

**Geography and Capital:
Explaining Foreign Listings of U.S. Railroad Securities
during the First Era of Financial Globalization**

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Abstract

We study motivations for the globalization of capital markets by examining the role of geography in the financing of U.S. railroad investment from 1866 to 1913. The selected industry and period provide a natural experiment to study the first globalization wave due to the relative underdevelopment of contemporary U.S. financial markets, the dramatic change in global communication technology, the enormity of capital investment needs, and the unique geography-specific nature of railroad assets. We observe an intense level of foreign listing activity in the European markets of Amsterdam, Frankfurt, and London on a scale much larger than that studied in more recent work. We find strong cross-regional variation in foreign listing frequency and its effects. Our evidence suggests that differences in capital constraints have a profound impact on geographic distribution of foreign listing activity.

JEL Classification: G15; G30

Keywords: Bond listing; Equity listing; Investment-cash flow sensitivity; Market integration

1. Introduction

Geography has long been characterized as playing an important role in capital market development. Distance can create frictions in connecting market participants including, but not limited to, explicit institutional barriers, physical exchange costs, and information and monitoring costs (John, Knyazeva, and Knyazeva, 2011). These frictions can substantially segment markets and, therefore, have significant effects on the price of capital (e.g., see Solnik, 1974; Errunza and Losq, 1985).

There is substantial evidence of a reduction in geographic frictions in recent years. Declines in cross-capital market barriers, transportation and delivery costs, and information costs have facilitated a profound globalization of financial markets, a trend which has been associated with a consolidation of securities exchanges to centralized locations (Michie, 1997). While the general trend toward market consolidation is clear, the direction in securities trading venue is not. In recent years there has been a strong increase in the number of firms listing their equity in multiple markets (e.g., see Fernandes and Giannetti, 2008; Doidge, Karoyi, and Stulz, 2009; and Sarkissian and Schill, 2008). The foreign listing decision is a particularly interesting laboratory to explore the relation between geography and finance as it represents a conscious choice by firm management to position the securities of the firm outside the local market for some benefit. There is a large literature that explores the gains to listing abroad. A fundamental motive for foreign listing is the overcoming of market segmentation by “home-delivering” the securities to a segmented market’s clientele. In this way, investors, who previously were excluded from holding foreign securities, become capable of investing in them and sharing global risk, thus, reducing the cost of capital for the home firm (e.g., see Foerster and Karolyi, 1999).

On August 16, 1858, the first telegraphic message was sent from the Old World to the New World. The message, “Glory to God in the highest; on earth, peace and good will toward men” was sent via a transatlantic cable laid from Valentia Island, Ireland to Trinity Bay in Newfoundland, Canada. It took 17 hours to transmit. Within a decade, a second, technologically

superior cable laid by the Anglo-American Telegraph Company improved transmission speeds to eight words per minute. The resulting dramatic reduction in global information transmission costs from the 1860s provided the impetus for the creation of a global financial market. This communication technology shock coincided with a period of massive railroad investment which enabled the development of the southern and western regions and the creation of a huge integrated American product market. According to Davis and Galman (2001: 333), "...in terms of economic development, the construction of the national railway network was probably the most important event of the last half of the nineteenth century" and required "a massive infusion of capital", a substantial portion of which came from Europe.

In this paper, we examine the motivation for the development of global capital markets over the period from 1866 to 1913 - the first era of financial globalization. As a natural experiment, we analyze U.S. railroad investment with the goal of understanding the effects of foreign listing during a period of time and in an industry when it mattered most.

Our data comes from a variety of U.S. and European sources. The foreign listing sample includes any U.S. railroad that was publicly listed on any of the following stock exchanges between 1866 and 1913: Amsterdam, Frankfurt, London, or New York. All our railroads are also present in the Manual of the Railroads of the United States, authored by Henry V. Poor, using annual volumes from 1870 to 1914. The final sample contains 193 U.S. railroad companies of which 144 companies were granted a total of 292 bond and ordinary stock listings on the Amsterdam, Frankfurt, and London stock exchanges. Frankfurt was more important than Berlin as a listing venue for US railroads. Other major continental European stock exchanges including Paris and Brussels attracted extremely few US railroad listings.

We observe large foreign listing activity among U.S. railroads in Europe, especially on the London and Amsterdam stock exchanges. Moreover, we find significant cross-regional differences in the preferences and extent of this activity. First, bonds were the security most preferred by U.S. railroad companies across all regions when listing on all three European exchanges. Second, the foreign listing penetration rates vary greatly across U.S. regions. For

example, railroads from New England seem to be able to finance most of their investment needs from domestic sources of capital and are almost absent from foreign exchanges. In contrast, almost 90% of railroads from the Southwest were listed on foreign exchanges. Given substantial differences across U.S. regions in the ability to attract local capital for railroad construction, we argue that the more capital-constrained railroads were, the more likely they were to pursue distant financing options on overseas exchanges. Consistent with this premise, we show evidence that after foreign listing there is a significant reduction in the investment-cash flow sensitivity among capital-hungry railroads from lesser developed regions of the United States.

The rest of the paper is organized as follows. Section 2 covers the background to the financing of U.S. railroad expansion in the 19th century. Section 3 describes our data. Sections 4 and 5 examine the geography of U.S. cross-listings and the financial impact of the cross-listing decision, respectively. Section 6 estimates the financial effects of U.S. railroad listings on European stock exchanges. Section 7 concludes.

2. Financing U.S. railroad expansion in the 19th century

Railroads contributed much to U.S. economic and financial development in the 19th century. Modern corporate finance and financial management had their origins in the railroad industry (Chandler, 1965), as did American investment banks, most notably J.P. Morgan, and new issue syndicates (Carosso, 1970, 1987). Even episodes of financial distress led to considerable innovation in equity receivership, security design and corporate governance (Tufano, 1997).

Above all, railroads were the leading industrial sector of the 19th century. Between 1839 and 1910, railroad services grew at 11.6% per annum, three times that of the overall national income, and the railroad capital stock, both track and equipment grew at 7% per annum (Fishlow, 1966: 626-628). Following the chartering of the first railroad, Baltimore and Ohio, in 1828, an extensive railroad network covering over 30,000 miles centering on the East Coast and

the Midwest had already been completed by the Civil War, but it was in the postbellum period when geographic expansion proceeded apace. The system was extended further west when the Union Pacific met the Central Pacific in 1869 to complete the first transcontinental line. Whilst the capital stock in 1909 dollars had reached \$1 billion at the end of the 1850s it had expanded to \$12 billion by 1910 (Fishlow, 1966: 611). Railroad expansion then peaked during WW1. Figure 1, which graphs the expansion in railroad track miles from 1830 to 1913, illustrates the dramatic increase in U.S. rail investment following the Civil War.

U.S. railroad expansion over this whole period was largely financed via private capital markets. Despite high social rates of return on railroads underpinning the case for direct government financing of railroad construction, the distaste for federal government involvement in business at that time remained an insurmountable hurdle to this happening (Fogel, 1960: 110). Public funds were provided directly by individual states in the antebellum period but later on indirectly via land grants, mainly in the case of the transcontinental lines faced with substantial initial construction costs.

When turning to the capital markets, U.S. railroads relied heavily on bond finance. In the absence of statutory limits on leverage such as existed in Britain, funded long-term debt totaled \$11.2 billion compared to \$7.2 billion of common stock in par values by 1913 (Baskin and Miranti 1996: 146-150). Initially, in the antebellum period, information asymmetry problems were mitigated by the proximity of local investors to the railroads of the densely populated Northeast, and there were sufficient local resources to facilitate private equity finance. However, after the Civil War, U.S. railroad expansion became increasingly “developmental” in nature as the railroads traversed sparsely populated areas to the West and were unable to generate profits directly from the local economies through which they passed (Dunlavy, 1994: 32). The postbellum railroads were therefore forced to finance themselves by looking to European investors. Total foreign investment in U.S. railroads reached \$4,170 million by 1914 based on par values and representing over one-fifth of all U.S. railroad securities outstanding (Lewis, 1938, figures quoted in Wilkins, 1989: 193). Foreign investors overwhelmingly preferred bonds

with some sort of collateral backing to stocks, and between 70% and 90% of their funds were allocated to bonds (Wilkins, 1989: 191, footnote 11). In general, investors were grateful for the opportunity to diversify their portfolios and invest in the railroad sector. British investors held two-thirds of U.S. railroad securities on the eve of WW1, whilst the Dutch, the Germans, and the French each accounted for around one-tenth.

London was the major overseas listing venue for U.S. railroads. The first public issues of railroad securities in London date from the early 1850s and listings on the London Stock Exchange before the Civil War were initially restricted to 6 major railroads (Adler, 1970: 53, 153). The number of listings then grew very rapidly through the 1870s and 1880s. In the antebellum period and in the decade after 1866, British funds concentrated on North-South lines along the Atlantic Seaboard and around New York and Philadelphia, in particular, and left the Midwest to the Dutch and German investors (Adler, 1970: 190-192). Those British investors inclined to take more risk invested in the South and South West rather than the West via convertible bonds and shares, whilst the more risk-averse stuck with mortgage bonds of the Northeast railroads.

British investors suffered losses in the mid-1870s, although not to the same extent as the Dutch and Germans, and in all 29 railroads listed in London fell into default (Adler, 1970: 77-78). Thereafter, they looked to protect themselves by relying more on the banker-railroad relationship, establishing protection committees in financially troubled or defaulting railroads, and occasionally either seeking board representation where legally permitted or taking over the line themselves (Adler, 1970: 170-188). Dutch and German investors adopted similar measures.

Notwithstanding the defaults in the mid-1870s and again in the mid-1890s, British investors received a consistent return premium on U.S. railroad securities over domestic railway securities throughout the period up to 1913 (Edelstein, 1982: 94-95). In fact, foreign, largely U.S., railroads accounted for approximately half the optimal portfolio of a British investor in London-listed securities in 1913, compared to a 37% index weight (Goetzmann and Ukhov, 2006: 289, Table XI). The flagship London-listed closed-end fund, Foreign and Colonial

Investment Trust, made its largest allocation to US railroads to the benefit of its performance (Chambers and Esteves, 2012).

After London, Amsterdam was the next most important destination for U.S. railroad listings on a foreign stock exchange. Dutch investment in U.S. railroads dates from the mid-1850s, the first listings in Amsterdam beginning during the following decade, and in part reflected the very limited opportunities to invest in domestic railroads (Veenendaal, 1996). Dutch investment was associated with the railroads of the Midwest particularly in those states where the Dutch themselves settled, Michigan, Iowa and Minnesota, as well the Northwest and Southwest (Veenendaal, 1996: 44, 168-169). Relatively little was invested in the established Northeast railroads, both because they preferred higher risk-return investments and were relatively late in investing compared to the British.

Similar to Dutch investors, German investors looked for opportunities abroad once domestic railroads were nationalized in the 1880 (Dunlavy, 1994: 33). Frankfurt was initially the important destination for U.S. railroad listings beginning in the early 1870s and, despite the emergence of Berlin as the dominant stock market in Germany, it remained an important market for foreign securities (Holtfrerich, 1999: 202-210).

Although the French also invested in this sector, most of these investments were made in the decade prior to the WW1 and very few railroads listed their shares on the Paris Stock Exchange (Wilkins, 1989: 193, footnote 36). Hence, in the rest of the paper we concentrate on London, Amsterdam, and Frankfurt as the main cross-listing destinations for U.S. railroads and examine further below the apparent preference of European investors for U.S. railroads in certain regions.

3. Data

We examine U.S. railroad enterprises over the period from 1866 to 1913. The sample period begins in 1866 since this is the first full year following the end to the disruption caused by

the Civil War. *The Commercial and Financial Chronicle*, the first national business newspaper in the United States which published extensive lists of the corporate bonds traded on the NYSE and other exchanges, first appeared in 1866. The first edition of *Poor's Manual of the Railroad of the United States* appeared shortly afterwards in 1868 and played a major role in the provision of reliable information available in a single source to both managers and investors alike (Chandler, 1956: 247).

Our sample includes any U.S. railroads over the sample period that had publicly traded bonds or ordinary shares on any of the following stock exchanges: Amsterdam, Frankfurt, London, or New York. Compared to other U.S. regional stock exchanges, New York dominated the market for railroad securities, particularly the largest railroads (Michie, 1987: 230-231). We opt not to include firms that were listed on other regional U.S. exchanges, particularly the Boston Stock Exchange, since these railroads were substantially smaller with modest financing requirements, and not comparable to the railroads in our sample. Over our sample period, the securities traded on the stock exchanges were mainly bonds, followed by ordinary shares. There were relatively few preferred shares listed and we choose to exclude these listings in order to simplify our analysis. Furthermore, we require that all railroads be identified within the *Manual of the Railroads of the United States* authored by Henry V. Poor using annual volumes from 1870 to 1914.

Amsterdam and London were by far the two most popular foreign listing destinations for U.S. railroads (Veenendaal, 1995). The listing data is collected from the *Investors Monthly Manual*, the *Stock Exchange Year Books* and the *Stock Exchange Daily Official List* for London and from the *Gidsbij de Officiele Prijscourant* in the case of Amsterdam. We also collected data for U.S. railroad securities listed in Frankfurt from the *Frankfurter Zeitung* up to 1899 and from the *Saling Borsenpapiere* from 1900 to 1913. U.S. railroads listed only bonds and no equities in Frankfurt. Our final sample includes 193 U.S. railroads with 292 foreign bond or ordinary equity listings on the three European exchanges.

Figure 2 shows the time-series variation in the frequency of railroads over our sample period. In the early part of the sample period there are just over 40 active U.S. railroads; by 1889 there are 135 of them; but by 1913 the number is down to 70. The decline in the number of U.S. railroads is due to large-scale bankruptcy and consolidation of the industry in the 1890s.

4. The Geography of Foreign Listings

We organize the railroads into eight geographical regions based on the location of their track. Our regional designations follow those of the Poor's Manuals from the 1890s to 1913. Prior to this period, several of the regions, particularly in the western area of the United States, were combined. For example, in 1870, Poor's organizes railroads into five regions: New England States, Middle States, Western States, Southern States, and Pacific States. We decided to use the later 1880s regional designation as it provides ground for a richer analysis. The regions are defined in the table below:

Region Name	Constituent States
New England (NEWENG)	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Middle (MIDDLE)	Delaware, Maryland, New Jersey, New York, and Pennsylvania
Central Northern (CENNOR)	Illinois, Indiana, Michigan, Ohio, and Wisconsin
South Atlantic (SOUATL)	Florida, Georgia, North Carolina, South Carolina, Virginia, West Virginia
Gulf (GULF) ¹	Alabama, Kentucky, Louisiana, Mississippi, Tennessee
Northwestern (NORWES)	Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wyoming
Southwestern (SOUWES)	Arkansas, Colorado, Kansas, Missouri, New Mexico, Oklahoma, Texas
Pacific (PACIFIC)	Arizona, California, Idaho, Nevada, Oregon, Utah, Washington

We assign each railroad to a region based on the location of the significant mass of their track assets furthest from New York. The Appendix details each of the 193 railroads in the

¹ The Gulf region is defined in the Poor's manuals as Gulf and Mississippi Valley.

sample and their regional designation and also summarizes the distribution of the first foreign listing dates in Amsterdam, Frankfurt, and London.

The U.S. led the rest of the world in railroad investment in this period. By 1884, of the 470,000 kilometers of railway track worldwide, 43% was located in the United States versus 40% in Britain and the other continental European countries, and only 4% in Asia, 2.5% in Australia, 1.5% in Africa, and the remainder in the rest of the Americas.² The U.S. reached this position thanks to the dramatic period of growth in the first half of the sample period, as is apparent from Figure 3, particularly in the two fastest growing regions.

The Poor's Manual reports regional track mileage for the period from 1860 to 1910, the last year that regional mileage statistics are reported. This data are graphed in Figure 3 which highlights the variation in the development patterns across regions. New England grows the slowest at a compound annual rate of 1.6% over the period from 3,834 miles to 8,001 miles. The Middle states and South Atlantic region grow slightly faster at a 3% rate from 8,174 miles to 28,302 miles and at a 3.3% rate from 5,593 miles to 29,052 track miles respectively. By 1910, the Central Northern region is the most developed having grown from 11,800 miles to 100,097 at a rate of 4.6%. The two fastest growing regions are the Gulf/Southwestern region and the Pacific/Northwestern region where track mileage expands at 5% per annum from 5,451 miles to 58,474 and at 13.7% from 233 track miles to 16,074 miles respectively.³

Table 1 provides the frequency distribution statistics for the sample. In Panel A we observe that of the 193 sample firms 75% (144) chose to have securities listed on one of the three European exchanges at some point during the sample period. Of all 292 foreign listings, a large portion were bond listings, with 116 railroads maintaining bond listings in London, 61 in Amsterdam, and 26 in Frankfurt. Foreign ordinary share listings were also common with 42 Amsterdam and 41 London listings. There were no equity listings in Frankfurt. With a dominant

² Poor's Manual of Railroads, 1886, as prepared by Paul Trasenter, Liege School of Mines.

³ In the next version of the paper the authors intend to split out these two regions into four to follow the regional designations used in the table above.

fraction of firms listing both bonds and stocks on foreign exchanges, this hitherto unstudied period of foreign listing activity is orders of magnitude greater than that observed a hundred years later (see Sarkissian and Schill, 2004).

These foreign listings exhibit wide variation in regional representation. The New England railroads tend not to seek listing outside of their local market. Although a large number of New England railroads were listed in Boston, only seven New England railroads listed either in New York or in Europe. In fact, only two New England railroads (the 1873 bond listing of Eastern Massachusetts in London and the 1911 bond listing of New York New Haven and Hartford in London) listed securities abroad during our sample period. Instead, the New England railroads drew on their local capital market in Boston. In contrast, the Gulf and the Southwestern railroads were highly active in listing securities on distant exchanges, with foreign-listing percentages of over 89%. Of the 28 Southwestern railroads, 25 were listed abroad, the majority of which had bond listings in London (17) and Amsterdam (16). The Southwestern and Pacific railroads were the best represented in Germany with 6 Frankfurt listings for each region. The characteristics of our sample are therefore consistent with the discussion in Section 2 above regarding the regional differences in financing patterns among U.S. railroads. We test these tendencies more formally in the next section.

Panel B of Table 1 provides cross-tab analysis on the types of listing. In this panel we observe a strong commonality across London listings. Of the 41 railroads that maintained ordinary shares in London, all but one also had a bond listing. This tendency is not as strong among Dutch listings. Of the 42 railroads that maintained ordinary shares in Amsterdam, just 31 also had an Amsterdam bond offering. The panel also provides data on cross-market listing frequency. For example, of the 62 railroads that maintained bonds listed in Amsterdam, 40 also had a bond listed in London and 18 maintained a bond listed in Frankfurt. Of the 26 railroads that maintained bonds listed in Frankfurt, 16 also had a bond listed in London.

Next, we examine the penetration rate, or the percentage of active sample firms in a given year that maintain their listing on a foreign market. Figure 4 displays the annual penetration rates

of U.S. railroads on European exchanges. Overall, we observe a strong rise in penetration over the sample period with the total fraction of U.S. railroads maintaining foreign listings rising from under 20% in 1866 to 90% in 1913.

The very high penetration rate suggests that having a security listed in European markets became standard corporate policy for U.S. railroads over the sample period. Penetration proceeded relatively steadily with surges over the periods from 1867 to 1880 when the rate rose to over 50% and from 1887 to 1895 when it surpassed the 80% mark. London bond listings are the most important drivers of foreign listing activity during much of the sample period but soften after 1895. Over this later sample period, Amsterdam bond listings see a rise in use. Amsterdam ordinary share listings see a surge in the early 1880s when nearly 30% of U.S. railroads maintain their share presence there. Frankfurt bond listings, on the other hand, have a steady presence over most of the sample but only with 10-15% representation.

In Figure 5, we disaggregate by region annual penetration rates expressed as five-year moving averages. Although a general upward penetration is common across all regions, there is strong variation in the regional patterns. Despite the fact that the Pacific, Southwestern, Northwestern, and Gulf region railroads were among the last U.S. railroads to be built, they nearly always attain the highest European listing penetration rate across regions. For the Pacific region over half of all railroads were listed in Europe for all but the earliest sample year. Southwestern and Northwestern railroads are also early to cross the 50% foreign listing threshold. The Gulf region maintains a 100% penetration rate for much of the latter part of the sample period. In contrast, New England and South Atlantic railroads are slow to list abroad. It is not until 1872 that the first South Atlantic railroad lists in Europe and not until 1889 that the first New England railroad lists.

5. Modeling foreign listing preferences

We explore the regional-host market penetration rates with the following model of foreign listing

$$FLIST(i, j, t) = a_0 + a_1t + a_2t^2 + a_3Default(t) + a_4AMS(j) + a_5FRA(j) + a_nREGION(i, j) + e(i, j, t), \quad (1)$$

where $FLIST(i, j, t)$ is an indicator variable that equals one if a railroad i from region j maintains a foreign listing in year t , and zero otherwise. The model allows for a coefficient on time and the squared value of time to capture the trend in foreign listings observed in the figures. The variable *Default* is the annual default rates for U.S. railroads interpolated from the Figure 1 in Giesecke, Longstaff, Schaefer, and Strebulaev (2011). The variables *AMS* and *FRA* are indicators that equal one if the host market of interest is Amsterdam or Frankfurt, respectively.

We estimate the model using *FLIST* values defined across the two types of securities, bonds and ordinary shares, and present the results of OLS estimates in Table 2. Regressions 1 and 4 include only time and time-squared terms. We observe that both bond and stock listings of U.S. railroads in Europe have a strongly increasing pattern but with a decline in the acceleration of that trend. Next, in Regressions 2 and 5, we also include dummy variables for Amsterdam and Frankfurt listings. For bond listings (Regression 2), London is strongly preferred to Amsterdam and Frankfurt with highly significant negative coefficients on the non-London indicator variables. This pattern does not hold for stock listings (Regression 5) that tend to exhibit no significant overall decline for the Amsterdam exchange.

Finally, in Regressions 3 and 6 of Table 2 we test the full specification (1) for bond and stock listings, respectively. In our specification, we omit the Middle states regional indicator such that this region provides the base value for the coefficient estimates. Hence, the overall coefficient on *AMS* and *FRA* applies to this region. The regression results provide strong evidence of regional variation in foreign listing patterns. The New England railroads are less

likely to list abroad than Middle states railroads, with highly negative and significant coefficients for both types of listings. Again, this appears consistent with the discussion above indicating that the New England railroads had less need for foreign capital. In Regression 3, we observe that the Central Northern and South Atlantic regions also maintain lower foreign bond listing frequency to that of the Middle states, but that of the other regions (GULF, NORWES, SOUWES, and PACIFIC) is substantially higher.

Coffee (1999, 2002), Stulz (1999), and Doidge, Karolyi, and Stulz (2004) characterize bonding motivation for foreign listing such that investors pay more for those firms that commit to improvements in investor protection and information dissemination by accepting the more stringent legal, monitoring, and disclosure standards, associated with host financial markets.

The legal and disclosure requirements of securities exchanges during this period of time were universally low. Listing requirements regarding financial disclosure were minimal, investors were weakly protected and there was no legal liability for false statements on the part of issuers or their advisers either in London throughout the period or in Germany, at least up to 1896 (Burhop, Chambers and Cheffins, 2012). The situation was very similar in Amsterdam (Jonkers, 1996; Veenendaal, 1995). The listing and disclosure requirements may well have been tougher in New York than in London (Michie, 1987: 198; Davis and Galman, 2001: 328-329; Davis and Neal, 2006). However, more recent archival research suggests that there was little difference between the two markets in this period (O'Sullivan, 2012). Since the cross-sectional variation in European institutions was low, we rule out institutional bonding as a primary motivation for railroad foreign listings in our sample.

There are a number of reasons that explain host-market listing choice. Black (1974), Solnik (1974), Stulz (1981), and Errunza and Losq (1985) discuss the implications of segmented capital markets. Merton (1987) and Foerster and Karolyi (1999) discuss the implications of frictions in information flow. For investors and firms in the second half of the 19th century these frictions were tangible and had important effects on capital flows. In particular, we postulate that there was regional variation in the access railroads had to capital within the United States. More

distant regional railroads found it harder to access capital and therefore had a greater need to turn to Europe in order to meet their financial requirements. We use a geographic distance measure to proxy for these frictions.

Our chosen geographic distance measure is the number of miles from each region to the center of U.S. capital formation. The geographic location of the center of capital is determined as follows. First, we identify 20 domestic U.S. stock exchanges that were active during our sample period. We obtain this information from Fietkiewicz and Proffitt (2010).⁴ The earliest U.S. stock exchange included in our sample is the Philadelphia Stock Exchange (opened in 1790), while the last – the Detroit Stock Exchange (opened in 1907). Second, since historical market capitalization data for those 20 exchanges are not available, we proxy the importance of each of those 20 exchanges by the total population in the respective state of each exchange for each year of the sample. State population figures are not available annually but only per decade since 1790. We obtain these data from the United States Census Bureau. The unobservable population data between census dates are filled using cubic spline interpolation method. Then, we determine the value-weighted (population-weighted) latitude and longitude of the U.S. capital center for each year in the sample, using geographic and population data from each of the 20 states that have stock exchanges. In the first year of our sample in 1866, only five exchanges were active, namely, Baltimore Stock Exchange, Boston Stock and Exchange Board, New York Stock Exchange, Philadelphia Stock Exchange, and Milwaukee Grain and Stock Exchange. As a result, the center of U.S. capital had the following coordinates: 40.5550N and 74.5924W (close to Somerville, PA). Over time, the center of U.S. capital moved westwards, and, at the end of the sample in 1913, it was at 40.2603N and 82.2645W (50 miles North-East of Columbus, OH).⁵ We approximate the distance between each railroad and the U.S. capital center by the distance from the center of each respective region of the U.S. to its capital center. The centers of the eight

⁴ Fietkiewicz and Proffitt (2010) report more than 20 stock exchanges, but we exclude all mining exchanges, such as Colorado Springs Mining Stock Exchange and San Francisco Mining Exchange.

⁵ The path of the U.S. capital center is similar to that of the mean mass of U.S. population determined by the United States Census Bureau. However, the track of the U.S. capital center in our sample always stays more northwards and more eastwards than the center of U.S. population.

regions are: Boston for NEWENG, New York for MIDDLE, Chicago for CENNOR, Atlanta for SOUATL, New Orleans for GULF, Billings (Montana) for NORWES, Dallas for SOUWES, and San Francisco for PACIFIC. For our final distance measure, we log-transform the mile distances and call it CC_DIST.

Frictions caused by distance can be ameliorated by familiarity. The intuition is that investors only trade those securities for which they reach some threshold of familiarity. Sarkissian and Schill (2004) propose that measures of familiarity based on cultural, economic, geographic, and industrial proxies play an important role in the foreign-listing choices of firms. During our sample period, the U.S. received large numbers of European immigrants. It is possible that the choice of European listing venue was influenced by the cultural backgrounds of those within the region. For example, among German immigrants if relatively large numbers settled in the Northwestern region, one might expect that railroads from this region might have a preference towards listing in Germany. We therefore relate familiarity in this study to measures of the European immigration rates.

Our measure of immigration is constructed from census microdata found in the Integrated Public Use Microdata Series (IPUMS) at the University of Minnesota. We extract data on the numbers of British, Dutch and German immigrants into the U.S. by individual state for the years 1870, 1880, 1890, and 1900 and aggregate them into our eight defined regions. We then create a variable, Immigration, which measures the proportion of each of the British, Dutch and German immigrants settling in each region at the beginning of each decade.

Figure 6 displays European immigration and foreign listing across U.S. regions. Plot A shows the percentage of British immigrants per region and number of foreign listings in London, Plot B – the percentage of Dutch immigrants per region and number of foreign listings in Amsterdam, and Plot C – the percentage of German immigrants per region and number of foreign listings in Frankfurt. All plots are drawn to the same scale for ease of comparison. We observe that railroads from regions with the largest percentage of British descendants (MIDDLE, CENNOR) prefer listing in London. Likewise, regions with relatively high percentage of Dutch

(CENNOR and NORWES) also have a sizable presence on the Amsterdam Stock Exchange. We find less visible correlation between regions with larger proportions of German settlers and Frankfurt listings. These plots provide some indication that cross-regional differences in the European immigration in the U.S. may impact the preference of U.S. railroads to cross-list on specific European exchanges.

In our model of foreign-listing behavior in this period, we therefore hypothesize that regional distance and familiarity were important determinants of the regional variation in foreign listing penetration and host-market choice of US railroads. Accordingly, we augment Model (1) by adding our CC_DIST and Immigration variables and estimate the following model of regional listing penetration:

$$\begin{aligned}
 FLIST(i, j, t) = & a_0 + a_1t + a_2t^2 + a_3Default(t) + a_4AMS(j) + a_5FRA(j) + \\
 & + a_6IMMIG(k, j, t) + a_6CC_DIST(i, t) + \\
 & + a_7AMS(j) * IMMIG(k, j, t) + a_8FRA(j) * CC_DIST(i, t) + e(i, j, t)
 \end{aligned} \tag{2}$$

where IMMIG(k,j,t) is the proportion of immigrants belonging to group k in region j at time t, and CC_DIST(i,t) is the distance between railroad i and U.S. capital center at time t. The other variables are defined as in Model (1).

The test results are reported in Table 3. We follow similar regression specifications with subsequent estimates for bond penetration and ordinary share penetration. The immigration effect appears non-existent in bond listings preferences but is strongly influential in the case of the equity listing choice, where the coefficient estimate is 0.197 with a t-statistic of 7.08. We speculate that cultural ties may be particularly important for stocks where information frictions are greater compared to bonds.

For both series (Regressions 1 and 3), we find positive and significant coefficient on the CC_DIST variable. The coefficient estimates are 0.10 (t-stat=13.23), and 0.04 (t-stat=7.90) for the bonds and ordinary shares, respectively. Hence, it would appear that the further away the

railroad assets are from the center of U.S. capital, the more likely that railroad will choose to list its bonds and ordinary shares abroad.

To further explore the importance of the distance effect, we interact the AMS and FRA indicator variables with CC_DIST. In the case of bond listings (Regression 2), we see that the further away the railroad is from the U.S. capital center, the more likely it is to list in Continental Europe. In the case of stock listings (Regression 4), the preference for Frankfurt goes down, reflecting the total absence of US railroad equity listings on that market, but Dutch listings retain their relative attraction.

6. Financial effects of foreign listings

Having documented the pattern of their foreign listings, we now examine the hypothesis that financing constraints were eased by the foreign listing policy of U.S. railroads over our sample period. To evaluate this hypothesis we collect data from the Poor's Manuals over the sample period on investment, size, growth, and profitability using the mileage of track owned and leased, railroad cars and engines, total assets, revenue, and operating costs. We use firm foreign securities listing events as an instrument for these firms gaining access to global capital markets (Gozzi, Levine, and Schmukler, 2008).

Table 4 provides summary statistics of the financial statement data by firm-years that are associated with a European foreign listing and those that are not. Railroads with foreign-listed bonds (Panel A) and ordinary shares (Panel B) are larger both in revenues and total assets and enjoy higher operating profit margins, all differences significant at least at the 5% level. Since the size is so different, it will be important to control for size in comparing performance. On the other hand, mean asset growth rates and return on assets are quite similar whether or not the railroad was foreign listed in a given year for both bonds and ordinary shares.

We also observe cross-sectional variation in firm characteristics by region in Table 5. Pacific region railroads are the largest in terms of both revenues and assets; Gulf region railroads

are the smallest. The relatively high asset turnover of the New England railroads generates the highest return on assets at 7.0%. Together with the next-to-lowest asset growth rate of 4.2%, this suggests that these railroads were less likely to be finance-constrained other things being equal. On the other hand, the lower asset turnover of the Pacific and Southwest region railroads pulls down their return on assets to only 4.7% and 3.9% respectively. With relatively high asset growth rates of 5.5% and 6.4% respectively, railroads in these two regions were more likely to be finance-constrained other things being equal.

We confirm these univariate results when we employ a model of investment-cash flow sensitivity following Fazzari, Hubbard, and Peterson (1988). We hypothesize that if financial markets are constrained then there will be a positive relationship between internally generated cashflow, as proxied by ROA, and asset growth. Employing our sample of firm-year observations, our regression specification is as follows:

$$\Delta TA(t) = a_0 + a_1 ROA(t-1) + a_2 X(t-1) + e(t), \quad (3)$$

where ROA is the return on assets defined as total revenue minus operating expenses divided by total revenue and X is a vector of control variables including asset turnover, revenue growth, firm size as defined by $\log(\text{revenue})$, and the Default variable as our time-varying financial conditions measure. In addition, since the U.S. investment bank J.P. Morgan is thought to have mitigated financial constraints faced by railroads during this period (Cantillo-Simon, 1998; Ramirez, 1995), we collect data on railroad connections to Morgan and include this dummy variable.

Table 6 provides the test results for each of the eight U.S. regions moving from east to west across the United States. For clarity of presentation, we only report the coefficient estimates for the ROA variable. We find a strong correlation between growth in total assets (the dependent variable) and firm profitability in every region. There is furthermore a strong regional variation in investment-cash flow sensitivity with increasing sensitivity demonstrated as one moves further away from the U.S. financial center of New York City. Hence, the largest coefficients are reported for the Southwest and the Pacific, 2.59 (t-stat = 9.62) and 3.33 (t-stat = 6.67)

respectively. This pattern clearly suggests that financial market constraints became more acute as railroads were highly dependent on operating profitability to fund asset growth.

We next test how overseas listings help relax that investment sensitivity to current firm cash flow following Lins, Strickland, and Zenner (2005). We add two interaction terms, $BOND*ROA$ and $STOCK*ROA$, to our regression equation (3), that is:

$$\Delta TA(t) = a_0 + a_1 ROA(t-1) + a_2 BOND(t-1) + a_3 STOCK(t-1) + a_4 BOND(t-1) * ROA(t-1) + a_5 STOCK(t-1) * ROA(t-1) + a_6 X(t-1) + e(t) \quad (4)$$

where $BOND$ and $STOCK$ are indicator variables equal to one when a firm lists a bond and ordinary share respectively in Europe. The coefficient on this interaction variable tests the ability of a foreign listing to reduce the sensitivity of asset growth to firm cash flow.

The test results are summarized by region in Table 7. We observe that the interaction term is most important in the regions that showed greater evidence of capital constraints. For bond listings, we find that railroads from the most constrained regions, Southwestern and Pacific, have the most significantly low coefficients on the interaction term, -1.33 (t-stat = -2.83) and -2.00 (t-stat = -2.55), respectively. These coefficients suggest that, compared to the case of not having a foreign listing, railroad asset growth in the Southwestern and Pacific regions is respectively 1.8 and 2.6 percentage points higher when ROA falls by one standard deviation. In the context of asset growth rates averaging 5 percentage points, such a reduction in investment growth is economically important. This gives compelling evidence that foreign listings relax firm capital constraints by reducing the dependency on firm profitability to fund asset growth.

The Northwestern region also generates a negative coefficient on foreign listing in the case of ordinary share listings. However, the regressions on the GULF region and Pacific region growth rates generate two surprising interaction terms with positive coefficients on stock listings. This surprising result is difficult to explain in economic terms. The most likely reason for this result is the small sample size. Outside New England, the Gulf and Pacific regions have the

fewest number of firms, and, unlike most of New England railroads, often are not present in the first part of our sample.

Overall, however, our results provide evidence that the relaxation of financial constraints played a role in explaining the popularity of overseas listings for railroads in remote areas of the United States.

7. Conclusions

The foreign listing decision is a particularly interesting example of the relationship between geography and finance. It is the conscious choice by firm management to position the securities of the firm outside the local market for some benefit. The period of globalization of world capital markets in the second half of the nineteenth century provides an ideal laboratory for understanding the gains from and costs of market integration for U.S. railroad sector hungry for investment capital. In this paper, we aim to understand the effects of foreign listing during a period of time and in an industry when this mattered most.

We document in detail the considerable cross-listing activity of U.S. railroads principally in London, Amsterdam, and Frankfurt. Our results indicate that this activity before 1913 was soundly motivated in that the most capital-hungry railroads from the less developed regions of the U.S. were the most likely to seek a foreign listing. Furthermore, having shown that there is strong evidence of firm capital constraint operating in the railroad sector at that time, we conclude that there is evidence of a reduction in investment-cash flow sensitivity consequent upon a foreign bond listing by those capital-hungry railroads with assets located in such remote areas of the U.S as the Pacific and Southwest.

Appendix

The Appendix lists the names of each railroad organized by regional designation. The first year that a security (bond or ordinary share) is listed in Amsterdam, Frankfurt, or London is also specified. Older names of the railroads are shown in parenthesis.

Railroad	Year of the First Foreign Listing		
	Amsterdam	Frankfurt	London
<u>New England (NEWENG) Region</u>			
Boston and Providence			
Danbury and Norwalk			
Eastern Massachusetts			1873
Housatonic			
New York and New England			
New York New Haven and Hartford			1911
Norwich and Worcester			
<u>Middle States (MIDDLE) Region</u>			
Albany and Susquehanna			1877
Atlantic and Great Western	1864		1865
Baltimore and Ohio	1892		1870
Beech Creek			1894
Buffalo New York Philadelphia	1882	1874	1883
Buffalo Pittsburgh and Western	1881	1881	
Carthage and Adirondack			1893
Central of New Jersey			1875
Delaware and Hudson Canal			
Delaware Lackawanna and Western			
Elmira Cortland and Northern			1895
Erie (Was New York Lake Erie and Western)	1879	1874	1865
Lehigh Valley Railroad			1874
Long Island			1883
Mohawk and Malone			1894
Morris and Essex		1874	
New Jersey Central			
New Jersey United			1869
New York and Canada			1874
New York and Putnam			1894
New York Central			1866
New York Central and Hudson	1881		1868
New York Ontario and Western	1881		1881
New York Pennsylvania and Ohio	1880		1880
New York Susquehanna and Western			1890
Pennsylvania			1865

Perkiomen			1873
Philadelphia and Reading (Reading)	1901		1870
Philadelphia Baltimore and Washington			1903
Pittsburg and Connellsville			1876
Pittsburg and Erie (Little Pittsburg)			
Pittsburgh and West Virginia			1890
Rome Watertown and Ogdensburg			
West Pennsylvania			1888
Western New York and Pennsylvania	1888	1888	

Central Northern (CENNOR) Region

Cairo and St Louis	1872	1874	
Canada Southern	1879		1873
Chicago and Alton			1873
Chicago and Atlantic	1881		
Chicago and Erie (Chicago and Atlantic)	1891		
Chicago and Grand Trunk (Grand Trunk)	1881		
Chicago and Lake Huron (Peninsular of Michigan)			
Chicago and Western Indiana			1884
Chicago Burlington and Quincy	1881	1874	1878
Chicago Peoria and St Louis			
Chicago Rock Island and Pacific	1868	1898	1888
Cincinnati and Springfield			
Cincinnati Hamilton and Dayton	1910		1912
Cincinnati Washington and Baltimore			1884
Cleveland Akron and Columbus	1882		
Cleveland and Marietta			1895
Cleveland and Pittsburg			1882
Cleveland Cincinnati Chicago and St Louis (Cleveland Columbus Cincinnati Indianapolis)	1870		1875
Cleveland Lorain and Wheeling			1895
Cleveland Mount Vernon and Delaware	1870		
Columbus Chicago and Indiana Central (Panhandle)			
Detroit and Milwaukee			1867
Evansville and Terre Haute			
Grand Rapids and Indiana			
Green Bay and Western			
Illinois Central	1856	1892	1865
Illinois Midland			1882
Indiana Bloomington and Western			
Indianapolis and Vincennes			1884
Lake Erie and Western			
Lake Shore and Michigan Southern			1881
Little Miami			
Louisville New Albany and Chicago			1895
Marietta and Cincinnati			1865

Michigan Central	1869		1866
New York Chicago and St Louis			
Ohio and Mississippi			1880
Ohio Southern			
Peoria Decatur and Evansville			
Pittsburgh Cincinnati Chicago and St Louis			
Pittsburgh Cleveland and Toledo			1888
Pittsburgh Fort Wayne and Chicago	1869		1874
Rockford Rock Island and St Louis			
Springfield and Illinois South Eastern			
St Louis and Southeastern			
Toledo and Ohio Central			1893
Toledo Peoria and Western	1886		
Toledo Walhonding Valley and Ohio			1892
Vandalia			1905
Wabash	1881		1881
Wheeling and Lake Erie			1888
Wisconsin Central			

South Atlantic (SOUATL) Region

Atlantic and Danville			1890
Brunswick and Western (Brunswick and Albany)			
Central of Georgia		1887	1897
Chattanooga Rome and Columbus Railroad			1891
Chesapeake and Ohio	1872		1889
East Tennessee Virginia and Georgia	1888		1888
Florida Central and Peninsular	1889		
Georgia			
Georgia Carolina and Northern			1890
Norfolk and Western	1888		1881
Richmond and Alleghany			
Richmond and Danville			1890
Richmond and West Point			
Savannah Florida and Western			1901
Seaboard Airline	1911		1911
South Carolina			
Southern			1895
Virginian			1912

Gulf and Mississippi Valley (GULF) Region

Alabama Great Southern		1879	1878
Alabama Midland			1890
Alabama New Orleans and Texas			1881
Chesapeake Ohio and Southwestern	1882		
Chicago St Louis and New Orleans	1881	1883	1884
Louisville and Nashville	1881	1881	1872

Memphis and Charleston			1883
Memphis and Ohio			1871
Mobile and Birmingham			1888
Mobile and Ohio	1900	1874	
Nashville Chattanooga and St Louis	1894		1893
Nashville Florence and Sheffield			1890
New Orleans and Gulf			1888
South and North Alabama			1874
Texas and New Orleans	1886		
Vicksburg Shreveport and Pacific			1886

Northwestern (NORWES) Region

Burlington Cedar Rapids and Minnesota			1873
Canada Pacific	1883		
Chicago and North Pacific			1892
Chicago and Northwestern	1869		1883
Chicago Great Western	1893		1895
Chicago Milwaukee and St Paul	1872	1880	1875
Chicago St Paul and Kansas	1888		1888
Des Moines and Fort Dodge	1877		
Dubuque and Sioux City			
Great Northern	1890		1897
Iowa Central			
Keokuk and Des Moines			
Minneapolis (Minneapolis and St Louis)	1872		1883
Minneapolis St Paul and Sault Ste Marie	1898		1888
Montana Central	1906		1894
Rock Island (Chicago, Rock Island and Pacific)	1902		1905
St Joseph and Grand Island			1886
St Paul and Duluth			
St Paul and Pacific	1864		
St Paul and Sioux City			
St Paul Minneapolis and Manitoba	1879		1888
Willmar and Sioux Falls			1893
Wisconsin Minnesota and Pacific			1907

Southwestern (SOUWES) Region

Arkansas Central	1872		
Atchison Topeka and Santa Fe	1872		1881
Atlantic and Pacific	1881	1881	
Colorado and Southern	1902		1907
Colorado Midland			1890
Denver and Rio Grande	1871	1881	1880
Galveston Harrisburg San Antonio			1873
Hannibal and St. Joseph			
Houston and Texas (Central)		1891	

Kansas City Fort Scott and Memphis	1901		
Kansas City Mexico and Orient			1907
Kansas City Pittsburg and Gulf	1895		1897
Kansas City Southern	1900		1900
Kansas City Wyandotte Northwestern			1888
Kansas Pacific	1870	1878	
Mexican Central	1902		1887
Missouri Kansas and Texas	1871		1871
Missouri Pacific	1884	1880	
New York Texas and Mexican			1883
Oklahoma Central	1907		
Rio Grande Junction			1890
St Louis and San Francisco	1879	1879	1881
St Louis Arkansas and Texas	1887		1888
St Louis Kansas City and Northern			
St Louis Southwestern	1892		1891
Texas and Pacific			1888
Texas Central			
Union Pacific Lincoln and Colorado	1888		1890

Pacific (PACIFIC) Region

California Pacific	1869	1874	
Central Pacific	1869	1874	1871
Chicago Milwaukee and Puget Sound			1912
Chicago Santa Fe and California			
Northern Pacific	1896	1885	1872
Oregon Rail and Navigation		1888	1893
Oregon Short Line	1897		1898
Oregon Short Line and Utah Northern	1894		1891
Rio Grande Western	1906		1890
San Francisco and North Pacific (Northwestern Pacific)			
Southern Pacific	1880		1900
Southern Pacific of California	1901	1880	1880
Union Pacific	1870	1874	1871
Utah and Northern	1894		

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Table 1
Frequency Distribution of U.S. Railroad Foreign Listings from 1866 to 1913

Panel A: Distribution of foreign listings by U.S. region and European exchanges

	Firms	Firms/Listings	All Listings	London		Amsterdam		Frankfurt	
				Bond	Stock	Bond	Stock	Bond	Stock
Total	193	144	292	116	41	61	42	26	0
NEWENG	7	2	2	2	0	0	0	0	0
MIDDLE	35	27	51	23	10	5	8	5	0
CENNOR	52	34	62	27	9	12	10	4	0
SOUATL	18	12	24	11	4	5	3	1	0
GULF	16	15	24	11	3	5	2	3	0
NORWES	23	18	36	14	4	11	6	1	0
SOUWES	28	25	54	17	7	16	8	6	0
PACIFIC	14	11	39	11	4	7	5	6	6

Panel B: Foreign listings

	LON Bond	LON Stock	AMS Bond	AMS Stock	FRA Bond
Total	116	41	61	42	26
LON Bond		40	40	33	16
LON Stock			22	24	9
AMS Bond				31	18
AMS Stock					15

This table lists the listing frequency of a sample of 193 U.S. railroad companies over the period from 1866 to 1913. Foreign listings are defined as any bond or ordinary share listing of a U.S. railroad on the Amsterdam, Frankfurt, or London stock exchanges. Firm/Listings is the total number of firms with foreign listings. The regional designations follow those of the Poor's Manuals from the 1890s to 1913. We assign each railroad to region based on the location of a significant mass of track assets furthest from New York. The regions are defined in the table in section 4.

Table 2
Foreign Listing Penetration Regression Estimates

	Bond Listings			Stock Listings		
	(1)	(2)	(3)	(4)	(5)	(6)
Time	0.015 (6.55)	0.015 (7.14)	0.015 (9.84)	0.006 (4.62)	0.005 (3.80)	0.005 (4.29)
Time ²	-0.152 (-3.88)	-0.145 (-4.04)	-0.100 (-5.56)	-0.035 (-1.66)	-0.027 (-1.52)	-0.020 (-0.97)
Amsterdam (AMS)		-0.130 (-8.69)	-0.130 (-12.00)		-0.003 (-0.39)	-0.003 (-0.43)
Frankfurt (FRA)		-0.235 (-15.70)	-0.235 (-21.60)		-0.182 (-20.69)	-0.182 (-22.90)
Region = NEWENG			-0.220 (-12.4)			-0.154 (-11.89)
Region = CENNOR			-0.074 (-4.15)			-0.037 (-2.87)
Region = NORWES			0.036 (2.05)			-0.029 (-2.20)
Region = SOUATL			-0.037 (-2.08)			-0.045 (-3.47)
Region = GULF			0.099 (5.56)			-0.054 (-4.16)
Region = SOUWES			0.090 (5.05)			-0.017 (-1.32)
Region = PACIFIC			0.306 (17.2)			0.062 (4.75)
Default	No	Yes	Yes	No	Yes	Yes

This table provides regression estimates of a model of the annual percentage of U.S. railroads from a particular region that are listed on a particular overseas exchange over the period from 1866 to 1913. The variable Time represents the calendar year. The region variables are indicators that equal one if the firm is from a particular region. The regions are defined in the table in section 4. The variables Amsterdam (AMS) and Frankfurt (FRA) are indicators that are equal to one if the listing is on the Amsterdam or Frankfurt exchange, respectively. Default indicates whether or not the Default variable, proxied by is the annual bond default rate interpolated from Giesecke et al. (2011), is included as a control variable. Time² coefficient is reported in 1000s.

Table 3
Foreign listing penetration regression estimates

	Bond Listings		Stock Listings	
	(1)	(2)	(3)	(4)
Time	0.014 (6.90)	0.137 (7.05)	0.004 (3.45)	0.004 (3.55)
Time ²	-0.100 (-3.68)	0.100 (-3.76)	-0.010 (-0.49)	-0.100 (-0.51)
Amsterdam (AMS)	-0.130 (-9.44)	-0.931 (-8.14)	-0.003 (-0.39)	-0.502 (-7.05)
Frankfurt (FRA)	-0.235 (-17.05)	-0.531 (-4.64)	-0.182 (-21.04)	-0.162 (-2.28)
IMMIG	0.055 (1.23)	0.046 (1.06)	0.197 (7.08)	0.193 (7.10)
CC_DIST	0.101 (13.23)	0.048 (4.03)	0.038 (7.90)	0.015 (1.98)
AMS * CC_DIST		0.114 (7.05)		0.071 (7.05)
FRA * CC_DIST		0.042 (2.61)		-0.003 (-0.28)
Default	Yes	Yes	Yes	Yes

This table provides regression estimates of a model of the annual percentage of U.S. railroads from a particular region that are listed on a particular overseas exchange over the period of 1866 to 1913. The regions are defined as in Table 1. Default is the annual bond default rate interpolated from Giesecke et al. (2011). The variables Amsterdam (AMS) and Frankfurt (FRA) are indicators that are equal to one if the listing is on the Amsterdam or Frankfurt exchange, respectively. IMMIG is the proportion of each of British, Dutch and German immigrants respectively settling in each region at the beginning of each decade. CC_DIST is the log number of miles from each region to the U.S. center of capital. The center of capital is determined as follows. We identify 20 U.S. active stock exchanges during our sample period from Fietkiewicz and Proffitt (2010). The importance of each exchange is proxied by the total population in the state where the exchange is located for each year in the sample. Population data are from the United States Census Bureau. Missing population data are interpolated using cubic spline method. We then determine the value-weighted (population-weighted) latitude and longitude of the U.S. capital center for each year in the sample, using geographic and population data from each of the 20 states that have stock exchanges. The regional geographic points used to calculate distance are: Boston for NEWENG, New York for MIDDLE, Chicago for CENNOR, Atlanta for SOUATL, New Orleans for GULF, Billings (Montana) for NORWES, Dallas for SOUWES, and San Francisco for PACIFIC. Interaction variables are indicated with an astericks. Time² coefficient is reported in 1000s.

Table 4
Summary statistics for sample of foreign-listed and non-foreign-listed railroads

Panel A. Bonds

	Foreign Listed Railroads		Non-Foreign Listed Railroads		Diff (t-stat)
	Number	Mean	Number	Mean	
Revenue	1,863	16,801	2,581	6,039	19.96
Assets	1,722	124,105	2,179	43,455	22.03
Asset growth	1,580	0.041	1,868	0.044	-0.88
Op margin	1,843	0.323	2,527	0.311	2.25
ROA	1,630	0.049	1,956	0.051	-1.69

Panel B. Ordinary shares

	Foreign Listed Railroads		Non-Foreign Listed Railroads		Diff (t-stat)
	Number	Mean	Number	Mean	
Revenue	873	25,694	3,571	6,848	22.12
Assets	824	186,217	3,077	50,359	24.13
Asset growth	781	0.042	2,667	0.043	-0.23
Op margin	871	0.341	3,499	0.310	7.50
ROA	806	0.053	2,780	0.049	3.20

This table shows the number of observations and averages of various financial statement data of the U.S. railroad companies from 1866 to 1913. These statistics are reported for both foreign-listed U.S. firms and non-foreign-listed U.S. firms and the t-statistics of their difference is reported in the last column, Diff (t-stat). The data are obtained from the Poor's manuals. Revenue and assets are reported in thousands of U.S. dollars. Panel A reports bond foreign listings, Panel B reports ordinary share listings.

Table 5
Summary statistics of financial statement data of U.S. railroads

	NEWENG	MIDDLE	CENNOB	SOUATL	GULF	NORWES	SOUWES	PACIFIC
Total firms	7	35	52	18	16	23	28	14
Mean firm years	3.1	13.7	22.7	6.5	5.7	7.6	8.8	3.8
Revenue	10.8	15.6	7.9	8.0	5.2	12.4	7.8	21.2
Assets	57.8	91.4	49.5	72.4	32.5	91.6	80.4	219.9
Asset growth	0.042	0.058	0.046	0.050	0.040	0.046	0.064	0.055
Op margin	0.367	0.341	0.294	0.312	0.281	0.360	0.322	0.443
ROA	0.070	0.062	0.057	0.046	0.050	0.051	0.039	0.047

This table shows the summary statistics of financial statement data of U.S. railroad companies from 1866 to 1913. The number and mean values are reported for the firm years in the sample. The data are from the Poor's Manual. The regions are defined in the table in section 4. Revenue and assets are reported in millions of U.S. dollars.

Table 6
Investment-cash flow sensitivity by region

	NEWENG	MIDDLE	CENNOR	SOUATL
Observations	135	609	1,036	295
ROA	0.535 (1.66)	0.247 (1.10)	0.801 (6.81)	0.830 (1.93)
Controls	Yes	Yes	Yes	Yes

	GULF	NORWES	SOUWES	PACIFIC
Observations	254	332	378	162
ROA	1.271 (4.01)	1.11 (4.59)	2.59 (9.62)	3.33 (6.67)
Controls	Yes	Yes	Yes	Yes

This table reports the estimates of a panel regression model following Fazzari et al. (1988). The sample includes firm-year observations in our preliminary sample. The dependent variable is the annual change in total firm assets. ROA equals one minus the firm annual operating expenses divided by total revenue. Control variables that are included in the regression but not reported are: Asset turnover, which equals to total annual revenue divided by total assets, Revenue growth, which is the annual change in total firm revenue, Size which is the natural logarithm of total revenue, a Morgan dummy variable which equals one if the firm maintained an affiliation with J.P. Morgan, and Default, which is the annual default rate of corporate bonds from Giesecke et al. (2011). To simplify the presentation, the table only reports the coefficient estimates for the ROA variable.

Table 7
Impact of foreign listing on investment-cash flow sensitivity

	NEWENG	MIDDLE	CENOR	SOUATL
Observations	135	609	1036	295
BOND	-0.843 (-0.84)	0.002 (0.09)	0.014 (1.45)	-0.038 (-1.10)
ORD		0.014 (0.58)	-0.033 (-1.64)	-0.044 (-0.47)
ROA	0.517 (1.61)	0.376 (1.54)	0.929 (6.93)	0.617 (1.34)
BOND * ROA	17.10 (0.78)	-0.225 (-0.90)	-0.203 (-1.29)	0.931 (1.26)
ORD * ROA		0.355 (1.08)	0.136 (0.51)	1.259 (0.58)

	GULF	NORWES	SOUWES	PACIFIC
Observations	254	332	378	162
BOND	-0.012 (0.46)	-0.025 (-1.29)	0.048 (2.66)	0.089 (3.00)
ORD	-0.188 (-2.14)	0.059 (2.29)	0.014 (0.39)	-0.094 (-2.57)
ROA	1.178 (3.03)	1.148 (4.51)	3.146 (10.05)	3.96 (6.63)
BOND * ROA	0.243 (0.52)	0.397 (1.05)	-1.325 (-2.83)	-2.00 (-2.55)
ORD * ROA	4.32 (3.18)	-0.549 (-1.87)	-0.555 (-0.51)	2.117 (2.68)

This table reports the estimates of a panel regression model following Fazzari, et al. (1988) and Lins, et al. (2005). Our sample includes 3,414 firm-year observations in our preliminary sample. The dependent variable is the annual change in total firm assets. ROA equals one minus the firm annual operating expenses divided by total revenue. BOND and ORD are indicator variables which equal one in any year where the firm maintains a European listing of a bond or ordinary share respectively. Control variables that are included in the regression but not reported are: Asset turnover, which equals to total annual revenue divided by total assets, Revenue growth, which is the annual change in total firm revenue, Size which is the natural logarithm of total revenue, a Morgan dummy variable which equals one if the firm maintained an affiliation with J.P. Morgan and DEFAULT, which is the annual default rate of corporate bonds from Giesecke et al. (2011).

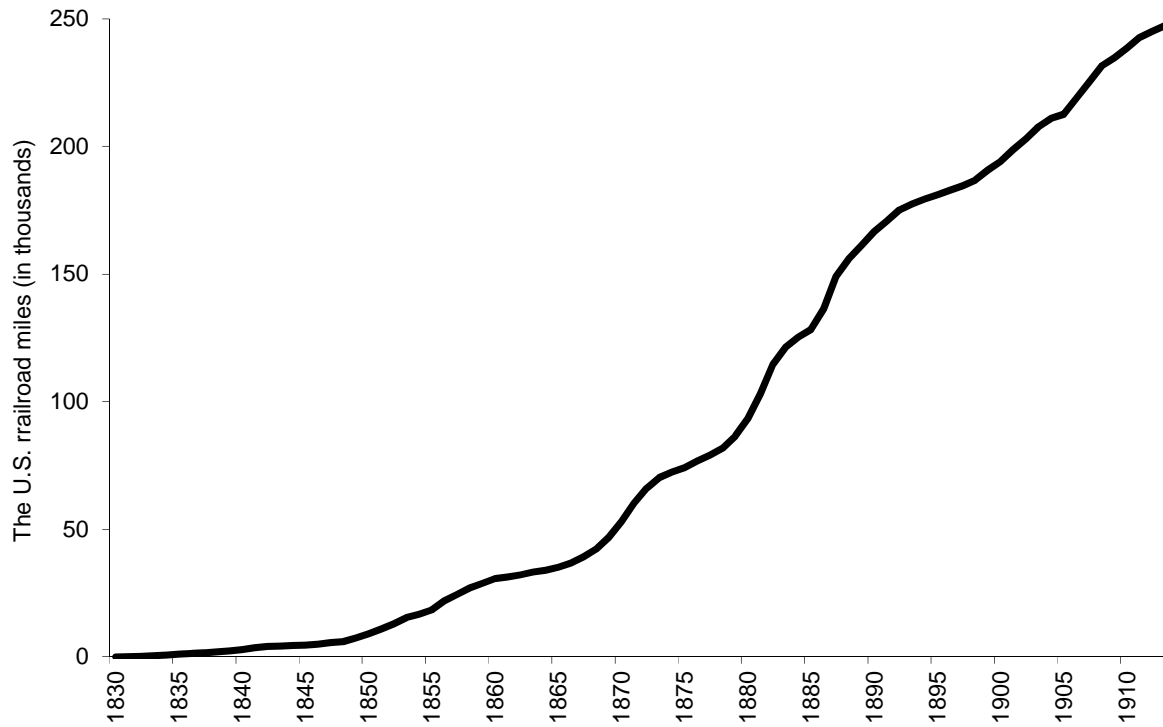


Figure 1. The U.S. railroad miles in operation. This figure shows the total miles (in thousands) of rail in operation in the U.S. based on the annual *Manual of the Railroads of the United States*, authored by Henry V. Poor, over the period from 1830 to 1905 and the *Annual Report on the Statistics of Railways in the United States*, Interstate Commerce Commission over the period from 1908 to 1916.

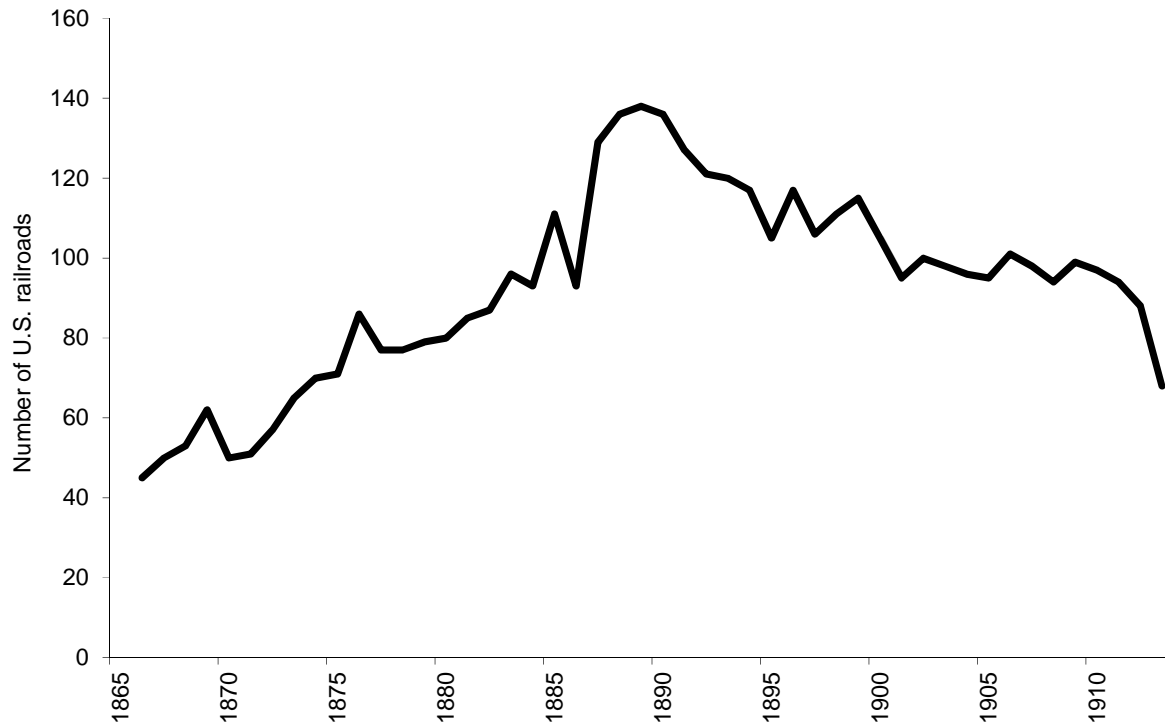


Figure 2. Annual number of U.S. railroads in the sample from 1866 to 1913. Our sample includes any U.S. railroads that had publicly traded securities on any of the following stock exchanges over the sample period: Amsterdam, Frankfurt, London, or New York. We further require that each railroad year be identified within the Poor’s manuals using annual volumes from 1870 to 1914.

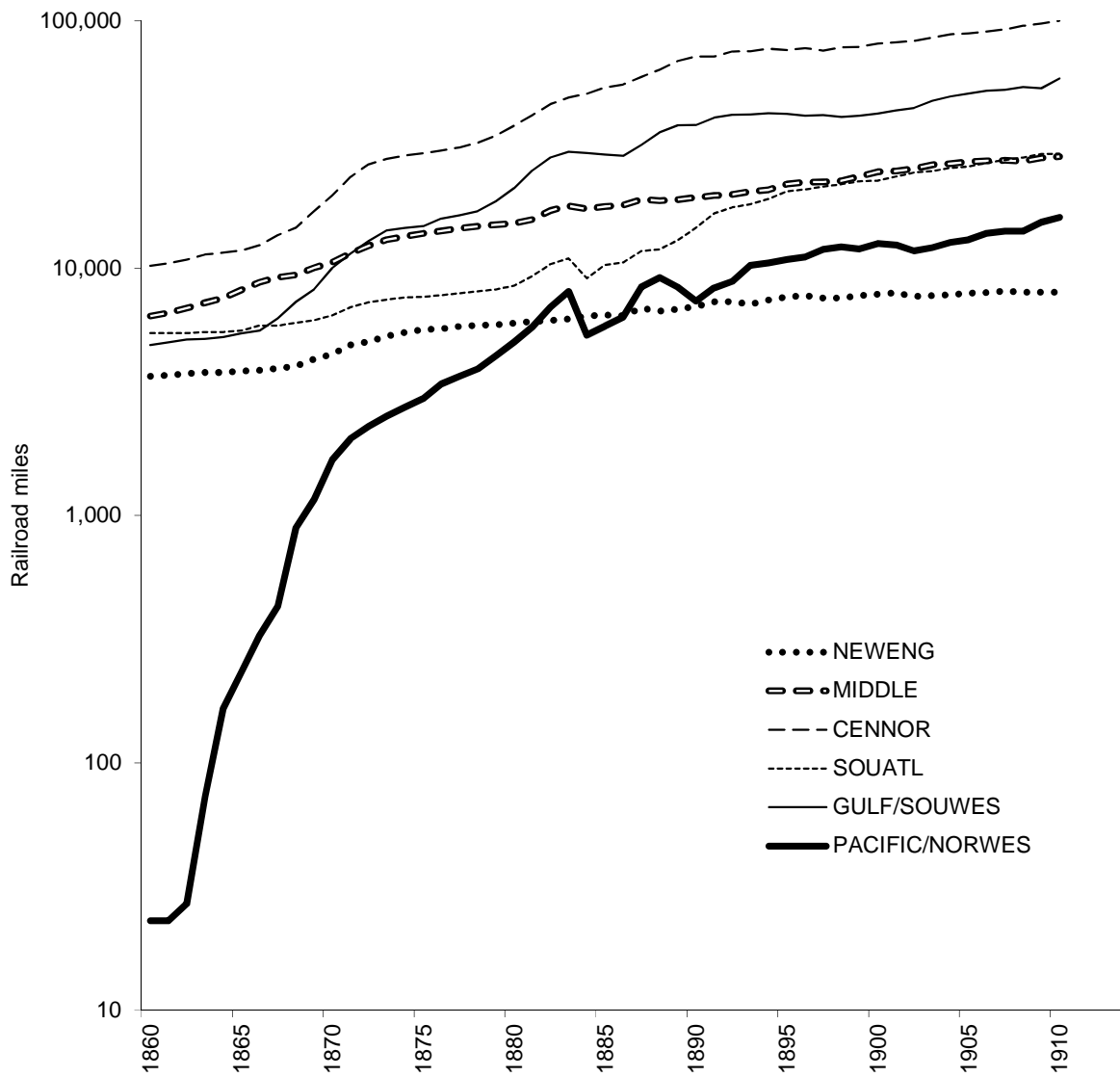


Figure 3. Annual mileage of U.S. railroads by region. This figure shows the annual railroad track miles by U.S. regions based on the Poor's manual from 1860 to 1910. The Poor's manual does not report regional track miles after 1910. Regional definitions are provided in the table in section 4.

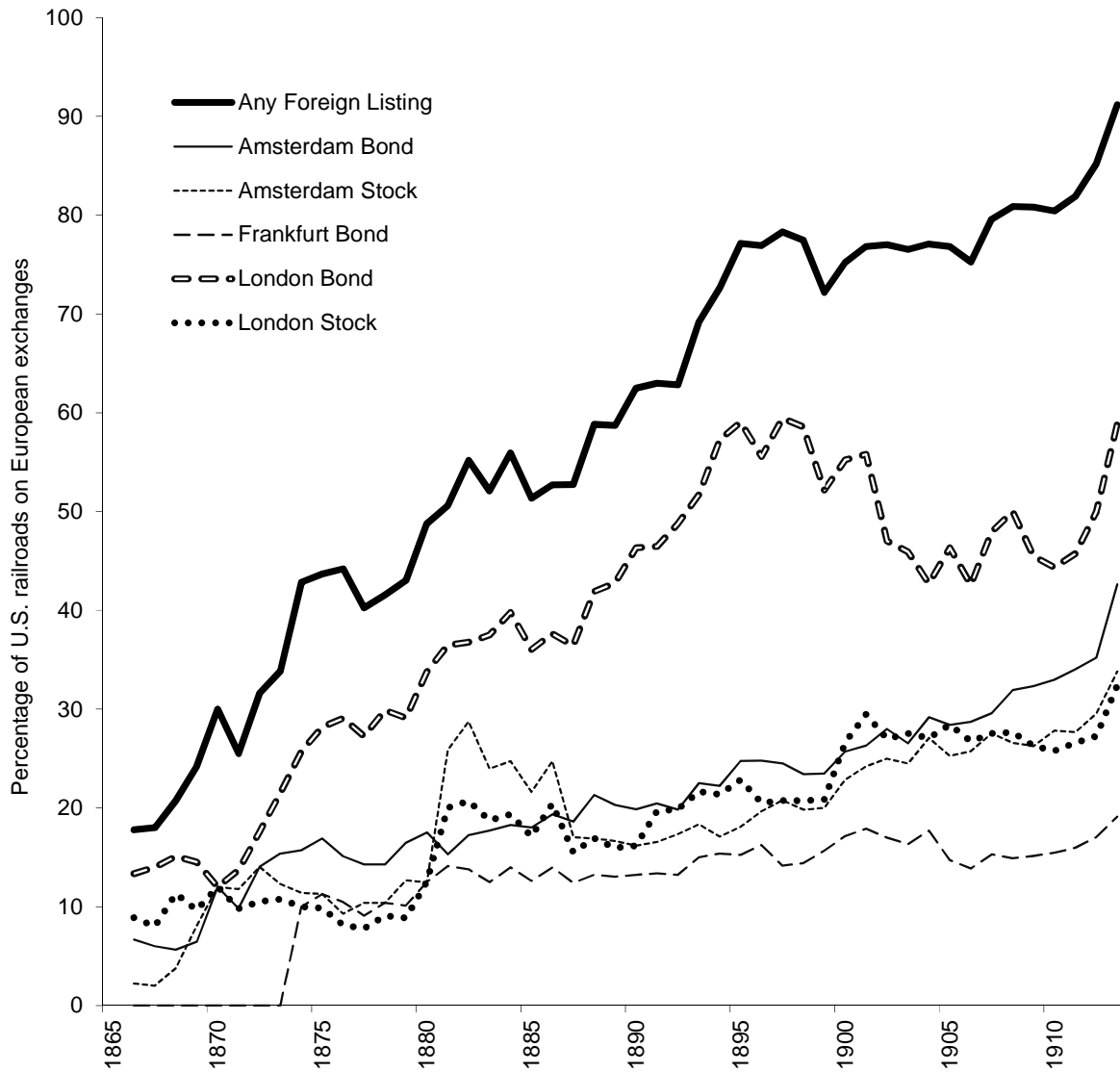


Figure 4. Annual penetration of U.S. railroads listed on European exchanges. This figure shows the annual percentage of U.S. railroads that have foreign listings based on a sample of 193 U.S. railroad companies over the period from 1866 to 1913. Foreign listings are defined as any bond or stock (ordinary share) listing on the Amsterdam, Frankfurt, or London stock exchanges.

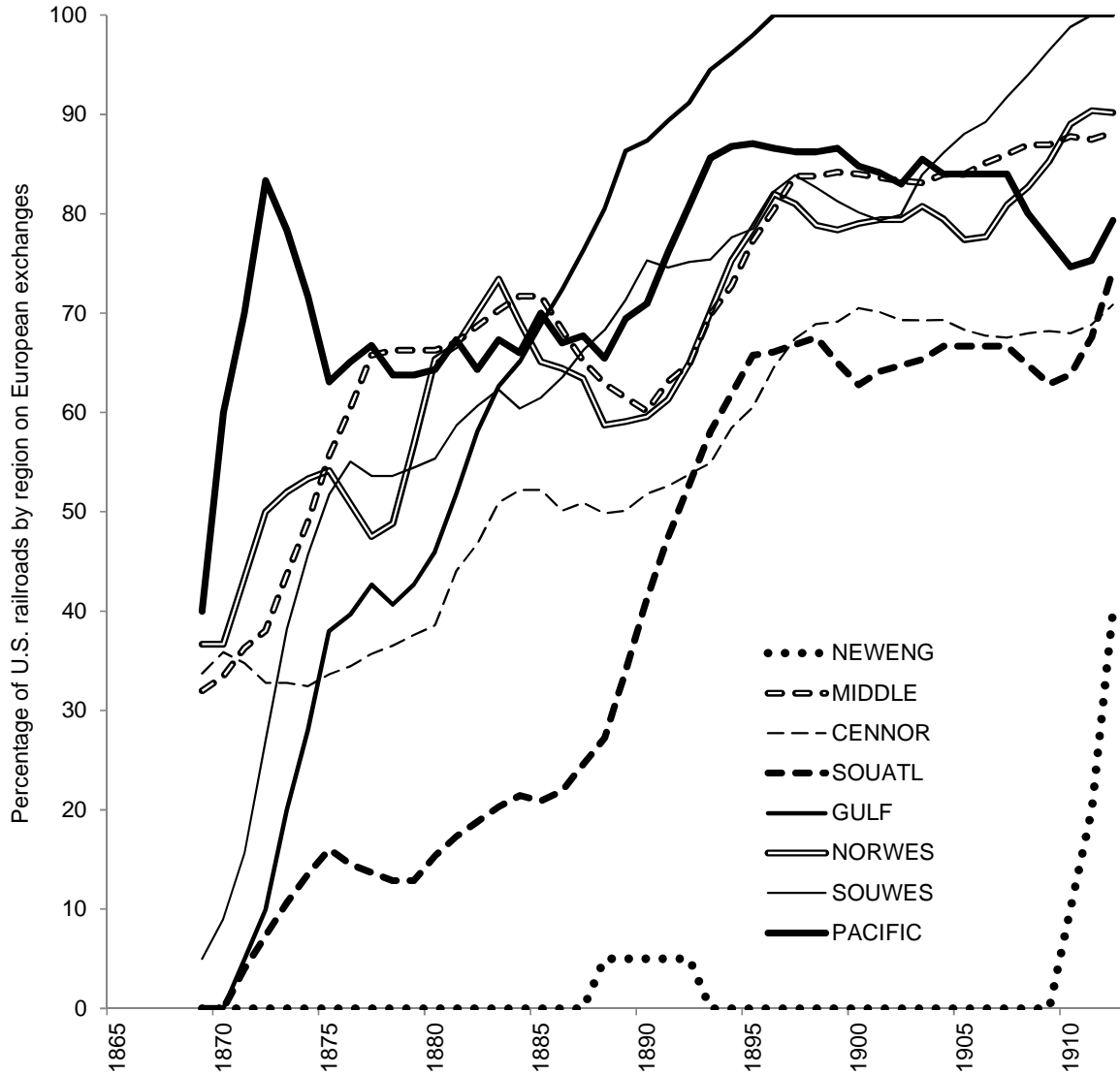
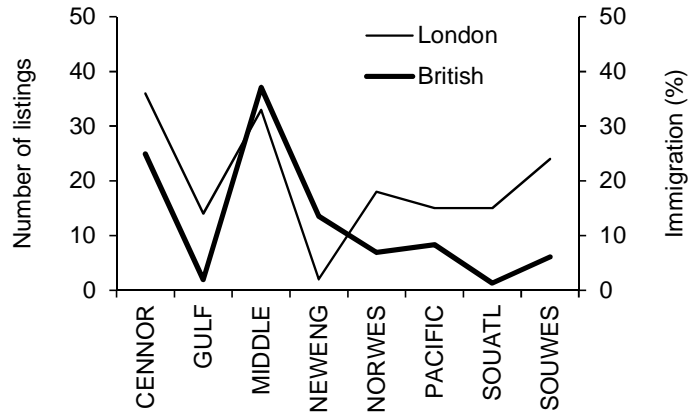
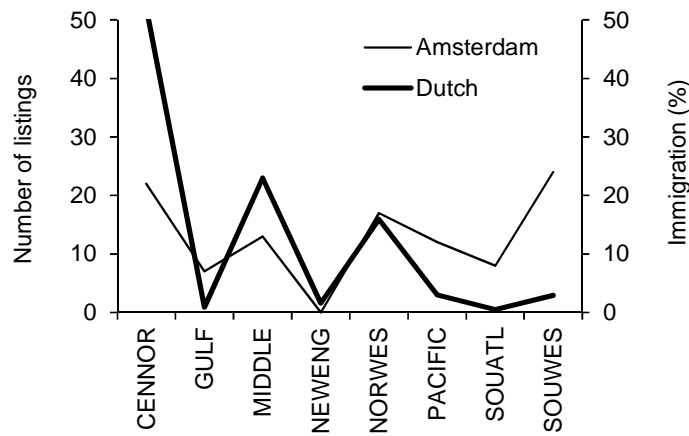


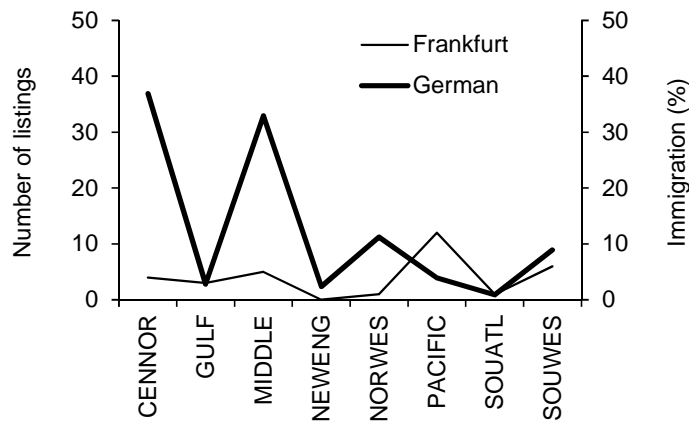
Figure 5. Annual penetration of U.S. railroads by region listed on European exchanges. This figure shows the five-year moving average annual percentage of U.S. railroads by region that has foreign listings on European exchanges over the period from 1866 to 1913. Foreign listings are defined as any bond or stock (ordinary share) listing on the Amsterdam, Frankfurt, or London stock exchanges. Regional definitions are provided in the table in section 4.



Plot A



Plot B



Plot C

Figure 6. European immigration and foreign listing patterns across U.S. regions. This figure shows the relative percentage of European immigrant population across eight U.S. regions and respective number of U.S. foreign listings from each region in immigrants' home country. Plot A reports the numbers for British immigrants and U.S. listings in London; Plot B – for Dutch immigrants and U.S. listings in Amsterdam; Plot C – for German immigrants and U.S. listings in Frankfurt. . Regional definitions are provided in the table in section 4.