



Emigrant voyages from the UK to North America and Australasia, 1853–1913

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Abstract

Studies of the determinants of emigration from Europe from 1850 to 1913 include the gains to migrants but often neglect the costs. One component of those costs is earnings forgone on the voyage. In this paper, I present new data on the voyage times for emigrants from the UK traveling to the United States and to Australia. Between 1853–7 and 1909–13 the voyage time from Liverpool to New York fell from 38 days to just 8 days (or 79 per cent). Over the same years, the emigrant voyage to Sydney fell by more in absolute terms, from 105 days to 46, but by less in relative terms (56 per cent). Differences in profiles of travel times are explained with a focus on the transition from sailing to steam ships and (for Australia) the use of the Suez Canal. Data series for fare prices and foregone wage costs during transit are combined to create new series on the ‘total’ cost of emigrant voyages. Econometric analysis of the determinants of UK emigration to the United States, Canada, and Australia supports the view that time costs mattered.

KEYWORDS

international migration, steam ships, voyage times

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In his well-known book, *The tyranny of distance*, Blainey wrote of Australia in the second half of the nineteenth century that: ‘the long era in which distance was a tyrant seemed to be fading away’.¹ Blainey and others have described how improved shipping technology and navigation brought Australia closer to Europe by reducing the length and variability of the time it took to get to the other side of the world. This was important for trade in goods and a range of studies have shown that declining shipping costs stimulated international trade in the first age of globalization. While the second half of the nineteenth century also witnessed a boom in international migration, much less attention has been paid to trends in migration costs. For migration, an important element of cost is the time it took to reach the destination. In this article, I provide new estimates for 1853 to 1913 both of the cost of a ticket to Australia, and most importantly, of the foregone earnings cost of time on the voyage. As potential migrants faced choice of destinations, it is important to place this in a comparative context. To do so I compare the estimates of ticket costs and time costs to Australia with those for the obvious alternative for UK emigrants – a voyage across the Atlantic to the United States or Canada.

My estimates show that the average duration of emigrant voyages from the UK to New South Wales fell from 105 days in 1853–57 to 46 days in 1909–13, while over the same years, average voyage times from Liverpool to New York fell from 38 days to just 8 days. In absolute terms the voyage to the antipodes fell by twice as much as the trip across the Atlantic – 59 days versus 30 days – but in relative terms it fell by less – 56 per cent compared with 79 per cent. I examine the reasons why the proportionate gains were smaller on the route to Australia. One reason is that the adverse winds and currents for westward passages on the North Atlantic route meant that the gains from the shift from sail to steam were greater than they were for sailing to Australia via the Cape of Good Hope, where the winds were mostly favourable. On the route to Australia there were continued improvements in voyage times under sail due to improved ship design and better navigation. The transition from sail to steam for steerage passengers on emigrant ships did not come until the early 1880s, nearly two decades later than on the Atlantic route. There were several reasons for the delay, notably the absence of coaling stations between the Cape and Australia. When it did come, the gains in voyage times from the transition to steam were somewhat smaller than they had been on the North Atlantic route. Perhaps more surprisingly, even as late as 1909–13, more than half of emigrant voyages still went via the Cape rather than through the Suez Canal, partly because the reduction in distance of using the Suez route was modest (as compared, for example, with voyages to the Far East) and partly because Suez tolls added to the cost.

In contrast to the trends in freight rates, the downward trend in ticket prices is modest at best. For the voyage to New South Wales the cost of a ticket fell from £17 in 1853–7 to £13 in 1909–13. For the voyage to the United States over the same years the cost of a ticket actually increased slightly. Thus falling ticket prices alone do not seem to have been a major cause of the boom in emigration. If foregone earnings on the voyage are added to form a measure of the ‘total’ voyage cost, then there is a strong downward trend, which is steeper when total cost is expressed in terms of weeks’ work (at average UK earnings). For the growth in long-distance trade the fall in freight rates was pre-eminent, but for emigration the decline in voyage times was more important. The fact remains, however, that for migration to Australia, the ticket price alone was higher by a factor of three than for an Atlantic passage, and the total cost, on average, by slightly more.

Even though the number of emigrants heading for the United States was four times the number travelling to Australia and New Zealand combined, perhaps the question should not be why so few went to Australia, but rather, why so many did so. In the nineteenth century antipodean

¹ Blainey, *Tyranny*, p. 173.



governments were well aware of competition with North America for UK emigrants and so they offered a variety of assisted passage schemes. As a result, from 1853 to 1913, nearly half of all emigrants to Australian and New Zealand travelled on assisted passages. It is possible, however, that for emigrants, the ticket price and the cost of foregone earnings may have mattered little compared with the allure of distant destinations. However, econometric analysis of unassisted emigrant flows from the UK to the United States, Canada, and Australia/New Zealand from 1855 to 1913 suggests that the total cost of emigration, including the cost of travel time, did in fact have a negative effect on the number of emigrants.

The rest of the paper proceeds as follows. The next section outlines some of the literature on migration highlighting the paucity of evidence on migration costs and with a focus on emigration from the UK. The following section presents new estimates of voyage durations for steerage passengers from the UK to New South Wales, and these are compared with recent estimates of voyage times from Liverpool to New York. The following section examines the question of why, from the 1850s, the duration of emigrant voyages to the antipodes did not fall even more steeply and why the transition from sail to steam occurred nearly two decades later than on the Atlantic route. I then examine trends in the voyage costs when the time costs, in the form of foregone earnings, are included. Finally, I offer some econometric evidence in support of the view that the costs, and especially the time costs, did indeed influence the volume of emigration from 1855 to 1913.

I | SHIPPING COSTS AND EMIGRATION FROM THE UK

It has become commonplace to think that the globalization era that gathered pace from the middle of the nineteenth century owes much to the decline in the cost of shipping from one part of the world to another. Estimates of freight rates for shipping goods by sea show declines on the order of 50 per cent between 1870 and 1913² and the evidence indicates that declining trade costs contributed to the boom in international trade.³ One study suggests that the transition from sail to steam in ocean shipping could account for as much as half of the increase in trade during the second half of the nineteenth century.⁴ Although the boom in international migration from mid-century is often cited as an integral part of the first era of globalization, much less attention has been paid to the likely contribution of the costs of migration. However, several studies have provided estimates of ticket costs on the emigrant route from Europe to North America.⁵ These cover different parts of the period from 1850 to 1913 and do not span the transition from sail to steam. Nevertheless, when linked together, the resulting index shows little evidence of the steep downward trend in ticket costs that is evident in ocean freight rates.⁶

Perhaps for this reason the studies that seek to estimate the determinants of emigration have often focused on the incentives for international migration while omitting the costs. For example, in their econometric studies of emigration from Europe to the New World, [Hatton](#) and [Hatton](#) and

² [Harley](#), 'Ocean freight rates'; [Shah Mohammed and Williamson](#) 'Freight rates'; [Jacks and Stuermer](#), 'Dry bulk shipping'.

³ [Jacks et al.](#), 'Trade costs'.

⁴ [Pascali](#), 'Wind of change'.

⁵ [Killick](#), 'Transatlantic steerage'; [Keeling](#), 'Voyage abstracts'; [Dupont et al.](#), 'First cabin fares'.

⁶ It is important to note that there are many other costs of migration, including travel to and from ports of arrival and departure including board and lodging and outfit for the voyage. [Keeling](#) ('Costs, risks and migration', 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. Unfortunately, we currently lack time series for these costs.



Williamson include measures representing the wage gains, as well as fluctuations in economic activity at home and abroad, but no direct measure of the costs.⁷ However, a few studies have paid more attention to the costs. In their study of quarterly data for 1899–1913, Deltas et al. found that emigration on routes to the United States and Canada was 22 per cent lower at times when shipping cartels in effect (and thus ticket prices were higher), but they do not measure ticket prices directly.⁸ Sánchez-Alonso found that between 1882 and 1905 the depreciation of the peseta, which increased the travel costs for Spanish emigrants, reduced their numbers by up to 30 per cent,⁹ and Hatton found that emigration to the United States, Canada, and Australia/New Zealand was associated negatively with an index of ticket prices.¹⁰

None of the existing quantitative studies of the determinants of migration have included the cost of foregone earnings. In comparison with trade in goods, time spent on the voyage was much more important for migrants. In what many see as the foundation paper on the economic analysis of migration, Sjaastad wrote: ‘The non-money considerations involved in migration are surely significant, probably far more so than the money costs. The first non-money costs to consider are opportunity costs – the earnings foregone while traveling, searching for, and learning a new job’.¹¹ Yet despite this imperative and despite the fact that in the nineteenth century emigration to the New World often involved a passage of weeks or months rather than hours or days, scant attention has been paid to this important component of the cost. While overlooked in much empirical work, the cost of time was often recognized by contemporaries. Indeed, an emigrant handbook when comparing voyages across the Atlantic by sail and by steam 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’.¹²

It is useful to compare emigration from a common source to destinations where the costs and voyage lengths are very different. Figure 1 shows the annual gross passenger movement from the UK to the United States, Canada, and Australia and New Zealand combined.¹³ Emigration to the United States was by far the largest stream, making up 64 per cent of the total, with Canada accounting for 20 per cent and Australia/New Zealand just 16 per cent. After a sharp decline in the early 1850s, the number travelling to the United States gradually increased with steep downturns in the late 1870s and late 1890s. In contrast, the numbers heading to Canada increased sharply from the turn of the century, as did those to Australia from 1905. As previous studies have shown, the wide year-to-year fluctuations are explained largely by the ups and downs of the business cycle in destination countries. Much less clear is how they were influenced by the costs of migration, and in particular, by foregone wage costs.

⁷ Hatton, ‘Model of UK emigration’; Hatton and Williamson, *Age of mass migration*.

⁸ Deltas et al., ‘Passenger shipping cartels’.

⁹ Sánchez-Alonso, ‘European emigration’.

¹⁰ Hatton, ‘Emigration from the United Kingdom’.

¹¹ Sjaastad, ‘Costs and returns’, p. 84.

¹² American Social Science Association, *Handbook*, p. 5. It is also an enduring theme in accounts of Australian economic history. For example, Jackson (*Australian economic development*, p. 41) observed that ‘a major barrier to migration to Australia was the length and cost of the ocean voyage from Europe’. Seltzer (‘Labour skills’, p. 181) notes that ‘part of this cost disadvantage was due to the tyranny of distance.’

¹³ Bandeira et al., ‘Making of modern America’, argue that net immigration to the United States was lower than indicated by the passenger statistics used here. A calculation in online app. 2 shows that this is largely due to the difference in estimated return flows rather than to the gross outflows.

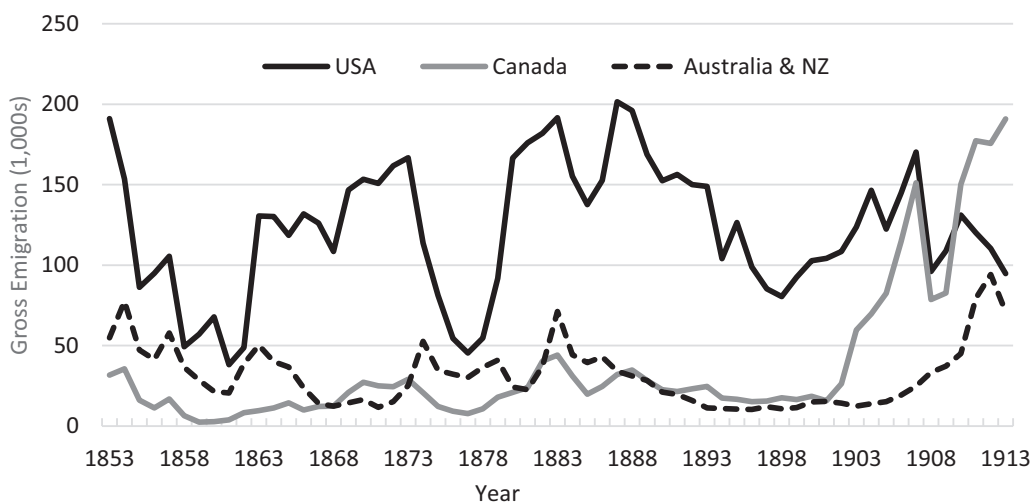


FIGURE 1 Gross emigration from the UK to the United States, Canada, and Australia and NZ, 1853–1913.
Source: Carrier and Jeffrey, *External migration*, Table D/F/G (1).

II | LONG-TERM TRENDS IN VOYAGE TIMES

One reason that the time costs of emigration from Europe have been neglected is that we lack comprehensive information on average voyage durations. While there are numerous commentaries on how changes in shipping technology, navigation, and business practices affected the speed of ships, much of this describes how innovations affected speeds at the technological frontier rather than presenting average speeds or durations. Additionally, much of the existing literature focuses on merchant shipping and trade costs rather than on emigrant ships. Here I present new series for average voyage times for emigrant ships travelling from the UK across the Atlantic and to Australia. A likely reason why such series have not previously been available is that existing sources for arrival dates at the destination often lack information on the date of departure, while sources for departure dates from ports of origin usually lack dates of arrival. To calculate voyage durations, it is therefore necessary to match arrival and departure dates for the same voyage from different sources.

Time on the Atlantic crossing is represented by the duration of voyages from Liverpool to New York. For the years from 1853 to 1913, the data on departure dates of emigrant ships from Liverpool presented in the annual reports of the UK Emigration Commissioners was matched with arrival dates of these ships in New York from *Arriving Passenger and Crew Lists (including Castle Garden and Ellis Island), 1820–1957*, at Ancestry.co.uk. For 1890 to 1913, a sample of ship arrivals was taken from the same source for each year and these were matched with departures of the same ships from *UK and Ireland, Outward Passenger Lists, 1890–1960*, also from Ancestry.co.uk. For the years 1870 to 1889 there is no convenient source for departures from Liverpool and so a series was constructed for ships carrying Mormon emigrants from Liverpool to New York from the website *Saints by Sea*. Overall, this series includes 2399 voyages for 1853 to 1869, 169 for 1870 to 1889, and 2620 for 1890 to 1913.¹⁴

¹⁴ Hatton, 'Time on the crossing', provides full details of the sources and construction of this series.

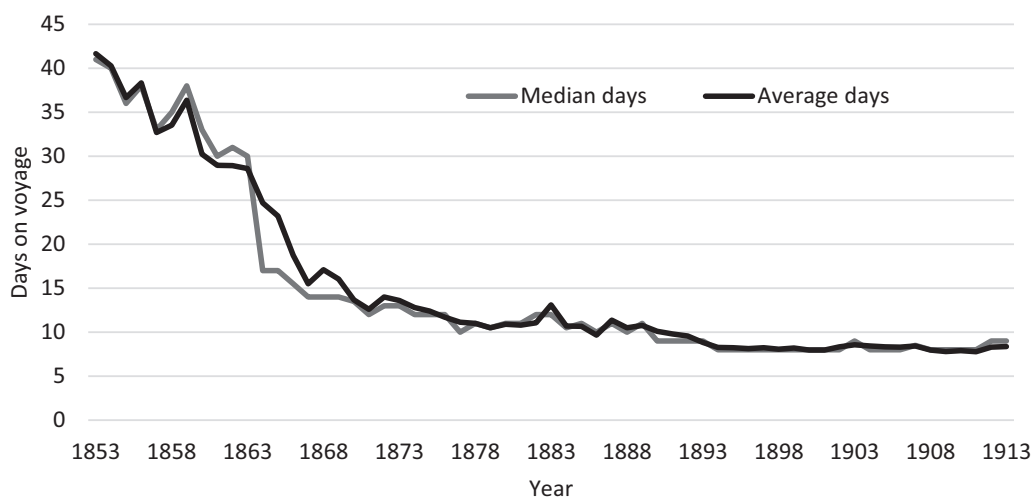


FIGURE 2 Mean and median crossing times from Liverpool to New York, 1853–1913. *Source:* Hatton, ‘Time on the crossing’.

As figure 2 shows, average voyage duration fell from around 38 days in 1853–57 to 8 days in 1909–13: a fall of 79 per cent. Four-fifths of this decline had taken place by 1869, by which time the average duration had fallen to 16 days, largely as a result of the transition from sail to steam (see further below). This is illustrated by the sharp drop in the median between 1863, when the median voyage was by sail, and 1864, when the median voyage was by steam. The voyages by sail were generally direct but steamships often stopped at Queenstown, Ireland (now Cobh, the port of Cork), which usually added 1 day or less. As sailing ships were more at the mercy of winds and ocean currents, their voyage durations varied far more than voyages by steam. The standard deviation of voyage times (all under sail) averaged 7.6 days in 1853–7, and by 1909–13 (under steam) it had fallen to just 1.4 days.

An index of average voyage times for emigrant ships to the antipodes was constructed from the difference between the dates of departure from the UK ports and dates of arrival at Sydney, New South Wales. From 1837 to 1888 the series is for ships carrying assisted immigrants. This is taken from the summary of *Assisted Immigrants (digital) Shipping Lists* at the New South Wales State Archives. Departure dates were obtained mainly from the original ships lists at the same site. For the years 1890 to 1913, a sample of ship arrivals was taken from the New South Wales *Unassisted Immigrant Passenger Lists 1826–1922*, accessed at Ancestry.com.au, and their arrival dates were matched with departures of the same ships from *UK and Ireland, Outward Passenger Lists, 1890–1960*, also from Ancestry. The series consists of a total of 1141 voyages: 667 voyages from 1837 to 1888 and 474 from 1890 to 1913. The annual series is reported in online appendix 1 together with full details of the sources and construction.

There are fewer voyages per year on average than in the series for Liverpool to New York, and their itineraries are rather more diverse. These voyages originated from a number of UK ports, although most departed the south coast of England, notably London or Plymouth. From the 1840s they less often stopped at Cape Town en route but often came to Sydney via another Australian destination such as Adelaide or Melbourne. As illustrated in figure 3, the average duration of

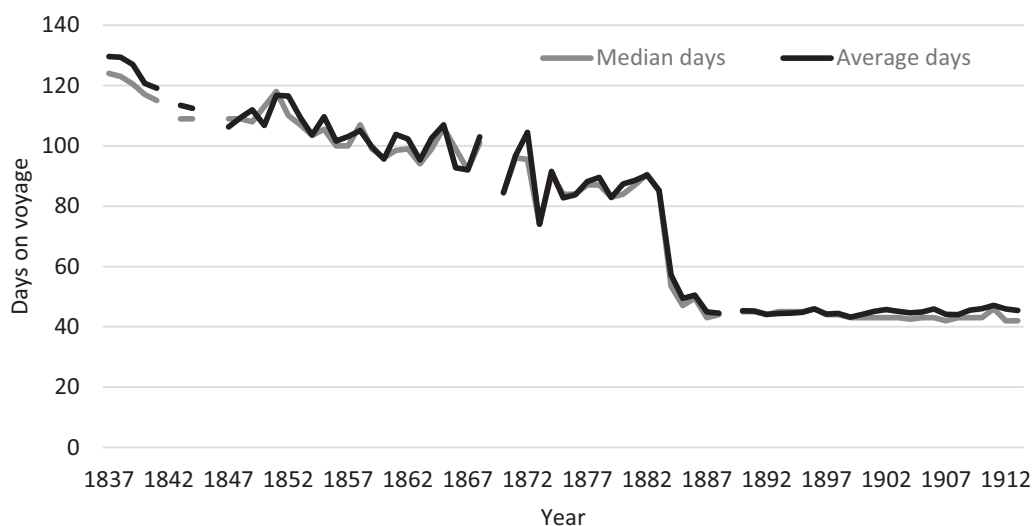


FIGURE 3 Mean and median voyage durations from UK ports to Sydney, 1837–1913. *Sources:* See text and online Appendix 1 for sources and methods of construction.

voyages in 1837–41 was 124 days, or exactly 4 months. It then declined by about 30 per cent to an average of 86 days in 1879–83. This was followed by a sharp drop from 1882 to 1885 in both the mean and the median voyage time with the transition of sail to steam. From the early 1890s there was almost no downward trend up to 1909–13, by which time the average voyage had fallen to 46 days. Not surprisingly, the standard deviation also fell steeply, from 22.7 days in 1837–41 to 13.4 days in 1879–83 and 5.8 days in 1909–13.

Comparing voyage durations to Australia with those across the Atlantic, three features stand out. First and most obvious, voyages to the antipodes took far longer than those across the Atlantic. Second, from 1853–57 to 1909–13, time on the voyage to Sydney fell by more in absolute terms – 59 versus 30 days to New York – but by less in relative terms – 56 per cent versus 79 per cent. Third, when the shift from sail to steam on emigrant voyages to Australia did come about in the early 1880s, it was almost two decades after the corresponding transition on the Atlantic route. This lag seems all the more surprising as the Suez Canal, which favoured steam over sail and also provided a more direct route to Australia, opened in 1869. So why were not the gains in voyage times to Australia even larger, and why was the transition from sail to steam apparently so tardy?

III | EXPLAINING TRENDS IN VOYAGE TIMES

There were significant improvements in sailing ship technology that increased ship speeds and reduced voyage durations up to the middle of the nineteenth century. These include coppering of hulls as well as a host of other improvements in the configuration of sails and rigging, the design of hulls and decks, and methods of construction such as the use of iron joints.¹⁵ On the North Atlantic route these gains were largely exhausted by the 1850s and sail was soon eclipsed by

¹⁵ Solar and Hens, 'Ship speeds'; Kelly and Ó Gráda, 'Speed under sail'.

steam.¹⁶ However, voyage times to Australia under sail continued to fall up to the 1870s (figure 3). This was due in part to further improvements that included increased tonnage, the diffusion of iron hulls, and above all, the advent from the early 1850s of the clipper ship.¹⁷ It was also due to improved navigation of the vast southern oceans, in particular the adoption of a more direct route, bypassing the Cape, and exploiting the great circle and the roaring forties, which in turn was facilitated by more robust ship design.¹⁸

There were three main improvements in navigation to the antipodes. One was the improvement in charts that detailed coastlines, islands, reefs, and navigational dangers.¹⁹ Another was the increased knowledge of sailing routes. In particular, Maury provided guidance to sea captains on the basis of a large collection of ship's logs which included data on prevailing winds, ocean currents and their seasonal variations.²⁰ Even more significant, the Mercator projection of the globe onto two dimensions gave a misleading impression of the most direct route. Maury showed that the great circle route, which involved sailing further west and south, was more direct and could cut sailing time from 125 to 92 days.²¹ On the outward route not only was the distance shorter, but by sailing due south towards the coast of South America and continuing south before turning east, ships could also pick up the winds of the roaring forties, where speeds of up to 15 knots were possible.²² A third factor was the improvement in ascertaining a ship's position, as the marine chronometer replaced dead reckoning and/or the lunar distance method as the means of ascertaining longitude.²³

On both routes the transition from sail to steam accounted for a dramatic decline in voyage times. From Liverpool to New York this transition took place over a decade from the late 1850s. On voyages to Sydney it took place almost two decades later and over shorter span in the early 1880s. Table 1 presents the average voyage times by sail and by steam from the data underlying figures 2 and 3 for the transition decade on each of the two routes. On the North American route, steamships reduced the voyage time by an average of 23.6 days, or 61 per cent. Not surprisingly the gain on the route to Australia was greater in absolute terms at 39.4 days, but as a percentage it was

¹⁶ My series for Liverpool to New York begins only in 1853 and thus I do not observe preceding improvements under sail. However, Albion (*Square-riggers*, pp. 197, 317) calculated average port-to-port times from Liverpool to New York for American sailing packets, which were the fastest ships of the day. These were 37.9 days in 1818–32, 34.3 days in 1833–47, and 34.6 days in 1848–57. These ships were typically hard-driven on a more direct, northerly route than emigrant ships. After 1830, they continued to increase in size but not in speed.

¹⁷ Improvements in hull design followed from changes in the measurement of ships' tonnage (which determined port fees), originally introduced 1836 but made effective by the Merchant Shipping Act of 1854. Iron hulls were not widely diffused for sailing vessels on long distance routes until the 1870s (Graham, 'Ascendency', pp. 76–80). On the clippers, see Clark, *Clipper ship era*, and Lubbock, *Colonial clippers*. These were stimulated by the gold rushes in California from 1848 and Victoria from 1851. Lubbock (*ibid.*, p. 52) reports that, in 1853–4, 26 of the fastest ships made it to anchorage in Australia (mainly Melbourne) in an average of 84 days. Clipper ships continued carrying emigrants on the Australian run for another 30 years.

¹⁸ Clark, *ibid.*, p. 261; Charlwood, *Long farewell*, pp. 16–9, 27–33.

¹⁹ Kelly *et al.*, 'Safety at sea'.

²⁰ Maury, *Explanations and sailing directions*, and *idem*, *Physical geography*.

²¹ Graham, 'Ascendency', p. 82.

²² This route, which became known as the Clipper route, was also popularized by Liverpool-based John Towson in the 1850s (Blainey, *Tyranny*, p. 179; Cotter, 'John Thomas Towson'). While the clippers, especially those carrying goods, could take full advantage of this intelligence, most emigrant ships took a compromise route, which involved sailing the easting leg from the prime meridian to about 140°E, only as far south as the low forties.

²³ Miotto and Pascali, 'Solving the longitude puzzle'.

**TABLE 1** Average voyage durations during transitions from sail to steam.

Voyage time (days)	Liverpool to New York 1860–9		UK to New South Wales 1879–88	
	Sail	Steam	Sail	Steam
Mean	38.4	14.8	88.4	49.0
Standard deviation	7.9	2.7	10.8	5.1
Number	524	1071	55	41

Source: Author calculations, see text and online app. 1.

much less, at 45 per cent.²⁴ This, despite the improvements in speed and efficiency of steamships between the 1860s and the 1880s, partly reflects the preceding improvements in voyage durations to Australia under sail.²⁵ In the age of sail, crossing the Atlantic in the face of the westerlies and against the gulf stream was slow. Westbound ships took a southerly route to take advantage of the north easterly trade winds in the southern part of the North Atlantic Oscillation. The return voyage, following a more northerly route where the winds and ocean currents were more favourable, took little more than half as long.²⁶ While the voyage to Australia presented many challenges, the winds were more favourable on the outward voyage, and as noted above, improvements in navigation enabled captains to take more advantage of them.²⁷

Given the large savings in voyage times, it is worth asking why the gains were not realized earlier, especially on the Australian route. One reason is that, because of the low efficiency of the early steam engines, steamships needed to carry a large amount of coal, halving the available space, and so they took few steerage passengers.²⁸ It was not until improvements in steam technology, specifically compound engines and screw propulsion, overcame lower carrying capacity and higher costs of motive power that mass migration shifted to steam on the North American route.²⁹ On the Australian route the lack of coaling stations beyond the Cape meant that even the later and more efficient ships needed to allocate considerable space to coal.³⁰ Thus, up to the late 1870s, with few exceptions, they carried mail and cabin passengers rather than

²⁴ The shortening of the voyage during the transition from sail to steam can also be assessed using data for the voyage durations of ships disembarking at least 100 emigrants at Queensland ports (mainly Brisbane). Full details are provided in online app. 1. For voyages departing the UK in the years 1878–87, the average number of days on the voyage was 98.5 by sail and 53.8 by steam, a difference of 44.7 days or 45%.

²⁵ It is worth noting that the variation in voyage length as represented by the standard deviation also fell by relatively more on the North American route. In part this reflects the vicissitudes of sail on the North Atlantic route despite the greater diversity, even under steam, in routes and ports of call on voyages to Sydney.

²⁶ Hubbard and Winter, *North Atlantic mail*, p. 1; Clark, *Clipper ship era*, p. 38.

²⁷ Some ships returned by rounding Cape Horn or passing through the Magellan Strait, which was faster even though it was a longer distance than going via the Cape of Good Hope.

²⁸ Steam ships were making voyages across the Atlantic and down into the Southern Hemisphere well before the respective transitions for steerage passengers in the 1860s and 1880s, respectively. On the Atlantic route, steam packets carrying mail and cabin passengers on a regular schedule became common from the late 1840s and were crossing in 16–18 days (Hubbard and Winter, *North Atlantic mail*, pp. 1, 388).

²⁹ Cohn, 'Transition'.

³⁰ In addition, the longer the voyage, the larger the share of coal in total cost. Even with the more advanced engine technology, cost of coal alone for an outward voyage of 50 days using 30 tons of coal a day at £1.25 per ton would amount to £1875, or the equivalent of around 130 adult fares. The breakthrough was marked by the voyage of the *SS Aberdeen* in 1882, equipped with a triple expansion engine, from London via Tenerife and the Cape to Adelaide, Melbourne, and Sydney



emigrants travelling steerage, and while steamships often needed to stop for coal, sailing ships could take a more direct route in the southern oceans without stopping at the Cape.

Two other factors increased the profitability of carrying steerage emigrants by steam in the early 1880s. One was overcoming the obstacle of finding a bulk cargo for the return voyage outside of the wool season (November–December).³¹ An important element in surmounting this mismatch was the rise in the exports of frozen meat and chilled dairy and fruit, lending itself to shipping by steam, which also provided the power for refrigeration.³² As these goods were high in value and low in volume, there was every incentive for shippers to choose the fastest possible method of transport, and hence they were well suited to mail ships.³³ A second precipitating factor was the award by the New South Wales government in 1883 of a mail contract (renewed in 1888) shared between the Peninsular and Oriental (P&O) line and the Orient line, the added security of which stimulated the latter to commission new steam ships catering to the emigrant mass market as well.³⁴ A similar development occurred in Queensland, where the government awarded a mail contract to the British Steam Navigation Company, which commenced operations in 1881.³⁵ This was quickly extended to include the transport of assisted immigrants, a programme that was expanded in 1882.³⁶

Even so, with the opening of the Suez Canal in 1869, one might have expected the transition to come earlier, causing an abrupt shift from sail to steam.³⁷ As compared with sailing via the Cape, the Suez Canal drastically reduced the longest distance between coaling stations for steamships from around 5000 to 2000 miles, releasing more space for passengers and cargo.³⁸ It also provided more potential ports of call for the comfort and convenience of passengers as well as better opportunities for return cargoes from Asian ports.³⁹ Yet, even after steam supplanted sail on passages to Australia, the striking fact is that more than half of the emigrant ships still travelled via the Cape

(Graham, 'Ascendancy', p. 87; Maber, *North Star*, p. 181; Broeze 'Distance tamed', p. 11). On the gradual diffusion of steam over longer distances, see Harley 'Shift from sailing ships', and Kaukiainen, 'Coal and canvas'.

³¹ As a result, sailing ships went on to destinations such as Shanghai, Manila, and Batavia or to pick up return cargoes, or engaged in trade within the region, before returning to Australia in a year-long seasonal rotation. See Broeze, 'British intercontinental shipping'; idem, 'Distance tamed'.

³² As Broeze ('Distance tamed', p. 10) notes the 'rapid rise of the frozen meat and dairy exports from [Australia and New Zealand], which provided attractive back-loading opportunities, ... precipitated a new wave of investment in steamers and a transition to steam on all routes incorporating the major ANZ ports'. This trade was initiated with voyage of the *SS Strathleven*, equipped with refrigeration machinery, which carried 60 tons of meat and butter from Sydney and Melbourne to London in 1880, and for the emigrant trade, it was pursued most vigorously by the Orient line.

³³ Harcourt, 'P & O and Orient', p. 4.

³⁴ Maber, *North Star*, p. 102; Broeze, 'Distance tamed', pp. 9–10; Williams, 'Market pressures', p. 2.

³⁵ Maber, *ibid.*, p. 170; Broeze, *ibid.*, p. 10.

³⁶ Woolcock, *Rights of passage*, p. 19.

³⁷ The very few sailing ships that did pass through the Suez Canal (just 4.5% in its first 5 years) needed to be towed and then sail the difficult passage through the Red Sea (Fletcher, 'Suez Canal', p. 558).

³⁸ Graham, 'Ascendancy', p. 81; Fletcher, *ibid.*, p. 559. On the Cape route the major coaling stations were Madeira, Las Palmas, St. Vincent, and Cape Town, which were stocked mainly with Welsh coal (local coal at Durban became increasingly important). Steamers had to carry sufficient coal for the longest leg from the Cape to Australia. On the Suez route steamers typically refuelled at Gibraltar, Port Said, and Colombo among a number of alternatives (Kirkaldy, *British shipping*, part III, ch. X). The implications for relative costs of the two routes are outlined in online appendix 2.

³⁹ While calling at more ports would have added to voyage times, as Williams and Armstrong ('Changing voyage patterns') point out, steamships were able to enter and depart from ports more easily than sailing vessels, which often had to wait upon on a 'fair wind'.



(although some with perishable cargoes returned via Suez). As late as 1909–13, among the 76 outward voyages underlying figure 3, only 48 per cent went through the Suez Canal. The Suez Canal dramatically cut sailing times to India and (to a lesser extent) China, providing a substantial boost to international trade,⁴⁰ but the reduction in voyage times to Australian ports was more modest. In 1909–13 the emigrant voyages that arrived in Sydney via the Cape took just 8 days longer on average than those coming through Suez. Nevertheless, this is still a significant difference in voyage times, and it raises the question of why so many emigrant ships continued to ply the Cape route.

One important reason is that passage through Suez incurred heavy tolls.⁴¹ A rough calculation, the details of which are provided in online appendix 2, suggests that, compared with a voyage via the Cape, the extra costs of using the canal (one way) amounted to something like £770 in 1884, reducing to £320 in 1913. Not surprisingly, the shipping lines that were at the forefront of the transition from sail to steam in the 1880s were those with lucrative mail contracts, and they also used the Suez Canal. These were the P&O line, whose voyages extended to Bombay, Shanghai, and Yokohama in the far east, and the Orient line. Indeed, the award of a share in the New South Wales government's mail contract caused the Orient line to abandon the Cape route in 1883 in favour of Suez,⁴² but almost all of the other regular services taking emigrants to the south coast of Australia still travelled via the Cape. Even among emigrant ships travelling to Queensland, which could be reached by sailing around the north of Australia through the Torres Strait, many still sailed via the Cape. In 1909–13, of ships disembarking at least 100 emigrants in Queensland, 21 per cent came via the Cape, taking an average of 59.2 days as compared with 50.3 days for ships that sailed through the Suez Canal.⁴³

IV | VOYAGE COSTS

How did the cost of a voyage to the antipodes compare with that across the Atlantic? In contrast with freight costs, there are few indices of ticket prices and none that cover the transition from sail to steam. For the route from Liverpool to New York I use an index for the steerage fares that covers the six decades from 1853 to 1913. This is based on combining the series provided by [Killick](#) for sail and [Dupont et al.](#) and [Keeling](#) for steam to calculate a weighted average of fares by sail and steam.⁴⁴ For voyages from the UK to New South Wales I construct a series for ticket prices on the basis of the contract price per adult emigrant paid to shipping lines for assisted emigrants up to the mid-1890s followed by an index of ticket prices from [Pope and Withers](#).⁴⁵ Full details are

⁴⁰ [Fletcher](#), 'Suez Canal'; [Harley](#), 'Shift from sailing ships'.

⁴¹ Noting that most passengers and cargo still reached Australia via the Cape, [Blainey](#) (*Tyranny*, p. 218) commented that 'a generation after the [Suez] canal opened, big mail steamers paid about 10% of the total cost of their Australian voyage for the privilege of passing through the canal'.

⁴² [Maber](#), *North Star*, p. 102

⁴³ Companies that continued to use the Cape route include the Aberdeen Line and the Federal Houlder Line. As they carried emigrants to destinations such as Adelaide, Melbourne, and Sydney, the number heading for Queensland tended to be smaller. If the criterion of the minimum number disembarking in Queensland is reduced from 100 to 50, the percentage of voyages via the Cape in 1909–13 increases from 21 to 32.

⁴⁴ [Killick](#), 'Transatlantic steerage'; [Dupont et al.](#), 'First cabin fares'; [Keeling](#), 'Voyage abstracts'. Full details of construction are provided in the appendix to [Hatton](#) 'Time on the crossing'.

⁴⁵ [Pope and Withers](#), 'Do migrants rob jobs?'

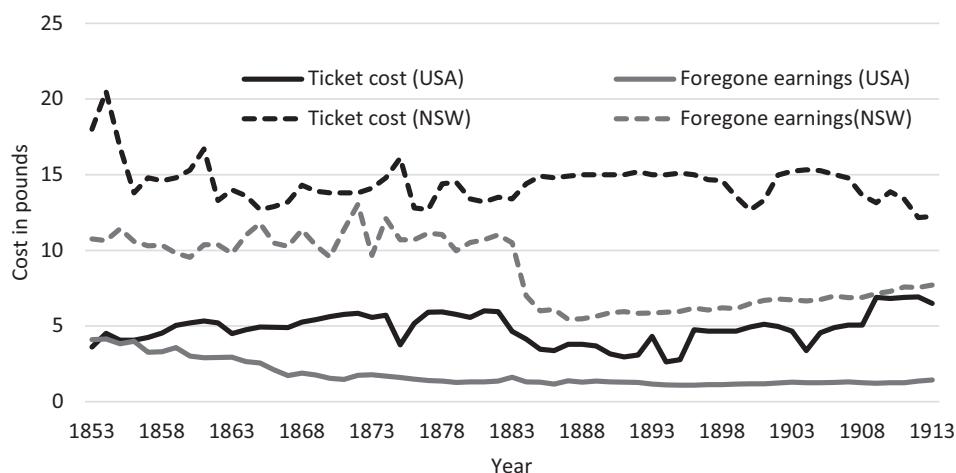


FIGURE 4 Ticket costs and foregone earnings costs, Liverpool to New York, 1853–1913 and UK to New South Wales. *Sources:* Liverpool to New York from Hatton, ‘Time on the crossing’; UK to NSW from online apps. 1 and 2 (underlying voyage length values are interpolated for 1868 and 1889).

provided in online appendix 2. The cost in terms of time (foregone earnings) is valued by applying average weekly earnings from Feinstein⁴⁶ to the average number of weeks on the voyage (online appendix 2).

As figure 4 shows, the ticket cost of a passage from Liverpool to New York increased from around £4 in the early 1850s to £6 in the early 1880s, declining to around £3 in the early 1890s before increasing to £7 in the early 1910s. From the mid-1890s passage prices were determined by the Atlantic shipping cartel, with occasional lapses.⁴⁷ The index also includes the US head tax on the arrivals of foreign nationals, which doubled three times from 50c in 1882 to \$4 in 1907. The foregone earnings cost, which was approximately equal to the price of a ticket in the early 1850s, declined steeply with the transition from sail to steam, and by the 1910s it was less than one-fifth of the ticket price. As figure 4 also shows, the costs of the voyage to Australia evolved rather differently. After a peak in the early 1850s, the passage price levelled out at £14–15 before declining in the decade to 1913. While contract prices probably varied by less than prices on the open market, the average price over the six decades was three times that of the Atlantic passage (£14.42 versus £4.74). The foregone earnings cost of travel to Australia was about two-thirds of the ticket price in the 1860s and 1870s, and after falling in the early 1880s with the transition from sail to steam, was still more than half of the ticket price in the 1910s. Thus, relative to the price of a ticket, the saving in earnings foregone over the six decades was much less on the route to Australia.

Figure 5 shows the effect of combining these two components of the cost. For travel to the United States, 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 £6 in the two decades from the mid-1880s before returning to around £8 at the end of the period. For voyages to Australia, after a sharp fall in the early 1850s, total cost in money terms (the darker hatched line, left scale)

⁴⁶ Feinstein, ‘New estimates’.

⁴⁷ Keeling, *Business of transatlantic migration*, pp. 63–70.

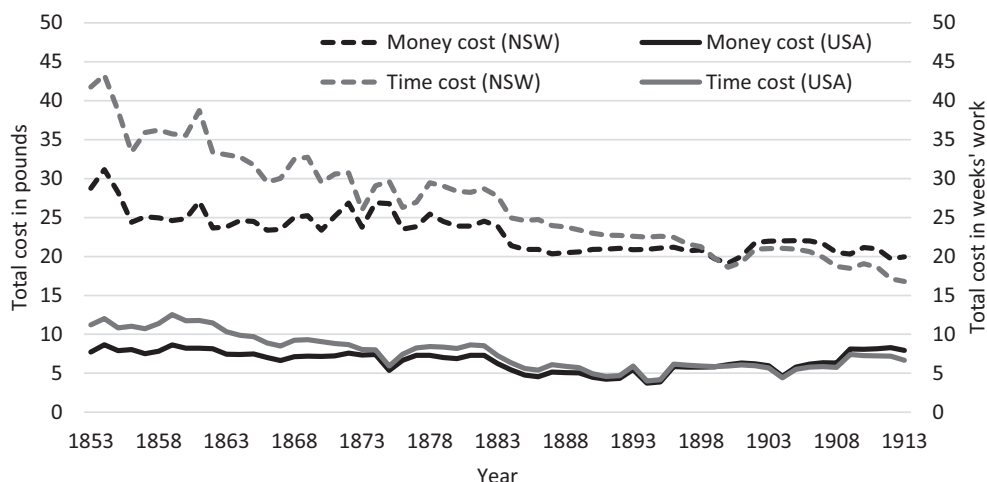


FIGURE 5 Cost of ticket plus foregone earnings in money and time equivalent. *Sources:* Liverpool to New York from [Hatton](#), 'Time on the crossing'; UK to NSW from online apps. 1 and 2 (underlying voyage length values for 1868 and 1889 are interpolated).

falls from £25 to around £20 in 1914. In contrast with the Atlantic voyage, both the ticket price and the foregone wage cost contribute to the downward trend. The total cost may alternatively be expressed in terms of weeks worked. For the voyages to the United States (lighter line, right scale) this exhibits a somewhat steeper decline from 11 weeks in the early 1850s to around 7 weeks in 1913. For Australia, the total cost in terms of weeks worked (lighter dashed line) falls more steeply, from 36 weeks in the late 1850s to 17 weeks in 1913, or by about half. While in absolute terms the decline in cost for travel to Australia is larger, in relative terms the decline is not much, if at all, greater than for the Atlantic crossing.

Given that a passage to Australia cost three times as much as crossing the Atlantic, notwithstanding other costs, why did emigrants of modest means choose to go to the antipodes? One important reason is the subsidized passages that were offered by Australian (and New Zealand) governments. As a historian of New South Wales immigration policies put it:

It was realized that the difference in cost and the length of time required for a passage from the United Kingdom to Australia as compared with one to the United States or to Canada required the colony to underwrite all or a portion of this difference if New South Wales was to compete with North America for the surplus population of the homeland.⁴⁸

At different times, the six Australian colonies and New Zealand operated a variety of schemes for assisting emigrants. The decision to offer assisted passages was determined mainly by economic and political influences within each colony.⁴⁹ The most important schemes were selection

⁴⁸ [Hayden](#), 'New South Wales', p. 3.

⁴⁹ [Hatton](#), 'Political economy'.

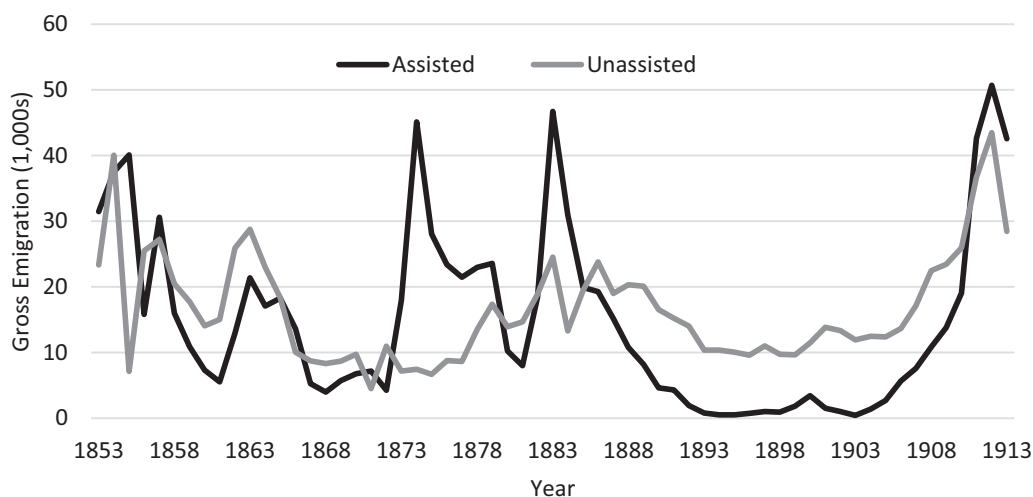


FIGURE 6 Assisted and unassisted migration to Australia and New Zealand. *Source:* See online app. 2.

and nomination, both of which provided substantial subsidies.⁵⁰ Selection schemes offered subsidized (and sometimes almost free) passages to emigrants with prescribed characteristics by occupation, age, and gender, who were recruited by agents in the UK.⁵¹ In nomination (or ‘remittance’) schemes, residents of the colony put down a deposit and nominated for a subsidized passage an emigrant who met specified criteria. In the early years these were sometimes linked to the purchase of land by the nominator. In addition, under so-called land order schemes (used especially in Queensland),⁵² full-fare-paying immigrants were allocated land to the value of the fare, subject to a repayment schedule.

These schemes were financed, for one or a few years at a time, by votes on appropriations in the individual colonial legislatures, as political and economic conditions warranted. After federation of the six Australian colonies in 1901, assisted immigration was revived but remained under the control of the individual (now state) legislatures. From 1853 to 1913 an estimated 47 per cent of all immigrants to Australia and New Zealand travelled on assisted passages. Figure 6 shows the profiles of assisted and unassisted emigration, the latter calculated by subtracting assisted from total emigration (for details see online appendix 2). Most of the Australian colonies offered one or more schemes up to the early 1880s, with sharp spikes in assisted arrivals in 1874 and 1883. While the former spike was driven almost entirely by free passages offered by the government of New Zealand, the latter was spread more widely across the colonies. From the late 1880s assisted immigration went into decline, ceasing almost completely in the 1890s depression before rising

⁵⁰ As Richards (‘How did poor people’, p. 262) notes, ‘The assistance given to emigrants to Australia was remarkably generous and met most of the expenses of transit to the colonies. Ordinary migrant families were commonly subsidized to the equivalent of a year’s income. Nevertheless, the total costs of passage and resettlement were rarely covered in their entirety’. While the Canadian government provided land settlement schemes and inland travel subsidies, it did not provide for voyage costs (Harper and Constantine, *Migration and empire*, Ch. 10).

⁵¹ As an example, for assisted passages to Queensland in 1875, emigrants aged between 12 and 40 years paid £4 (men) or £2 (women) plus 10s 6d for ‘ship kit’ (bedding, utensils, etc.), and ‘free’ passages were offered to those with certain occupations for £1 (Agent General for Queensland, *Handbook*, p. 14).

⁵² Woolcock, *Rights of passage*, pp. 9–21; Morgan, ‘Peopling a new colony’.



to another peak in 1912. Thus, while the US government was busy increasing the head tax on immigrants, governments in Australia were reviving assisted passages to compete for migrants from the UK. Unassisted emigration, while somewhat less volatile, increased steadily from the 1860s, then declined in the 1890s before rising to a peak in 1912.⁵³

V | DID THE TIME COSTS AFFECT EMIGRATION?

Numerous studies have estimated the correlates of emigration in the so-called age of mass migration, but as noted above, few have taken full account of the costs. To examine the possible influence of costs on emigration to the three destinations, the following equation is estimated:

$$y_{it} = \alpha_0 + \alpha_1 x_{it} + \alpha_2 z_{it} + \alpha_3 y_{it-1} + \alpha_4 d_i + \varepsilon_{it}$$

The dependent variable is the log of the number of emigrants to each of the three destinations – the United States, Canada, and Australia/New Zealand – where i is destination and t is year. These are the series illustrated in figure 1, except that for Australia/New Zealand the dependent variable is unassisted emigration only (see online appendix 2). Assisted emigration is excluded because the cost to emigrants and the number assisted varied over time and between the different colonies. While it is possible that the availability of assisted emigration could reduce the number of unassisted emigrants, Hatton finds little evidence that there was ‘crowding out’ (or ‘crowding in’) of unassisted by assisted emigration.⁵⁴

x_{it} represents the costs of migration, including foregone earnings, as illustrated in figure 5, either in money terms, deflated by the UK cost of living index, or in the equivalent of weeks worked. The Liverpool to New York series are used for migration to the United States as well as to Canada but excluding the US head tax from the ticket cost. As some studies have found that the migration costs depend on the volume of migrants (as well as other variables),⁵⁵ these costs are taken as endogenous and so instrumental variables are used. Three instruments for voyage costs are used. The first is freight rates for carrying coal to Atlantic ports for the United States and Canada and to ports in the East for Australia/New Zealand from Harley to instrument for ticket prices.⁵⁶ As coal was carried mainly by tramp shipping and over different routes, these are not close substitutes for ships carrying emigrants.⁵⁷ The second is a dummy variable representing the shift from sail to steam. The shift is dated from when the median voyage changed from sail to

⁵³ Given the difference in cost one might wonder why any migrants travelled to Australia unassisted. Australia’s policy of assisting manual workers combined with its convict background meant that there was only a small middle class situated between manual workers on the one hand and property owners on the other. There would have thus been particularly good opportunities for those with clerical, managerial, and professional skills. There were also good opportunities to acquire land or perhaps mining concessions at modest prices.

⁵⁴ Hatton, ‘Emigration from the United Kingdom’.

⁵⁵ See McDonald and Shlomowitz, ‘Passenger fares’; Deltas et al., ‘Passenger shipping cartels’.

⁵⁶ Harley, ‘Coal exports’.

⁵⁷ Harley (ibid, p. 315) notes that ‘the great trade of the North Atlantic that employed some 16% of British shipping before the war had practically no connection with the coal trade’. And with regard to Australasia and the Far East, that ‘this shipping was somewhat connected with the coal exports to the Mediterranean as they passed on their outward voyages to the Suez Canal, but there were no important coal exports to the region itself’. Use of these series is further justified on the grounds that (a) coal (mainly from South Wales) is a relatively homogenous bulk cargo, (b) these series represent outward voyages, and (c) they go back (almost) to 1853, while most others go back only to 1870.



steam: 1864 for the United States and Canada, and 1884 for Australia/New Zealand. This variable is justified as an instrument on the grounds that the transition was determined largely by technical advance and political decisions rather than by the volume of passengers. The third instrument is a linear time trend aimed at capturing the decrease in voyage length.

z_{it} represents variables that often appear in push–pull models of international migration. The real wage gap comes from Williamson and is lagged 1 year.⁵⁸ Fluctuations in economic activity in destination countries are represented by the rate of change of real GDP per capita from Maddison,⁵⁹ including both the current value and the 1-year lag. It is worth mentioning at the outset that three variables that were originally included were dropped from the analysis as they were never significant. One is the stock of UK-born at each destination aimed to capture the friends and relatives (chain migration) effect. As this was constructed from using the emigration series to interpolate between census benchmarks, it seems likely that the lagged dependent variable captures this effect, especially as recent emigrants are likely to have been the most important. In addition, neither the growth of UK real GDP (a push factor) nor a linear time trend took a significant coefficient. y_{it-1} is the lagged dependent variable, which captures the equation dynamics which may arise from the formation of expectations and/or the so-called friends and relatives effect. d_i are destination country dummies (fixed effects) and ε_{it} is the stochastic error term with possible cross correlations. The data sources are detailed in full in online appendix 2.

The results of this estimation over the years 1855–1913 are presented in table 2. These are instrumental variable regressions with standard errors adjusted for cross sectional dependence and autocorrelation. The first-stage results are reported in online appendix 3, table A3.1. ‘Total’ costs measured in either money, column (1), or weeks of work, column (2), give significant negative coefficients, as would be expected. The significance of test statistics for under-identification, and the overall F -statistic for the first stage, indicate that the instruments are sufficiently highly correlated with the cost variables. More importantly, the insignificant test statistics for over-identification indicate that the instruments are not correlated with the error term and are therefore valid in the sense that they can be legitimately excluded from the second stage regression. As the instruments include a time trend, this suggests that there is no additional trend component in the second-stage regression.

Columns (3) and (4) of table 2 include the ticket cost in terms of weeks worked and the number of weeks on the voyage separately. These two components of the total time cost variable each take negative and significant coefficients. Among the other variables, it is worth noting that the log wage ratio gives positive coefficients, as would be expected, although they are not significant. Economic activity in destination countries gives strongly significant positive coefficients on both current and lagged terms, which is consistent with the standard push–pull model. The most significant variable of all is the lagged dependent variable, which indicates strong persistence in emigration flows, a feature of all models of this type. Further lags of the dependent variable were not significant.

These results may be compared with those when the cost variables are not instrumented. As reported in online appendix 3 table A3.2, the coefficients are less negative and largely insignificant. This positive bias would be consistent with increasing emigration driving up voyage costs. Substituting an index of freight rates from Jacks and Pendakur⁶⁰ as an instrument

⁵⁸ Williamson, ‘Evolution of global labor markets’.

⁵⁹ Bolt and van Zanden, ‘Maddison project database’.

⁶⁰ Jacks and Pendakur, ‘Global trade’.

**TABLE 2** Panel estimation of emigration from the UK to the United States, Canada, and Australia/New Zealand (ANZ), 1855–1913.

	(1)	(2)	(3)	(4)
Log real total money cost (t)	-1.135** (0.52)			
Log total cost in weeks (t)		-0.435** (0.17)		
Log ticket cost in weeks (t)			-0.530** (0.23)	
Log weeks on voyage (t)				-0.223** (0.09)
Log real wage ratio (destination/origin) ($t-1$)	0.352 (0.29)	0.341 (0.27)	0.268 (0.28)	0.268 (0.25)
Growth of real GDP per capita (destination, t)	5.284*** (1.46)	4.823*** (1.40)	5.006*** (1.49)	4.560*** (1.37)
Growth of real GDP per capita (destination, $t-1$)	4.021*** (1.40)	3.600*** (1.22)	3.758*** (1.29)	3.409*** (1.20)
Log emigration ($t-1$)	0.772*** (0.07)	0.787*** (0.06)	0.801*** (0.06)	0.804*** (0.06)
R^2	0.898	0.916	0.909	0.920
Under-identification, X^2 (3)	11.62	17.37	15.29	17.01
Excluded instruments, F (3, 59)	13.84	75.76	16.90	254.75
Over-identification, X^2 (2)	1.109	0.401	1.601	0.926
Observations	177	177	177	177

Note: Estimation using IV-GMM with Driscoll–Kraay standard errors (in parentheses) with bandwidth 2 in the time dimension; significance levels: ** 1%, * 5%, and * 10%. The instruments are freight rates for coal for shipping from South Wales to Atlantic ports (United States and Canada) and to the far East (Australia/New Zealand), a dummy variable for the switch from sail to steam in 1864 for the United States and Canada and 1884 for Australia/New Zealand, and a common time trend. The first stage estimates are reported in app. 3, tab. A3.1.

in place of coal freights gives results similar results (online [appendix table A3.3](#)). However, when decade dummies are added to the regressions in table 2, the cost coefficients become insignificant (online [appendix table A3.4](#)). This is perhaps not surprising with just three time series where the cost variables for two of them (Canada and the United States) are essentially the same. However, the decade dummies are jointly insignificant and so these are excluded. These caveats mean that the results provide suggestive but not definitive evidence that the costs of migration, including the cost of time on the voyage, influenced migration flows in the six decades before 1913.

A further concern is that this estimation takes no account of possible substitution or complementarity between assisted and unassisted emigration to Australia and New Zealand.⁶¹ One approach is to add a policy indicator to the regressions in table 2 to assess the effects of assisted

⁶¹ There is also measurement error in the calculation of the series for unassisted emigration that is plotted in fig. 6. As this is calculated as the difference between total emigration recorded at the origin and assisted immigration recorded at the destination, the timing differs between these two numbers according to the average length of the voyage.



TABLE 3 Emigration from the UK to the United States, Canada, and ANZ, 1855–1913: alternative specifications.

	(1)	(2)	(3)	(4)
	Unassisted emigration		Total emigration	
Log real total money cost (t)	-1.209** (0.52)		-1.161** (0.49)	
Log total cost in weeks (t)		-0.489*** (0.17)		-0.504*** (0.16)
Log real wage ratio (destination/origin) ($t-1$)	0.333 (0.29)	0.294 (0.26)	0.429 (0.26)	0.407* (0.23)
Growth of real GDP per capita (destination, t)	5.244*** (1.46)	4.673*** (1.36)	3.935*** (1.08)	3.374*** (0.92)
Growth of real GDP per capita (destination, $t-1$)	3.993*** (1.42)	3.483*** (1.23)	3.990*** (1.08)	3.487*** (0.93)
Log emigration ($t-1$)	0.763*** (0.08)	0.771*** (0.06)	0.768*** (0.06)	0.771*** (0.06)
Assisted emigration policy index (t)	0.085 (0.12)	0.182 (0.12)	0.292** (0.12)	0.391*** (0.12)
R^2	0.896	0.915	0.888	0.912
Under-identification, X^2 (3)	11.88	19.47	12.79	20.91
Excluded instruments, F (3, 59)	12.22	59.28	12.80	61.81
Over-identification, X^2 (2)	2.13	0.62	2.64	0.45
Observations	177	177	177	177

Note: Estimation using IV-GMM with Driscoll–Kraay standard errors (in parentheses) with bandwidth 2 in the time dimension; significance levels: ** 1%, ** 5%, and * 10. In columns (1) and (2), the dependent variable for Australia and New Zealand is unassisted emigration (as in fig. 6), and in columns (3) and (4), it is total emigration (as in fig. 1). The instruments are freight rates for coal for shipping from Wales to Atlantic ports (United States and Canada) and to the far East (Australia/New Zealand), a dummy variable for the switch from sail to steam in 1864 for the United States and Canada and 1884 for Australia/New Zealand, and a common time trend.

migration policies on unassisted emigration. An alternative is to use total emigration from the UK as the dependent variable but to control for assisted immigration policies. To construct the policy indicator a dummy variable was derived for each colony/state taking the value 1 in years when any policy of assistance was in effect, otherwise zero. The dummies were then combined using as weights the population share of each colony/state in the total for 1881. This index varies between 1 if all colonies/states had a policy in place and 0 if none did. It is set to zero for emigration to the United States and Canada.

Table 3 presents the results of estimating these alternative specifications. When the policy index is included for unassisted emigration in columns (1) and (2), it takes insignificant coefficients, suggesting that assisted passages neither decreased nor increased unassisted migration. Not surprisingly, in columns (3) and (4), where the dependent variable is total emigration, the coefficient on the policy index is larger and more significant. In all these specifications, coefficients on the total cost variables remain negative and significant. These coefficients also remain significant when either Canada or the United States are dropped from the regression, as reported in online appendix table A3.5.



VI | CONCLUSION

The determinants of emigration from Europe from 1850 to 1913 have been widely studied but more emphasis has been placed on the incentives than on the costs. An important part of these costs is the earnings forgone on the voyage. In this paper, I present a new series on average voyage times for emigrant ships from the UK to Australia and compare these with the very different profile of voyage times to North America. Over the six decades from 1853 to 1913, time on the passage fell dramatically to both destinations. A large part of this decline was due to the transition from sail to steam, which took place nearly two decades earlier on the Atlantic route than on the route to the antipodes. While the absolute decline in voyage times to Sydney was much greater than to New York, the proportionate decrease was smaller. This was largely because sail was competitive for longer on the antipodean route. Thus the gain from switching to steam was less, and took place later, notwithstanding the opening of the Suez Canal in 1869.

If we take seriously the value of time on the voyage as measured by foregone earnings, then this forms a substantial and strongly decreasing part of the costs facing emigrants. This was especially important for emigration to Australia, where the total cost, including both the ticket and time cost, was on average three times that for crossing the Atlantic. For that reason, nearly half of all emigrants who arrived in Australia travelled on some form of assisted passage. Econometric analysis of the determinants of three streams of emigration supports the view that, in the presence of variables representing the incentive to migrate, the costs of migration are negatively associated with gross emigration. Accounting for endogeneity, it suggests that voyage times were a significant influence, whether or not assisted passages are included in the analysis. While the effect on the overall trend in emigration is uncertain, it is likely that falling voyage times were an important element supporting and increasing emigration in the six decades to 1913.

The evidence presented here suggests a number of avenues for future research. One would be to account more fully for other elements of the cost of emigration, specifically for the costs of overland travel to and from ports, waiting time, board and lodging, and outfit for the voyage. It is likely that these elements of cost also declined, but at present, we lack the data to establish the long-term trends. Another avenue would be to examine the possible effects of voyage times, not just on the volume of emigrants, but on the type of emigrant by occupation, age, and family demographics. If, as is often suggested, higher migration costs are associated with more positive labour market selection, then falling voyage times should have increased emigration among those lower down the economic scale. Finally, on a related theme, for Australia it would be useful to examine the differences in the demographic and occupational composition of assisted and unassisted migrants.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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