivals, is also added. The head tax was introduced at $0.50 in 1882, and subsequently raised to $1 in I894, $2 in 1903, and $4 in I907.

The final series is listed in Table A1 above. I am grateful to Drew Keeling for detailed consultations and additional data for the construction of this series. Needless to say, he bears no responsibility for any remaining errors. Please note that this series is not adjusted for changes in the general price level. When deflating these nominal values (as in Figure 3) I prefer to use average UK earnings in order to focus more directly on affordability.

Table A1: Index of Fares from the UK to the US in £

Year	Fare (£)	Year	Fare (£)	Year	Fare (£)	Year	Fare (£)
1853	3.61	1868	5.25	1883	4.64	1898	4.67
1854	4.52	1869	5.42	1884	4.13	1899	4.67
1855	4.06	1870	5.62	1885	3.46	1900	4.94
1856	4.06	1871	5.77	1886	3.38	1901	5.12
1857	4.24	1872	5.84	1887	3.78	1902	4.96
1858	4.54	1873	5.58	1888	3.78	1903	4.67
1859	5.05	1874	5.72	1889	3.68	1904	3.37
1860	5.20	1875	3.76	1890	3.17	1905	4.55
1861	5.33	1876	5.16	1891	2.95	1906	4.90
1862	5.21	1877	5.91	1892	3.09	1907	5.06
1863	4.50	1878	5.93	1893	4.32	1908	5.07
1864	4.76	1879	5.77	1894	2.63	1909	6.90
1865	4.93	1880	5.57	1895	2.79	1910	6.82
1866	4.91	1881	6.00	1896	4.75	1911	6.90
1867	4.91	1882	5.95	1897	4.67	1912	6.92
						1913	6.49

Sources: See text.

Appendix References

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