Market and Regional Segmentation and Risk Premia in the First Era of Financial Globalization

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Abstract

This paper studies the financing effects of U.S. railroad investments through active issuance of London listed bonds in 1870-1913. The selected industry and time period provide a natural experiment to analyze foreign listing benefits due to the unique geography-specific nature of railroad assets and the precision of cost of capital gains attributable to bond yields. The segmentation premium, which is over 80bps in the early 1870s, declines to almost zero by 1910s, consistent with diminishing through time foreign listing gains as information costs fell and markets became more integrated. The cross-listing significance for both borrowing costs and financing constraints is lower for U.S. railroads from remote areas. These results offer novel evidence on the importance of geography and information costs for global financial opportunities.

JEL Classification: F36; G15; G30; O16

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1. Introduction

In 1913, stock markets were at least as well developed, relative to the size of their respective national economies, as they were at the end of the 20^{th} century (Rajan and Zingales, 2003). This reflected the tremendous growth in international capital flows and early moves toward Transatlantic market integration during the first era of financial globalization over the half century to 1913. Railroads, the leading industry in the United States during this period, were a major beneficiary from international capital flows, and railroad services grew at three times the national income over the seven decades up to World War 1 (WW1, Fishlow, 1966: 626-628).

In this paper, using a hand-collected sample of U.S. railroad companies from 1870 to 1913, and their foreign bond and stock listings on the London Stock Exchange, we examine the role of foreign markets in reducing the cost of capital and in relaxing the financing constraints of domestic firms. Specifically, we focus on variation in the degree of market integration across U.S. regions with the London financial market during our sample period.

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, as well as 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). 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. 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 able to invest

in them and share global risk, thus reducing the cost of capital for the home firm (e.g., see Alexander, Eun, and Janakiramanan, 1988; Foerster and Karolyi, 1999).[1]

Models of market segmentation predict a super risk premium on the cost of capital for firms with rationed investors (Errunza and Losq, 1985; Merton, 1987). The magnitude of such effects, however, has been difficult to assess. Foreign listing is an important instrument that has been used to estimate the impact of market segmentation since it effectively allows a firm to span potentially segmented markets. However, empirical tests conducted using current samples of foreign *stock* listings (Miller, 1999; Foerster and Karolyi, 1999; and Hail and Leuz, 2009) have been criticized for being confounded with other effects of cross-listing such as gains in legal or information disclosure (e.g., Doidge, Karolyi, and Stulz, 2004, 2007) and being contaminated with transitory price reactions (Gozzi, Levine, and Schmukler, 2005; Sarkissian and Schill, 2009, 2014). Furthermore, there is substantial evidence of a reduction in cross-market frictions in recent years making the detection of the benefits of cross-listing even more difficult. Declines in capital market barriers and information costs since the 1980s have facilitated a profound globalization of financial markets.

Similar to the recent past, a dramatic reduction in global information transmission costs from the 1860s with the advent of the telegraph provided the impetus for the creation of the first global financial marketplace.[2] This communication technology shock coincided with a period of massive railroad investment in the United States after the end of the American Civil War. This expansion enabled the development of its Southern and Western regions and the creation of an integrated American product market. Figure 1 shows maps of the United States railroad network

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[1]Other motives for cross-listing include enhancing product visibility (Mittoo, 1992; Pagano, Roell, and Zechner, 2002; Saudagaran, 1988), improving liquidity (Domowitz, Glen, and Madhavan, 1998; Tinic and West, 1974; Werner and Kleidon, 1996), easing foreign firm acquisitions (Gangon and Karolyi, 2009), improving investor protection (Coffee, 1999, 2002; Doidge, 2004; Doidge, Karolyi, and Stulz, 2004, 2007, 2009; Doidge, et al., 2009; Dyck and Zingales, 2004; Hail and Leuz, 2009; Reese and Weisbach, 2002), and familiarity links (Sarkissian and Schill, 2004). Sarkissian and Schill (2009) and King and Segal (2009) show that often cost of capital gains to a foreign listing are transitory.

[2] 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" took 17 hours to transmit. Within a decade, a second, superior cable improved transmission speeds to eight words per minute.

in 1870, 1880, and 1890, illustrating a dramatic increase in the U.S. railroad investment after the end of the Civil War in 1865. According to Davis and Galman (2001), "…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" on a scale which far outstripped the domestic sources of funding. Among foreign investors, British were the most important and held two-thirds of U.S. railroad securities by 1900, far surpassing the next most important investor groups – the Dutch, the Germans, and the French each accounting for only one-tenth.[3] The importance of British investors in turn made the London Stock Exchange a major foreign listing venue for U.S. railroads.[4]

We use a railroad sample containing 198 publicly listed U.S. railroad companies with 117 maintaining listings on the New York Stock Exchange and 115 maintaining listings on the London Stock Exchange between 1870 and 1913. We allocate each U.S. railroad to one of the four regions within the United States: NORTH, CENTRAL, SOUTH, and WEST. Table 1 provides the details of this classification. We show that the foreign listing activity among U.S. railroads in London was very high especially towards the end of our sample period. The foreign listing penetration rate by the end of the period exceeded 60% across all four U.S. regions, and was close to 100% for firms from the NORTH region. This illustrates that in relative terms the tendency to list abroad at that time was much greater in this period than for the much more studied samples from the late 20th and early 21st centuries.[5] The London-listed firms carried out a total of 114 bond and 41 ordinary stock listings. Hence, unlike today, the security of choice in

[3] Total foreign investment in U.S. railroads reached $4.2 billion by 1913 based on par values and represented over one-fifth of all U.S. railroad securities outstanding (Lewis, 1938, figures quoted in Wilkins, 1989: 191-193).
[4] The first public issue of a U.S. railroad in London was in early 1850s, and only six railroads were listed there by the end of the decade (Adler, 1970: 53, 153). The number of London listings grew rapidly after 1870 so that, by 1913, U.S. railroads accounted for half of the optimal portfolio of a British investor in London-listed securities compared to a 37% index weight (Goetzmann and Ukhov, 2006: Table XI). Consistent with this aggregate evidence, Foreign and Colonial Investment Trust, the flagship London-listed closed-end fund, made its largest allocation to U.S. railroad bonds to the benefit of its investment performance (Chambers and Esteves, 2013).
[5] The proportion of foreign to domestic listings in our sample is almost unity, while the same ratio for all developed and emerging markets nowadays is much less than unity.

foreign listings of the late 19th and early 20th centuries was the corporate bond.[6] Our bond yield data covers 62 and 104 of U.S. railroad companies with bonds listed in New York and London, respectively, during the same time period.

Our novel dataset provides a unique natural experiment for the precise identification of the effects of mild market segmentation in financial markets, while avoiding the problems associated with their evaluation in the recent studies stated above. First, since bonds specify the contracted cash payments, bond yields provide more straightforward estimates of implied capital costs than equity returns. Cost of debt estimates are substantially easier to estimate than cost of equity as they are not so dependent on model specification error and risk premium estimation error. Moreover as railroads were highly leveraged, bond finance represented the most important component of the cost of capital. Second, cross-border differences in listing regulations can generate a contaminating effect on the signal value achieved by a cross-listing (Miller and Puthenpurackal, 2002, 2005). Variation in cross-country reporting and legal liability can create important variation in bonding effects to cross listing (Doidge, Karolyi, and Stulz, 2004). However, during our historical period investor protection laws for creditors and shareholders alike were extremely weak on both sides of the Atlantic and listing regulations set down by the London and New York Stock Exchanges were minimal (Coffee, 2001).[7] As such, it is unlikely that any confounding bonding effect arises from a U.S. railroad listing in London during our sample period. Third, product market effects can have important implications for foreign listing (Pagano, Roell, and Zechner, 2002). As a unique feature to our sample, our railroad assets are geographically defined by nature such that there is no export-driven value from listing abroad. Hence, there is little chance that a listing in London creates any contaminating product market effect. A similar argument neutralizes the acquisition facilitation motive (Gangon and Karolyi,

[6] This is consistent with the fact that U.S. railroad funded long-term debt totaled $11.2 billion by 1913 compared to only $7.2 billion in outstanding common stock at par values (Baskin and Miranti, 1996: 146-150) and that between 70% and 90% of the portfolios of foreign investors were allocated to bonds (Wilkins, 1989: 191).

[7] If anything, New York was tougher in screening listing applications than was London (Michie, 1987: 256-257). Similarly, U.S. investment banks in New York were far more active than their British counterparts in London playing the honest broker between U.S. railroads and British investors (Coffee, 2001).

2009). Lastly, the available evidence suggests that differences in liquidity across the two markets cannot affect our analysis. Bid-ask spreads in both New York and London showed no increases in our sample period.[8] Furthermore, spreads were if anything higher in London than New York.

In addition, our experiment provides a clear setting for analyzing the specific effects of market segmentation not only at the aggregate but also regional levels. The United States was still a developing economy in the second half of the nineteenth century and displayed substantial cross-regional variation driven by (i) the country's vast size, (ii) the economic legacy of the Civil War on the South where personal income per capita was around half the national average over the period of our study (Mitchener and McLean, 1999: Table 1) and (iii) the huge importance of the manufacturing belt within the U.S. economy. The manufacturing belt in 1900 accounted for four-fifths of the U.S. industrial output with only one-sixth of the land area and covered 18 states in total (Klein and Crafts, 2012). All but two states were in the NORTH and CENTRAL regions. Hence, it is in this sense that we refer in the rest of the paper to the NORTH and CENTRAL regions being more developed than SOUTH and WEST. These regional differences within one country may result in a certain degree of within-country segmentation of capital markets and, thus, help in estimating the cost of capital and financing opportunities specific to each region.

Merton (1987) discusses the effect of information segmentation in creating a super risk premium in capital costs. Since bonds were the quoted security of choice among railroads and their investors, we proxy the cost of capital by bond yields. Consistent with Merton's premise, we observe strong time-series and cross-regional effects in the super premium among U.S. railroads and are able to identify precise magnitudes for this premium. We observe that the bond yields of U.S. railroads listed in New York compared to those of U.S. railroads listed in London displayed a super premium which averaged over 15-22 basis points (bps) during our sample

[8] We collected the bid-ask spreads, where available, of U.S. railroads traded in New York and London in our sample for years 1890 and 1913 from the *Commercial and Financial Chronicle* and the *Stock Exchange Daily Official List* respectively. Bid-ask spreads were not quoted for all stocks. Whilst New York spreads were published throughout our sample period for New York, London spreads were not published before the late 1880s. The average spread on U.S. railroads in London was 2.4% in 1890 and 2.8% in 1913. The bid-ask spreads in New York were around 2% in the same two years.

period controlling for railroad and bond characteristics. This premium is economically meaningful in the context of U.S. railroad bond yields averaging around 5%. Moreover, as the New York and London capital markets became less segmented, the premium declined from at least 89bps at the beginning of our sample period to almost zero by the end of the sample period. Although there is strong time-series variation in the gains to listing abroad, we find, however, that while a listing of U.S. railroads in London lowers their bond yields, it does not offset the borrowing cost risk during economic and financial crises in the United States.

We use a control sample of British railroads to measure the magnitude of the gain to British investors. We observe that in the early 1870s U.S. railroads traded in London at an average premium of at least 155bps above that of British railroads, suggesting that British investors were able to gain 1.55% by investing in cross-listed U.S. bonds. The magnitude of this premium also implies that the total difference between bond yields on British railroads in London and U.S. railroads in New York was at that time 244bps (155bps + 89bps). By 1910s, the yield differential had largely disappeared. In fact, at the end of the sample period U.S. railroads listed in London traded at lower yields than their British counterparts.

In cross-sectional tests we show that the bond yield premium reduction associated with cross-listing exhibits significant regional variation. The cost of capital reduction is smaller for railroads located in the more remote regions of the United States. For a matched sample of firms that are traded in both New York and London, a London listing, relative to that in New York, provides a reduction in average bond yield for NORTH and CENTRAL railroads that is 15bps larger than for SOUTH and WEST companies. This cross-regional difference remains the same if not even larger in panel tests when controlling for various firm and bond characteristics.

Finally, we find significant regional differences in the investment to cash flow sensitivity of cross-listed firms. Foreign listings of railroads from the NORTH and CENTRAL regions of the United States decrease their firms’ investment to cash flow sensitivity, implying that the presence of these firms in London reduces their financing constraints (see Fazzari, Hubbard, and Peterson, 1988; Lins, Strickland, and Zenner, 2005). This stands in stark contrast to foreign

listings of firms from the SOUTH and WEST regions. Thus, we conclude that foreign listings for NORTH and CENTRAL railroads helped reduce not only their borrowing costs but also their overall financing constraints. By contrast, such benefits were either more modest or non-existent in the case of SOUTH and WEST railroads. Proxying information costs by telegraph rates between major U.S. regional centers and London, we suggest that this finding is related to the greater information costs faced by London investors in assessing and monitoring railroads in the more remote regions of the United States. In addition, the cultural ties between these regions and Britain, as proxied by the relative importance of British immigration to the United States in this period, could have contributed to investors obtaining better information and monitoring their investments in a less costly manner.

Our study, similar to Foerster and Karolyi (1999), makes two broad contributions. First, it extends the literature on market segmentation, whilst using a novel setting, which alleviates the influence of various confounding effects present in other studies on cost of capital estimation. Second, it adds to the literature on Merton's (1987) investor recognition hypothesis, but it shows directly how information asymmetries between otherwise similar firms and different pools of investors affect their cost of capital and financing opportunities in the cross-section.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 estimates the impact of U.S. railroad bond listings in London on the cost of capital. Section 4 examines the relation between U.S. bond listings in London and financial constraints. Section 5 offers explanations for the observed time-series and cross-regional patterns in financial opportunities of U.S. railroads. Section 6 concludes.

2. Data and Summary Statistics

2.1. Cross-Listing Data

Our data set of 198 U.S. railroad firms is constructed from a variety of sources. To make data collection tractable, we concentrate on the large and medium sized railroads publicly listed

on the New York Stock Exchange or London Stock Exchange between 1870 and 1913 and described in Henry V. Poor's *Manual of the Railroads of the United States*.[9] These volumes were published annually from 1870 to 1914. Our sample therefore excludes small U.S. railroads for which the Poor's *Manuals* had no entry or missing financial information or which were listed on a regional exchange. Our sample is somewhat larger than that used by Benmelech (2009) to exploit differences in U.S. railroad track gauges in order to study asset salability and debt maturity over a comparable but shorter time period, 1868-1882.[10]

Table 2 provides the frequency distribution of U.S. railroad bond and common stock listings in New York and London by geographic region. With the development of the United States, the regional definitions in the Poor's *Manuals* change over our sample period. Regional definitions used in 1913 don't apply well to the early part of the sample period when the western United States was undeveloped. The regional designations we establish in Table 1 are derived by aggregating the eight regions used by the Poor's *Manuals* at the end of the sample period into four broader regional classifications. For example, the New England and Middle states are combined to form the NORTH region. We assign each railroad to one of our four regions based on the location of the mass of its track assets. Out of the 198 railroads, WEST provides the greatest number of companies, 68, while SOUTH provides the fewest, 36.

We observe that bonds were the most popular type of security for railroads across all U.S. regions when listing in London. Among the 117 railroads quoted on the New York Stock Exchange, 106 firms chose to list at least one bond compared to only 72 listing their common stock. Similarly, among the 115 U.S. railroads quoted on the London Stock Exchange, 114 firms elected for at least one bond listing and only 41 listed their common stock. To further illustrate

[9] The New York Stock Exchange was the dominant venue in the United States for all publicly listed companies, including transportation stocks, and the transportation industry became the dominant industry on the exchange since the early 1850s (e.g., Fietkiewicz and Proffitt, 2010).

[10] Note that during this period some U.S. railroads also listed their bonds and stocks in Amsterdam and, to a lesser extent, their bonds in Frankfurt. We focus in this paper on listings on the London Stock Exchange given that it was the dominant overseas foreign listing market in our sample period.

the point, in the last column of the table for each stock exchange venue, we give the ratio of firms that list a bond before a stock in each market.

Figure 2 charts the total number of U.S. railroads listed in New York, U.S. railroads cross-listed in London, and British railroads listed in London over our sample period. Both the number of U.S. railroads listed in New York and British railroads listed in London increase steadily from the 1870s to the 1890s before flattening out around 45-50 listings and then decreasing marginally toward 40 by 1913. As for U.S. railroads cross-listed in London, their number continues to increase until 1900 passing the 70 mark, and then drops sharply to around 40 by 1913. These end-of-sample decreases in the number of railroads on both exchanges were due largely to consolidating mergers within the industry.

Figure 3 presents the annual penetration of U.S. railroads with a London listing by region over the whole sample period. We define annual penetration as the proportion of U.S. railroads in a given region with a bond listing in London in a given year. As expected, due to their earlier emergence, the railroads from the NORTH region were the undisputed leaders in the pursuit of a London listing for most of the 1870s and 1880s, and retained their lead in the second part of the sample period. In contrast, the penetration rate of railroads from SOUTH remained below 20% up until the late 1880s, probably reflecting the economic legacy of the Civil War for this region. Their penetration rate only caught up with that of other regions in the 1890s but then rose to almost 100% by 1913, similar to NORTH. Finally, the penetration rates of railroads from the CENTRAL and WEST regions of the United States ranged between those of NORTH and SOUTH before 1890 and remained below NORTH thereafter. The strong upward trend in London listings among railroads from all U.S. regions seem to sugget substantial benetits to them resulting from their presence on the world's preeminent stock exchange before WW1.

2.2. Firm and Bond Yield Data

For each railroad and year in our sample period, we also collect from the Poor's Manuals data on the mileage of track owned and leased and five firm characteristics: revenue (Revenue),

total assets (Assets), revenue growth (Revenue growth), asset growth (Asset growth), and the return on assets (ROA). Revenue growth (Asset growth) is the current total revenue (assets) divided by the lagged revenue (assets) less unity. ROA is the difference between total revenue and operating costs divided by the total assets. In total, we collect 4,730 firm-year observations.

The bond yield data covers 104 U.S. railroad companies with bonds listed in London during the same sample period. Our two control samples consist of bond yield data for those U.S. railroads with bonds listed only in New York and for British railroads with bonds listed in London. The latter sample includes all British railroads with a bond listed on the London Stock Exchange over our sample period according to the *Investors Monthly Manual*.[11] The bond yield (Yield) is defined as the coupon payment divided by the prevailing end of year bond price. To minimize the impact of financial distress effects, yields are only calculated on bonds with prices of 75 and above. U.S. railroad bond prices listed in New York are taken from the *Commercial and Financial Chronicle* and those in London from the *Investors Monthly Manual* and the *Stock Exchange Daily Official List*. British railroad bond prices listed in London are taken from the *Investors Monthly Manual*. Where a railroad has more than one bond listed, we select the bond with the longest maturity. We also estimate the bond yield spread (Spread), which equals the bond yield less the prevailing yield on the long-dated British government bond.

We consider several control variables in modeling the behavior of bond yield spreads. Some investors preferred the security of bonds paying interest and principal in gold or sterling, rather than in U.S. dollars, despite the dollar being on the gold standard other than during and shortly after the Civil War.[12] Hence, we employ two indicator variables. The first indicator (Gold) equals unity if the principal and the coupons on the bond were payable in gold, and zero otherwise; the second (Sterling) equals unity if the principal and the coupons on the bond were

[11] Exclusions for comparability are confined to seven very small railroads.

[12] Although the U.S. had adopted a bimetallic standard for its currency in 1792, the mint ratio overvalued gold such that by 1849 the United States was on a *de facto* gold standard. Convertibility was suspended during the Civil War. The dollar de facto returned to the gold standard in 1879 and was exchangeable at a fixed exchange rate of $4.86/£1 (Bordo and Rockoff, 1996: 401). In some specifications we control for this change in regimes by adding a pre-1879 fixed effect, OffGold, and an interaction variable between the OffGold and the Sterling variables.

payable in pounds sterling, and zero otherwise. The third variable is the Default dummy, which is equal to unity in any year that a railroad is in default on its bonds, and zero otherwise. A fourth variable is the time left to bond maturity (Years-to-Maturity). Since the bonds in our sample are effectively all secured bonds, we do not include a variable to capture variation in borrowing costs for secured versus unsecured debt. The data on the Gold, Sterling, and Years-to-Maturity variables are drawn from the price lists, the (London) *Stock Exchange Year Books* and the Poor's *Manuals*.[13]

We also collect data on control variables for British railroads listed in London. The assets of each British railroad are defined as the total of book debt and equity capital as reported in the *Investors Monthly Manual* and the *Stock Exchange Year Book* and converted to U.S. dollars at an exchange rate of USD4.86 = GBP1. The Years-to-Maturity is defined as 100 years for all British bonds as virtually all were issued as perpetual bonds (Coyle and Turner, 2013).

Table 3 summarizes the statistics of railroad company characteristics and their corporate bond data. Panel A shows the number of observations and average firm and bond characteristics across U.S. regions. First, we observe wide cross-regional differences in firm characteristics. The railroads from NORTH are the leaders in revenue and ROA, while those from WEST – in revenue growth. Most notable is that railroads from SOUTH and WEST post the lowest ROA and the lowest asset turnover (Revenue/Assets). Railroads in these relatively remote U.S. regions appear to be operated less efficiently than in the more developed NORTH and CENTRAL regions. Railroads in the WEST region have the largest asset base since, given the region's size, they require more track. Second, we also see cross-regional variation in bond characteristics. Railroads from NORTH have the lowest average bond yields and, as a result, the lowest spreads over British Government bonds. Companies from SOUTH and WEST have a larger proportion of their bonds granting investors the right to be paid in gold than those from NORTH and

[13] We also considered a dummy if a railroad had its bonds underwritten by J.P. Morgan since such a connection was thought to have both lowered the cost of capital (Simon, 1998) and mitigated financial constraints during this period (Ramirez, 1995). These results are not reported since we found no evidence of any benefit from a Morgan connection.

CENTRAL (0.57 and 0.62 versus 0.39 and 0.28). This implies that other things equal securities from SOUTH and WEST were possibly viewed as more risky and this was a way of making their bonds more attractive to investors. This is substantiated in the case of railroads in the WEST that experienced a higher rate of defaults (0.016) than did those from the other regions.

Panel B of Table 3 provides the number of observations and the average firm and bond characteristics for U.S. railroads listed in New York and London, as well as for British railroads listed in London. First, railroads cross-listed in London are much larger than their counterparts listed solely in New York. This difference is similar to more recent patterns in cross-listing placements (see Sarkissian and Schill, 2012). Not surprisingly given the vast distances travelled in the United States, the size of U.S. railroads listed in London was considerably larger than that of British railroads.

Second, we observe wide differences in bond characteristics by listing venue. The proportion of U.S. railroad bonds redeemable for gold was much larger among those listed in London (0.65) than among railroads listed only in New York (0.21). This suggests that British investors were more concerned than their American counterparts about holding stakes in companies operated on American soil, possibly due to informational or monitoring disadvantages. Currency hedging has been identified as a reason for the issuing of foreign currency-denominated debt (see Kedia and Mozumdar, 2003; Henderson et al., 2006). However, in our sample, none of the New York listed bonds and only 17% of the London listed U.S. bonds were sterling-denominated. This suggests that only a few railroads were looking to hedge any currency exposure arising from the importation of British track or rolling stock. In the case of defaults, there is no difference between bonds listed in New York and London. The average maturity of U.S. railroad bonds listed in London was more than 20% higher than those listed in New York.

Finally, the bond yield spreads of U.S. railroads listed in New York (219bps) are higher than those cross-listed in London (191bps), and both are higher than the corresponding yields of British railroads on the London Stock Exchange (54bps). This finding is similar to that of Massa

and Zadora (2014) that yield spreads on international bonds issued by companies from the United States and other countries in the recent past are lower than those on their domestic offerings. In the next section, we examine whether differences in yield spreads are robust to controlling for firm and bond characteristics.

3. Financial Effects of Bond Listings in London

3.1. Preliminary Evidence

We start by examining the time-series and cross-regional dynamics of yields on U.S. railroad bonds that are traded in the United States and Britain, as well as bond yields of British railroads in London. Table 4 shows the results. Panel A presents bond yields for U.S. railroads listed in New York and London as well as British railroads listed in London, both for each year in the sample period and for each calendar decade. It also shows the annual difference in yield spreads between New York and London listed U.S. bonds (New York – London), between London listed U.S. bonds and British bonds (London – British), as well as the statistical significance of these differences. We observe a decrease in bond yields for all U.S. railroad listings. In the 1870s, the borrowing costs for U.S. railroads listed in New York displayed an average premium of 56bps over U.S. railroads listed in London. By the 1890s, this average premium declined to 12bps, before rising modestly in 1910-1913 to 28bps. The premium relative to British railroads dropped 211bps from 278bps (56 + 222bps) in the 1870s by to 67bps (28bps + 39bps) by the end of our sample period.

In Panel A of Table 4, the membership of the sub-samples of railroads with listings in New York and London are time-varying. Therefore, the observed decrease in the New York – London yield spread over time could be due to any changes in the composition of each sub-sample. To alleviate this concern, we examine the behavior of bond yield spreads for a sub-sample of 27 railroads where we find a bond listed in both New York and London at the same time. Note that in most cases this is not the same bond. Figure 4 graphs the frequency

distribution of the number of such railroads over time (Panel A) and then the average New York – London bond yield spread for this sub-sample at the end of each year (Panel B). Given the very small number of observations in the early years, we begin charting the bond yield spread in Panel B from 1879 when the number of railroads listed on both exchanges reached four. The main take away from this figure is that the New York – London spread for this matched sub-sample of bond listings confirms the existence of a super risk premium for U.S. railroad bonds without a London listing.

Panel B of Table 4 summarizes the average bond yield spreads across exchanges for U.S. railroads from each of the four regions. Recall that where a railroad has more than one bond listed, we select only the bond with the longest maturity. The CENTRAL region has the largest number of railroads with New York bond listings (25), while the WEST region has the greatest number of London bond listings (35). There are only nine SOUTH railroads listed in New York and 22 listed in London. The panel also shows the difference in spreads between New York and London listed U.S. railroad bonds. Across all U.S. regions, bond yields in London are significantly lower than those in New York. Moreover, we also observe cross-regional differences in average yield spreads between New York and London traded bonds. The spreads for NORTH and CENTRAL (44bps and 37bps, respectively) are three-to-four times large than those for SOUTH and WEST (13bps and 9bps, respectively). This pattern suggests that the value of a foreign bond listing in reducing borrowing costs varies across U.S. regions: Railroads from developed NORTH and CENTRAL regions benefit more than those from remote SOUTH and WEST.

Of course, the regional sub-samples of railroads with listings in New York and London in Panel B of Table 4 are also subject to compositional changes over time. These changes may, therefore, account for the observed cross-regional differences in bond yield spreads between the two stock exchanges. We address this concern by analyzing the same sub-sample of 27 railroads with bonds listed in both markets and conducting matched-pair tests of the difference in the mean of New York – London bond yield spreads by region. Given the small sample size, we

aggregate our four U.S. regions into two: NORTH and CENTRAL (NORTH/CENTRAL) and SOUTH and WEST (SOUTH/WEST).

Table 5 reports the number of firms that maintain bond listings in both New York and London for each of the two combined regions and their respective bond yields in percentage points. It also shows the number of matched pair observations, where our dataset includes yields for bonds in both markets in the same year, as well as the test for the difference in matched pair means with the corresponding t-statistic. New York listed bonds of railroads from NORTH/CENTRAL exhibit a 17bps risk premium compared to their simultaneously listed London listed bonds, whereas this risk premium is absent in the case of railroads from SOUTH/WEST. The matched pairs test reveals that this average difference in the New York – London spread of 15bps is, in spite of the small sample size, significant at almost the 5% level. Hence, controlling for firm-specific effects, the value of cross-listing in London in terms of the reduction in risk premia is larger for NORTH and CENTRAL railroads than for those from SOUTH and WEST. In the next sub-section, we further test this relation for our entire sample of railroads in the presence of various controls.

3.2. Regression Results

In our first set of regressions, we test for the impact of a London bond listing on bond yield spreads (Spread) after accounting for both firm and bond characteristics.[14] Therefore, we construct an indicator variable, FBond, which is equal to unity if a firm has a bond foreign listing in London, and zero otherwise. Other independent variables include all railroad characteristics from Table 3.

Table 6 reports our test results using the full sample of U.S. railroads over the whole sample period for various sets of control variables. It also reports the number of observations and the adjusted R-squared for each regression. Panel A provides the estimation output for U.S.

[14] We also tested for the impact of a stock listing on yield spreads, but it did not materially change our results.

railroads only. Regression (1) contains FBond, Gold, Sterling and Default, dummies, as well as year fixed effects. First of all, the coefficient on FBond is negative and very significant, which confirms our earlier observation that a bond listing of U.S. railroads in London markedly reduces their bond yield spreads. Regressions (2-6) replace year fixed effects with a time trend, Time. Its coefficient is strongly negative confirming the finding of Table 4 that the average yield spread of New York listed U.S. railroad bonds is decreasing during our sample period. The coefficient on the Gold dummy in Regressions (1) and (2) indicates that investors are prepared to accept a lower yield on the bonds of those railroads that commit to pay in gold. In contrast, the Default dummy in Regressions (1-4) suggests that bonds have suffered prior defaults were forced to offer investors a higher yield. Regression (3) includes two additional controls: Years-to-Maturity and Assets. The coefficients on both these variables are negative and significant implying that companies with longer maturity bonds and larger companies, which are probably perceived as representing better quality firms, enjoy lower borrowing costs. Their inclusion draws statistical significance away from the Gold variable. In Regression (4), replacing Assets with Revenue does not materially affect any of our other estimates. Regression (5) additionally controls for ROA and Revenue growth. As might be expected, firms with higher ROA and growth in revenues experience lower bond yields and spreads. In this specification, the Default variable becomes insignificant.

In spite of the addition of various controls, the FBond coefficient loses neither statistical nor economic significance in any of the remaining specifications in Table 6. On average, a foreign bond listing decreases the bond yield spread by 15-22bps. In Regression (6), we estimate the level of New York – London bond yield spreads at the beginning of our sample period as well as the time trend in this spread by including the interaction term, FBond × Time. The negative FBond coefficient indicates that the New York – London bond spread starts at 41bps, and the positive coefficient on the interaction term suggests that this spread declines by 0.8bps per year over the next 43 years of the sample. Both coefficients are highly significant.

In Regression (7) we further refine this analysis by including yearly effects interacted with FBond to estimate the foreign listing gain in each year of our sample. We report these coefficients only for the first three and last three years of the sample. We find that the interaction coefficient for FBond in the early 1870s is below -0.89. In contrast, this coefficient for the 1910s is substantially reduced in magnitude with values effectively close to zero. In Figure 5, we report all 44 coefficients on the annual interaction terms from Regression (7), taken with the negative sign, to illustrate the magnitude of the listing gain across the whole sample period. Despite some large swings in annual estimates, the figure suggests that the gains to listing in London declined consistently over time. These results document and highlight the significant reduction which took place in the cost of capital benefit of a London listing as the New York and London markets became less segmented.

In Panel B of Table 6, we repeat our estimation of bond yield spreads this time comparing London listed U.S. railroads to London listed British railroads. We use a sample of British railroads to measure the magnitude of the extra yield available to British investors from investing in U.S. railroads traded in London. We denote British railroads with a dummy variable. The set of controls now is limited to that available for British railroads reported in Table 3. Consistent with the results of Table 4, British railroads have significantly lower average bond yields in the first two regressions, and this discount diminishes over time, as shown in Regression (3). Bonds denominated in pounds sterling enjoy lower spreads. Furthermore, longer bond maturity and larger firm size are also important for lowering bond yield spreads of U.S. railroads issuing bonds in London. In Regression (4) we capture the British railroad discount over time. Similar to Regression (7) in Panel A, we add yearly effects interacted with the British railroads variable, and again report these estimates for the first and last three years of the sample period. We observe that in the early 1870s U.S. railroads traded in London at an average premium of at least 155bps above that of British railroads. Hence, at the beginning of our sample period British investors were being compensated with a substantial yield premium for investing

in London listed U.S. railroad bonds.[15] By 1910s, that premium had declined sharply such that U.S. railroads in London traded at lower yields than their British counterparts.

Next, we consider whether foreign listings, besides helping reduce borrowing costs to U.S. railroads, are also able to provide them with some diversification gains in weak economic and financial conditions. Table 7 shows the results of such tests for two Crisis proxies: economic and financial. The first two regressions are estimated for the economic crisis variable, Recession, which is an indicator variable equal to unity if a given year contains at least six months defined as contraction months according to the NBER (Business Cycle Expansions and Contractions). The last two regressions are estimated for the financial crisis variable, Default Rate > 5%, which is an indicator variable equal to unity if Default Rate is greater than 5% in the prevailing year. Default Rate is taken from the annual default rates for U.S. railroads reported by Giesecke, Longstaff, Schaefer, and Strebulaev (2011) in their Figure 1. The set of control variables across all regressions is the same as in Regression (3) of Table 6.

All regressions in Table 7 show a positive and significant coefficient associated with the Crisis dummy, irrespective of whether it relates to economic recession or financial distress. This implies, as expected, that during economic and financial downturns U.S. bond yield spreads increase. In economic terms, recessions increase bond spreads by about 11bps, while financial distress increases them by 4bps. Regressions (2) and (4) also include an interaction term, FBond × Crisis, but in both estimations its coefficient is insignificant. These regressions therefore suggest that foreign bond listings in London do not help in mitigating the negative effects of increased borrowing costs during economic and financial crises. This result is consistent with more recent studies, which find that during crisis times there is no cost of capital benefit in their local markets for foreign firms cross-listed in the United States (see Chandara, Patrob, and Yezegel, 2009).

[15] Furthermore, in the early 1870s the total difference between yields on British railroad bonds in London and U.S. railroad bonds in New York was at least 244bps (155bps + 89bps).

Similar to Table 6, we examine further the relation between yield spreads and London bond listing but this time at a disaggregated regional level. Table 8 reports the test results. Panel A provides regression estimates for each of the four U.S. regions. In this panel, besides the main variable of interest, FBond, the set of independent variables includes all other bond characteristics, a time trend, and a firm size proxy, Assets.

We find that the coefficient on FBond is negative and significant for the NORTH and CENTRAL regions and is positive and significant for the SOUTH. That is, the railroads from the NORTH and CENTRAL regions enjoy on average lower bond yield spreads from a listing in London than those from the SOUTH and WEST. We also note that the Gold dummy lowers yield spreads in three of the four regions where railroads issuing such bonds are found. The Default dummy indicates that those railroads in default suffered increased yield spreads, particularly in the SOUTH. However, and most importantly, the main result of Table 8 Panel A is consistent with the documented patterns in cross-regional yield spread differences in Panel B of Table 4 and suggests larger borrowing cost benefits for the two U.S. regions (NORTH and CENTRAL) that are less distant from London.

Since we were unable to quantify the regional differences in yield spreads or provide any statistical tests of these cross-regional differences in Panel A of Table 8, we next run pooled regressions across all regions in Panel B. The control variables are the same as in Panel A. In Regressions (1) and (2), our benchmark region is NORTH, and the coefficients on all dummy variables for the other three U.S. regions as well as any interaction terms are measured relative to the corresponding variables involving NORTH. From Regression (1) we observe that the coefficients on the interaction terms, SOUTH × FBond and WEST × FBond, are positive and significant, implying larger yield spreads for railroads from these regions listed in London relative to those from NORTH. In terms of economic significance, they are larger by 36bps and 46bps, respectively. Bonds from the CENTRAL region command even smaller foreign listing premium (17bps) than those from NORTH. Thus, we again see that the geographic distance

between London and the SOUTH and WEST regions of the United States reduces substantially any positive impact that foreign listings in London may have on borrowing rates.

In Regression (2) of Panel B, we make treat the combined NORTH/CENTRAL region as the benchmark region. We do this because of the importance of the U.S. manufacturing belt within the U.S. economy during our sample period. Concepts in economic geography have been employed to understand how it is that industrial activity can become heavily concentrated and flourish in a single region (Krugman, 1991; Dougal, Parsons, and Titman, 2014). The manufacturing belt is a prime example of such a regional concentration and all but two of the 18 states fell into the NORTH and CENTRAL regions. The other two states were in the SOUTH (Virginia and West Virginia) and none were in the WEST regions (Klein and Crafts, 2012). Therefore, the coefficients on all terms involving the other two U.S. regions, SOUTH and WEST, are in relation to the combined NORTH/CENTRAL region. Our results are qualitatively the same as in regression (1); however, the point estimates on SOUTH × FBond and WEST × FBond are now larger in magnitude and even more significant.

We note that the distribution of railroads in terms of company size is uneven across U.S. regions (Table 3, Panel A). It could be that instead of picking up differences related to geographic distance between each region and London, our estimates reflect differences in the familiarity of U.K. investors with railroads proxied by their size. To account for this possibility in Regression (3) we add a size control, Large, which is a dummy equal to unity if the firm's assets are larger than the median for each year and region, and is zero otherwise. It appears that large railroads experience a greater reduction in bond yields from cross-listing than their smaller counterparts by about 24bps. In addition, the estimated coefficients on the regional interaction terms here are similar to those in Regression (2). Thus, Table 8 highlights the large differences in borrowing costs across U.S. regions.

4. Cross-Listings and Financing Constraints

In the previous section, we found that firms from the less developed SOUTH and WEST regions of the United States enjoyed less of a benefit in terms of borrowing costs from a London bond listing than did firms from its NORTH and CENTRAL regions. In this section, we examine whether the cross-listing decision of U.S. railroads impacts their financing constraints in general, and whether there are any cross-regional differences. In order to do so, we employ the model of investment-cash flow sensitivity following Fazzari, Hubbard, and Peterson (1988). We hypothesize that if firms are financially constrained then there will be a positive relation between internally generated cash flow, as proxied by ROA, and total asset growth, ΔTA. Employing our sample of firm-year observations, our regression specification is as follows:

$$\Delta TA_t = \alpha_0 + a_1 ROA_{t-1} + \boldsymbol{\delta X}_{t-1} + e_t \,, \qquad (1)$$

where $\boldsymbol{\delta}$ is a coefficient vector for a set of control variables $\boldsymbol{X}$ that includes: Revenue, Revenue growth, Asset turnover, which equals the total annual revenue divided by the total assets, Default, which measures time-varying financial conditions for each railroad, and the Default Rate from Giesecke et al. (2011).[16]

We assess how overseas listings may change investment sensitivity to cash flow by following Lins, Strickland, and Zenner (2005) and augment equation (2) with our foreign bond listing dummy variable, FBond, and an interaction term, FBond × ROA, as follows:

$$\Delta TA_t = \alpha_0 + a_1 ROA_{t-1} + a_2 FBond_{t-1} + a_3 FBond_{t-1} \times ROA_{t-1} + \boldsymbol{\delta X}_{t-1} + e_t \,, \qquad (2)$$

The coefficient on the interaction variable, FBond × ROA, tests the ability of a foreign listing to reduce the sensitivity of asset growth to firm cash flow. We should mention that Kaplan and Zingales (1997) have questioned the finding that greater investment to cash flow sensitivity of a

[16] We are unable to include an estimate of Tobin's Q as one of our control variables since over one-third of our U.S. railroad sample did not have a publically listed common stock.

firm suggests a more binding financing constraint. However, the time-series nature of our tests which compares investment sensitivities of U.S. railroads pre- and post-listing in London makes their critique less of a concern in this setting.[17]

Table 9 reports the investment-cash flow sensitivity results by U.S. region. The intercepts in all panels of this table are not reported. Panel A gives the determinants of total assets growth of U.S. railroads across the four regions based on model (1). First, we observe that the coefficient on the main variable of interest, ROA, is consistently of the same correct sign and statistically significant across all regions. Second, ROA appears to be two-to-three times larger for SOUTH and WEST railroads than for those from NORTH and CENTRAL. Among the control variables, only Revenue growth and Asset turnover are statistically significant for all or most of the regions, while the other three controls appear unimportant.

In Panel B of Table 9 we analyze how a foreign bond listing in London affects a railroad's total asset growth using model (2). The control variables are the same as in Panel A, but we do not report their estimates. We observe that foreign listing placements are positively related to changes in the asset growth of CENTRAL and WEST railroads. More importantly, for only two regions, NORTH and CENTRAL, the coefficient on the interaction term, FBond × ROA, is negative and significant at the 5% and 1% levels respectively. This result implies that a foreign listing in London reduces investment to cash flow sensitivity for NORTH and CENTRAL railroads but does not affect much that for SOUTH and WEST railroads. In the former two regions, the coefficients on the interaction term suggest that, compared to the case of not having a foreign listing, railroad asset growth in the NORTH and CENTRAL regions is, respectively, 0.3 and 0.5 percentage points higher when ROA falls by one standard deviation. In the context of asset growth rates averaging less than five percentage points, such a reduction in investment growth is economically important. Thus, Table 9 highlights substantial differences in

[17] See Lins, Strickland, and Zenner (2005, p. 121).

the reduction of financing constraints across U.S. regions from placing their respective railroad bonds in London.

5. Explaining Regional Patterns

In our tests we observe two distinct patterns in the financial benefits accruing to U.S. railroads from a cross-listing in London during the 1870-1913 period. The first is the time-series trend that shows a decrease in bond yield spreads across all exchanges and a substantial reduction in the super risk premium associated with a listing in New York as opposed to London. The second is the cross-regional difference in borrowing costs and financing constraints. How might we explain these patterns?

British investors in U.S. railroads in the second half of the nineteenth century experienced considerable asymmetric information problems in the absence of any meaningful investor protection. Three out of ten London listed U.S. railroads in our sample fell into default during the 1873-75 and 1893-95 crises periods.[18] Following Merton (1987), changes in the information and monitoring costs borne by investors over time and the differences in such costs across U.S. regions can help us understand the observed patterns. These costs can be proxied by the telegraph communication rates, depicted in Figure 6, from London to the centers of our four U.S. regions: New York (NORTH), Chicago (CENTRAL), Atlanta/New Orleans (SOUTH), and San Francisco (WEST), between 1870 and 1913.[19] The rates are the cost of transmitting the first 10 words of any message. The source data for London to New York is published in the *Historical Statistics of the United States: Colonial Times to 1970 Part 2, U.S. Department of Commerce*, 1975, based on documents from the U.S. Federal Communications Commission and other sources specified in the report. The rates from New York to Chicago and San Francisco, as well

[18] Anthony Trollope's famous novel, *The Way We Live Now*, published in 1875 and based on such experiences, described the great fraud inflicted upon London investors by the promotion of a fictitious western railroad.
[19] While the main centers for NORTH, CENTRAL, and WEST can be easily defined, there is no clearly defined center for the SOUTH region. Therefore, SOUTH is represented by both Atlanta and New Orleans.

as the equally-weighted average of the rates from New York to Atlanta and New Orleans are from Honsowetz (2014). The rates from London to Chicago, San Francisco, and Atlanta/New Orleans are estimated by adding the London – New York rate to the rate between the destination city and New York. The data points for missing observations are interpolated.

First, the decline in telegraph rates across the period graphed in Figure 6 is dramatic and highlights the extent of the communication technology shock. This decline coincides with the reduction in the super risk premium of New York listed railroads as measured by the bond yield spread differential compared to London listed railroads from above 80bps in 1870 down to zero by 1913. In fact, the majority of the decline in both bond yield spreads and telegraph rates occurs in the first half of our sample period. This relationship between risk premia and communication costs is clearly suggestive of the increasing market integration between the United States and the United Kingdom during this time period.

Second, Figure 6 also shows a clear ordering of the relative costs of information transmission to and from London across the four U.S. regions reflecting both geographic and economic distance from Britain. The cheapest rate is to New York, while the most expensive is to San Francisco. Furthermore, the ordering of these differences in communication costs across the four U.S. regions is preserved through time, notwithstanding the overall downward trend in rates. The implication is that it was cheaper for British investors to access information regarding their investments in railroads from the more proximate NORTH and CENTRAL regions than from the relatively distant SOUTH and WEST. Moreover, the NORTH and CENTRAL regions were synonymous with the manufacturing belt, as discussed in Section 3, and thereby possessed an enormous economic power in that period. This power in turn had a direct effect on the strength of NORTH-CENTRAL trade relations with the United Kingdom. Sarkissian and Schill (2004) argue that in an international setting economic distance between markets may play a larger role in investments than geographic distance. Overall, this is consistent with evidence in Coval and Moskowitz (1999, 2001) who show that investors prefer investing in more proximate securities where they enjoy some information advantage.

Third, it is also possible that the regional variation in information costs reflects variation in cultural factors across the regions. Cultural factors have been found to be related to financial and economic outcomes. For instance, Grinblatt, and Keloharju (2001) find the existence of cultural and language preferences in investors' portfolio holdings. Moreover, Algan and Cahuc (2010) show a causal effect of trust on economic growth using the inherited trust of descendants of U.S. immigrants as a measure of inherited trust in their country of origin. Consequently, those U.S. regions with a larger number of British immigrants are more likely to enjoy stronger ties to their home country, other things equal. Figure 7 shows British immigration into each of the four U.S. regions normalized by the total regional population for each decade between 1870 and 1910. The immigration data are taken from the census data of the Integrated Public Use Microdata Series (IPUMS) at the University of Minnesota. We extract data on the numbers of British immigrants into the United States by individual state for the years 1870, 1880, 1890, 1900, and 1910 and aggregate them into our four defined regions. We can see that NORTH was most settled by British immigrants. The CENTRAL region was the second most important U.S. destination for British immigrants. The suggestion is then that the stronger cultural linkages of the NORTH and CENTRAL regions with the United Kingdom could help British investors in U.S. railroad securities from these regions minimize any information gaps.

In sum, the economic attractions of the NORTH and CENTRAL regions may have reinforced the relatively lower information costs and stronger cultural ties between these regions and the United Kingdom. As a result, each of these factors may have contributed to the decision by British investors to pay up for London listed railroad bonds from those regions.

6. Conclusions

The period from 1870 to 1913 represents the first era of financial globalization. During this period, the world of finance exhibited two distinctive features. First, communication costs fell dramatically between the major regional centers across the United States, on the one hand,

and Britain, on the other. Second, capital markets became more integrated as British investors made investments in the capital-hungry United States on a scale not previously seen. The railroad industry during this time period offers a unique natural experiment to understand the potential benefits accruing to U.S. firms pursuing an overseas listing in London in terms of both lower costs of capital and reduced financing constraints. In this paper, we examine the extent of both of these cross-listing benefits using firm-level data on U.S. railroads listed in New York and London during this period.

We find significant time-series and cross-regional differences in the impact of foreign bond listing activity on railroad borrowing costs. Our main test results are consistent with Merton (1987). We observe substantial foreign listing activity in London among U.S. railroads from all regions that peaked by 1900, with bonds being the preferred security for foreign placements. New York listed U.S. railroads exhibited a super risk premium compared to London listed U.S. railroads of above 80bps in the beginning of 1870s. Over the next 40 years this premium declined to practically a zero level. Over our sample period, U.S. railroads listed in London also migrate from yields of about 155bps above comparable British railroads to trading at yields below their British counterparts. These declines reflect a substantial reduction in market segmentation between the United States and the United Kingdom over this period. We find, however, that a London cross-listing was of little help to U.S. railroads in mitigating the impact of either type of crisis on their cost of capital.

Importantly, we observe that the impact of a London listing on borrowing costs of U.S. railroads varied across regions. London listed railroads from the SOUTH and WEST regions exhibited higher yield spreads than those from the more developed NORTH and CENTRAL regions. The SOUTH and WEST regions also delivered a more modest decline in yield spreads compared to the NORTH and CENTRAL regions, when their railroads cross-listed overseas.

Last, we examine whether the decision to cross-list relieved any financing constraints on investments experienced by U.S. railroads during our sample period. We find that whilst all railroads had some financial constraints, railroads from the SOUTH and WEST regions of the

United States displayed the greatest sensitivity of asset growth to cash flow implying less profitability. Moreover, among U.S. railroad listings in London, those from the NORTH and CENTRAL regions became substantially less sensitive to cash flow, but those from SOUTH and WEST received no such benefit.

Thus, our findings show in a novel historical setting how the integration of two of the major capital markets in the world over a century ago provided financial opportunities to U.S. industry faced with a shortage of savings and eager to finance its huge capital investment program. Yet, we find that gains arising from a foreign listing in terms of a lower cost of capital or a relief of financing constraints differ across regions. We suggest that these regional differences in the gains from cross-listing were inversely related to differences in information costs proxied by regional differences in telegraph communication rates and cultural links with Britain. Hence, the benefits of a foreign listing are negatively related to information costs between the firms and their investors.

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Table 1
Classification of U.S. regions

Region Name	Constituent States
NORTH:	
New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Middle	Delaware, Maryland, New Jersey, New York, Pennsylvania
CENTRAL:	
Central Northern	Illinois, Indiana, Michigan, Ohio, Wisconsin
SOUTH:	
South Atlantic	Florida, Georgia, North Carolina, South Carolina, Virginia, West Virginia
Gulf & Mississippi Valley	Alabama, Kentucky, Louisiana, Mississippi, Tennessee
WEST:	
Northwestern	Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wyoming
Southwestern	Arkansas, Colorado, Kansas, Missouri, New Mexico, Oklahoma, Texas
Pacific	Arizona , California, Idaho, Nevada, Oregon, Utah, Washington

This table classifies all U.S. states into four U.S. regions using regional designations of the Poor's Manuals from the 1890s to 1913. Railroad companies are allocated to a region based on the location of the mass of their track.

Table 2
Frequency distribution of U.S. railroad listings

		New York Listings				London Foreign Listings			
	Total Firms	Firms	Bond	Stock	Bond First	Firms	Bond	Stock	Bond First
NORTH	40	26	20	18	0.42	25	24	9	0.93
CENTRAL	54	36	34	20	0.64	25	25	9	0.88
SOUTH	36	16	15	11	0.88	22	22	7	0.92
WEST	68	39	37	23	0.78	43	43	16	1.00
Total	198	117	106	72	0.67	115	114	41	0.94

This table provides a frequency distribution of the types of securities listings for a sample of 198 U.S. railroads on the New York and London Stock Exchanges from 1870 to 1913. The sample is defined as all U.S. railroads with a bond or ordinary stock listing in New York or London based on the *Commercial and Financial Chronicle* and the *Investors Monthly Manual*. The regions are defined in Table 1. We assign each railroad to a region based on the location of a significant mass of track assets furthest from New York. Bond First denotes the proportion of firms which listed bonds in the respective market prior to equities.

Table 3
Summary statistics of characteristics of U.S. and British railroads

Panel A: Sample characteristics for U.S. railroads by region

		Mean				
	Obs.	All	NORTH	CENTRAL	SOUTH	WEST
Firm characteristics:						
Revenue	4,483	9.97	14.36	7.28	6.16	11.61
Assets	4,145	73.3	85.2	47.5	50.1	102.1
Revenue growth	4,151	0.088	0.079	0.069	0.087	0.113
Asset growth	3,822	0.035	0.037	0.032	0.034	0.039
ROA	3,867	0.046	0.057	0.047	0.043	0.041
Bond characteristics:						
Gold	3,522	0.46	0.39	0.28	0.57	0.62
Sterling	3,522	0.10	0.26	0.05	0.11	0.00
Default	3,522	0.011	0.007	0.009	0.009	0.016
Years-to-Maturity	3,347	35.1	37.8	30.6	35.2	36.7
Yield	3,522	5.04	4.87	5.10	5.21	5.05
Spread	3,522	2.03	1.85	2.09	2.21	2.04

Panel B: Sample characteristics for U.S. and British railroads by listing location

	U.S. Railroads					
	in New York		in London		British Railroads in London	
	Obs.	Mean	Obs.	Mean	Obs.	Mean
Firm characteristics:						
Revenue	3,016	12.62	2,192	16.00		
Assets	2,870	87.55	2,103	116.1	1,421	89.7
Revenue growth	2,884	0.073	2,089	0.080		
Asset growth	2,731	0.034	1,995	0.035		
ROA	2,755	0.049	2,010	0.047		
Bond characteristics:						
Gold	1,542	0.21	1,980	0.65		
Sterling	1,542	0.00	1,980	0.17		
Default	1,542	0.012	1,980	0.010		
Years-to-Maturity	1,530	31.6	1,817	38.0	1,688	100
Yield	1,542	5.22	1,980	4.91	1,688	3.58
Spread	1,542	2.19	1,980	1.91	1,688	0.54

Table 3 (continued)

This table provides summary statistics for the sample of 198 U.S. railroads and 59 British railroads from 1870 to 1913. The U.S. sample is defined as all U.S. railroads with a bond or stock listing on the New York or London stock exchanges over this period of time based on the *Commercial and Financial Chronicle* and the *Investors Monthly Manual*. The British sample includes all but the smallest British railroads with a bond listed on the London Stock Exchange over the sample period based on the *Investors Monthly Manual*. Panel A gives the summaries across U.S. regions, and Panel B – across stock exchanges. The regions are defined in Table 1. The variables are defined as follows: Revenue is the total revenue reported in the Poor's Manuals in millions of U.S. dollars. Assets is the total assets reported in the Poor's Manuals in millions of U.S. dollars. ROA is the difference of total revenue and operating expenses divided by the total assets. Revenue (Asset) growth is, respectively, the current total revenue (assets) divided by the lagged revenue (assets) less unity. Spread is the yield less the prevailing yield on the long-dated British government bond. Where a railroad has more than one bond listed, we select the bond with the longest maturity. Gold is an indicator variable, which equals to unity if the bond is redeemable for gold, and zero otherwise. Sterling is an indicator variable, which equals to unity if the bond is denominated in pounds sterling, and zero otherwise. Default is an indicator variable which equals to unity in any year when a railroad is in default on its bonds according to the *Stock Exchange Year Book* and zero otherwise. Years-to-Maturity is equal to the number of years until the bond is stated to mature, as indicated by the price source or Poor's Manual. Gold, Sterling, and Years-to-Maturity are inferred from descriptions in the source documents. Assets in millions of U.S. dollars are taken from the Poor's manual for the previous year. For British railroads, assets are reported as the total of book debt and equity capital and converted to U.S. dollars at an exchange rate of USD4.86 = GBP1. British railroads typically issued perpetual bonds, so following Coyle and Turner (2013) Years-to-Maturity is defined as 100 years for all British bonds.

Table 4
Characteristics of U.S. and British railroad bond yields across listing exchanges

Panel A: Time-series comparison

	U.S. Railroads							
	New York		London			British Railroads		
	Obs.	Mean	Obs.	Mean	New York – London	Obs.	Mean	London – British
1870#	5	3.73	3	2.98	0.76^{*}	26	0.90	2.08^{**}
1871	8	3.85	8	3.36	0.49	26	0.89	2.47^{**}
1872	18	3.92	9	3.75	0.17	27	0.87	2.88^{**}
1873	13	4.49	11	3.29	1.20^{**}	26	0.89	2.40^{**}
1874#	15	3.79	14	3.17	0.62	26	0.90	2.27^{**}
1875#	15	3.62	19	3.22	0.41	27	0.99	2.23^{**}
1876#	17	3.76	19	3.28	0.48	26	1.04	2.25^{**}
1877#	19	3.88	18	3.20	0.69	26	1.04	2.15^{**}
1878#	18	3.42	21	3.07	0.34	26	1.05	2.03^{**}
1879	24	3.22	24	2.77	0.45	27	0.88	1.89^{**}
1870-1879	152	3.72	146	3.17	0.56^{**}	263	0.94	2.22^{**}
1880	26	2.93	28	2.46	0.48^{*}	27	0.79	1.67^{**}
1881	32	2.97	35	2.47	0.49^{*}	30	0.76	1.71^{**}
1882#	32	2.91	36	2.65	0.26	33	0.80	1.85^{**}
1883#	38	2.90	39	2.55	0.35	37	0.82	1.73^{**}
1884#	35	2.98	39	2.46	0.52^{*}	39	0.71	1.74^{**}
1885	41	2.65	41	2.31	0.34	39	0.72	1.59^{**}
1886	39	2.44	46	2.12	0.33	39	0.70	1.42^{**}
1887#	40	2.53	47	2.18	0.34^{*}	39	0.69	1.49^{**}
1888	45	2.30	58	2.14	0.16	39	0.47	1.67^{**}
1889	48	2.32	58	2.19	0.13	35	0.44	1.75^{**}
1880-1889	376	2.66	427	2.32	0.33^{**}	357	0.69	1.64^{**}
1890#	48	2.44	64	2.28	0.16	41	0.43	1.85^{**}
1891	48	2.35	68	2.33	0.03	42	0.43	1.90^{**}
1892	47	2.35	67	2.24	0.11	44	0.40	1.84^{**}
1893#	46	2.41	65	2.32	0.10	43	0.34	1.98^{**}
1894#	42	2.33	68	2.18	0.16	42	0.20	1.98^{**}
1895	42	2.41	71	2.19	0.22	43	0.12	2.08^{**}
1896#	40	2.51	73	2.34	0.16	45	0.09	2.26^{**}
1897#	39	2.26	75	2.21	0.05	48	0.15	2.06^{**}
1898	36	1.93	74	1.87	0.06	48	0.24	1.63^{**}
1899#	43	1.60	70	1.50	0.10	48	0.11	1.38^{**}
1890-1899	431	2.27	695	2.14	0.12^{*}	444	0.25	1.90^{**}
1900#	44	1.41	67	1.31	0.09	48	0.22	1.10^{**}
1901	44	1.44	66	1.33	0.10	51	0.39	0.94^{**}
1902	44	1.54	62	1.31	0.24	51	0.40	0.91^{**}
1903#	43	1.59	54	1.29	0.30	49	0.43	0.86^{**}
1904#	43	1.40	51	1.18	0.22	48	0.41	0.77^{**}
1905	43	1.41	50	1.14	0.27	46	0.47	0.66^{**}
1906	41	1.43	50	1.16	0.28	45	0.48	0.67^{**}
1907#	41	1.72	49	1.33	0.39^{*}	44	0.58	0.75^{**}
1908#	42	1.55	50	1.25	0.30^{*}	43	0.69	0.56^{**}
1909	43	1.46	45	1.15	0.31	42	0.66	0.49^{**}
1900-1909	428	1.49	551	1.25	0.24^{**}	467	0.47	0.78^{**}
1910#	40	1.38	42	1.09	0.29	41	0.66	0.43^{**}
1911#	39	1.24	40	0.99	0.25	41	0.57	0.42^{**}
1912	39	1.21	38	0.93	0.28	39	0.56	0.36^{**}
1913#	37	1.18	37	0.89	0.29	36	0.56	0.33^{**}
1910-1913	155	1.25	161	0.98	0.28^{**}	157	0.59	0.39^{**}

Table 4 (continued)

Panel B: Cross-regional comparison

	New York			London			
	Firms	Obs.	Mean	Firms	Obs.	Mean	New York – London
NORTH	11	310	2.14	25	589	1.71	0.44**
CENTRAL	25	567	2.25	24	391	1.88	0.37**
SOUTH	9	210	2.29	22	357	2.16	0.13
WEST	17	455	2.10	35	648	2.01	0.09
Total	62	1,542	2.19	106	1,985	1.92	0.27**

This table gives bond yields for U.S. and British railroads for each year between 1870 and 1913. Yield refers to the current yield defined as the coupon payment divided by the prevailing end of year bond price. In order to minimize the impact of financial distress considerations, yields are only calculated on bonds with prices of 75 and above. U.S. Railroad bond prices listed in New York and London are taken from the *Commercial and Financial Chronicle* and the *Investors Monthly Manual* respectively. British railroad bond prices listed in London are taken from the *Investors Monthly Manual*. Where a railroad has more than one bond listed, we select the bond with the longest maturity. Spread the yield less the prevailing yield on the long-dated British government bond. The U.S. regions are defined in Table 1. Panel A shows bond yields for every year in our sample and for each decade, while Panel B – bond yield characteristics across U.S. regions. # indicates a recession year if a given year contains at least six months defined as a contraction months according to the NBER (Business Cycle Expansions and Contractions). * and ** denote statistical significance at the 5% and 1% level, respectively.

Table 5
Matched-pairs tests

	Full Sample	NORTH/CENTRAL	SOUTH/WEST	Diff: N/C – S/W
Firms	27	16	11	
New York				
Obs.	496	353	143	
Mean bond yield	4.80	4.81	4.78	
London				
Obs.	380	253	127	
Mean bond yield	4.79	4.58	5.21	
New York – London (matched)				
Obs.	283	193	90	
Mean bond yield difference	0.12	0.17	0.01	0.15
	(2.02)	(2.41)	(0.14)	(2.88)

This table provides matched-pair tests for the sample of bond yields for U.S. railroads from 1870 to 1913. The U.S. regions are defined in Table 1 and aggregated into two groups: NORTH and CENTRAL as NORTH/CENTRAL (N/C) and SOUTH and WEST as SOUTH/WEST (S/W). The table reports the number of firms that maintain bond listings in both New York and London and the respective bond yields in percentage points. The New York – London (matched) heading indicates statistics for the instances when we can estimate a yield spread for a railroad with bonds traded in both markets in the same year. The "Diff: N/C– S/W" indicates a test of the difference in matched pair means across the two combined regions. The t-statistics are reported in parentheses.

Table 6
Aggregate regression estimates

Panel A: All U.S. railroads

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FBond	-0.215 (-7.45)	-0.210 (-7.05)	-0.189 (-5.76)	-0.179 (-5.60)	-0.154 (-4.94)	-0.405 (-4.86)	
FBond_1870							-1.042 (-1.35)
FBond_1871							-1.026 (-2.01)
FBond_1872							-0.893 (-2.29)
FBond_1911							0.012 (0.06)
FBond_1912							0.057 (0.30)
FBond_1913							0.057 (0.27)
Time		-0.060 (-47.76)	-0.051 (-35.70)	-0.051 (-36.45)	-0.048 (-31.63)	-0.052 (-25.31)	
FBond × Time						0.008 (3.25)	
Gold	-0.083 (-2.90)	-0.084 (-2.84)	0.007 (0.20)	-0.030 (-0.93)	-0.025 (-0.78)	-0.024 (-0.77)	-0.068 (-1.96)
Sterling	0.008 (0.19)	0.016 (0.35)	-0.062 (-1.32)	-0.036 (-0.78)	0.116 (2.45)	0.123 (2.58)	0.031 (0.60)
Default	0.432 (3.67)	0.405 (3.35)	0.270 (2.22)	0.264 (2.31)	0.124 (1.10)	0.115 (1.01)	0.210 (1.68)
Years-to-Maturity			-0.008 (-12.86)	-0.008 (-13.37)	-0.008 (-13.60)	-0.008 (-13.80)	
Log (Assets)			-0.136 (-11.53)		-0.110 (-9.46)	-0.110 (-9.47)	-0.131 (-10.08)
Log (Revenue)				-0.154 (-15.66)			
ROA					-8.758 (-15.34)	-8.764 (-15.38)	-9.536 (-14.08)
Revenue growth					-0.481 (-3.98**)**	-0.487 (-4.03**)**	-0.477 (-2.83**)**
Intercept	3.529 (14.00)	3.986 (97.80)	5.369 (44.74)	5.263 (63.42)	5.396 (45.77)	5.535 (44.23)	6.243 (9.17)
Fixed effects	Year	No	No	No	OffGold	OffGold	Year
Obs.	3,522	3,522	2,338	2,388	2,232	2,232	2,294
Adj. R^2	0.486	0.446	0.543	0.579	0.611	0.612	0.536

Table 6 (continued)

Panel B: London-listed U.S. and British railroads

	(1)	(2)	(3)	(4)
British Railroads	-0.781 (-14.14)	-0.749 (-13.28)	-2.161 (-29.56)	
British Railroads_1870				-1.556 (-4.88)
British Railroads_1871				-1.670 (-6.95)
British Railroads_1872				-2.230 (-12.46)
British Railroads_1911				0.138 (1.17)
British Railroads_1912				0.200 (1.66)
British Railroads_1913				0.205 (1.61)
Time		-0.032 (-34.87)	-0.054 (-46.19)	
British Railroads × Time			0.045 (27.30)	
Sterling	-0.113 (-2.75)	-0.103 (-2.46)	-0.176 (-4.54)	-0.178 (-4.91)
Years-to-Maturity	-0.011 (-19.88)	-0.011 (-20.70)	-0.009 (-17.50)	-0.008 (-17.99)
Log (Assets)	-0.081 (-14.42)	-0.074 (-12.93)	-0.060 (-11.46)	-0.066 (-13.30)
Intercept	3.602 (27.61)	4.139 (62.25)	4.591 (72.72)	4.010 (13.19)
Fixed effects	Year	No	No	Year
Obs.	3,901	3,901	3,901	3,901
Adj. R^2	0.685	0.669	0.722	0.760

This table provides regressions results for the sample of bond yields for U.S. and British railroads from 1870 to 1913. Panel A gives the estimates for U.S. railroads listed in New York and London; Panel B – results for London listed U.S. and British railroads. The dependent variable Spread is the yield less the prevailing yield on British government bonds. Time is equal to the year less 1870. FBond is an indicator variable which equals to unity if the firm has a bond foreign listing in London and zero otherwise. British Railroad is an indicator variable which equals to unity if the firm is British railroad and zero otherwise. The fixed effect variables are defined as Year (annual fixed effects) and OffGold (fixed effect for the pre-1879 period and interaction of pre-1879 period with Sterling). The last regression in both panels contains interaction variables for all years 1870 to 1913, but only the coefficients for the first three and last three years are reported. Other variables are defined in Table 3. The t-statistics are in parentheses.

Table 7
Impact of cross-listing in crisis periods

	Recession		Default Rate	
	(1)	(2)	(3)	(4)
FBond	-0.618 (-7.34)	-0.618 (-7.11)	-0.599 (-7.15)	-0.646 (-5.71)
Crisis	0.106 (4.04)	0.106 (2.64)	0.037 (5.99)	0.033 (3.78)
FBond × Crisis		-0.001 (-0.02)		0.008 (0.62)
Time	-0.059 (-29.74)	-0.059 (-29.67)	-0.054 (-25.30)	-0.055 (-23.81)
FBond × Time	0.014 (5.52)	0.014 (5.50)	0.014 (5.37)	0.015 (4.91)
Gold	0.008 (0.24)	0.008 (0.24)	0.008 (0.26)	0.008 (0.26)
Sterling	-0.032 (-0.69)	-0.032 (-0.69)	-0.037 (-0.80)	-0.038 (-0.82)
Default	0.254 (2.11)	0.254 (2.11)	0.212 (1.77)	0.210 (1.74)
Years-to-Maturity	-0.008 (-13.22)	-0.008 (-13.22)	-0.008 (-13.22)	-0.008 (-13.22)
Log(Assets)	-0.136 (-11.70)	-0.136 (-11.69)	-0.135 (-11.66)	-0.135 (-11.66)
Intercept	5.560 (44.15)	5.560 (43.96)	5.358 (40.85)	5.382 (39.32)
Obs.	2,338	2,338	2,338	2,338
Adj. R^2	0.552	0.552	0.555	0.555

This table provides regression results for the sample of bond yields for U.S. railroads from 1870 to 1913. The dependent variable Spread is the yield less the prevailing yield on British government bonds. The Crisis variable is modeled in two ways: Recession is an indicator variable that is equal to 1 if the year contains at least six months defined as a contraction months according to the NBER (Business Cycle Expansions and Contractions); and Default Rate is taken from the annual default rates for U.S. railroads in Figure 1 by Giesecke, Longstaff, Schaefer, and Strebulaev (2011). It is meant to model the time-varying credit-market conditions in the United States. FBond is an indicator variable which equals to unity if the firm has a bond foreign listing in London and zero otherwise. Default is an indicator variable which equals to unity in any year when a railroad is in default on its bonds according to the *Stock Exchange Year Book* and zero otherwise. Other variables are defined in Table 3. The t-statistics are in parentheses.

Table 8
Regional and railroad size regression estimates

Panel A: Regional tests

	NORTH	CENTRAL	SOUTH	WEST
FBond	-0.138	-0.380	0.183	-0.044
	(-1.84)	(-7.09)	(1.98)	(-0.61)
Time	-0.042	-0.061	-0.049	-0.055
	(-14.98)	(-23.56)	(-14.44)	(-16.84)
Gold	-0.409	-0.277	-0.387	0.258
	(-5.71)	(-4.80)	(-3.96)	(3.53)
Sterling	0.206	-0.040	0.271	
	(2.94)	(-0.37)	(1.93)	
Default	0.514	0.004	0.498	0.328
	(1.82)	(0.01)	(1.98)	(1.71)
Log (Assets)	-0.198	-0.153	-0.155	-0.154
	(-7.51)	(-7.23)	(-5.89)	(-5.32)
Intercept	5.321	5.714	5.540	5.315
	(20.00)	(26.02)	(22.89)	(17.23)
Obs.	543	742	358	759
Adj. R^2	0.529	0.591	0.617	0.378

Table 8 (continued)

Panel B: Pooled tests

	(1)	(2)	(3)
FBond	-0.275	-0.399	-0.288
	(-3.95)	(-9.02)	(-5.44)
Time	-0.053	-0.053	-0.052
	(-34.65)	(-34.39)	(-32.47)
Gold	-0.163	-0.157	-0.160
	(-4.61)	(-4.48)	(-4.57)
Sterling	0.193	0.155	0.163
	(3.42)	(2.88)	(3.04)
Default	0.329	0.341	0.346
	(2.65)	(2.73)	(2.78)
Log (Assets)	-0.163	-0.167	-0.169
	(-12.52)	(-12.85)	(-8.24)
CENTRAL	0.294		
	(5.04)		
SOUTH	0.438	0.240	0.236
	(5.65)	(3.56)	(3.49)
WEST	0.203	0.009	-0.000
	(3.09)	(0.17)	(-0.00)
Large			0.164
			(3.09)
CENTRAL × FBond	-0.171		
	(-2.09)		
SOUTH × FBond	0.361	0.489	0.490
	(3.67)	(5.69)	(5.70)
WEST × FBond	0.456	0.578	0.584
	(5.39)	(8.54)	(8.63)
Large × FBond			-0.241
			(-4.09)
Intercept	5.250	5.479	5.434
	(37.71)	(41.01)	(28.17)
Obs.	2,402	2,402	2,402
Adj. R^2	0.508	0.502	0.506

This table provides regression results for the sample of bond yields for U.S. railroads from 1870 to 1913. The U.S. regions are defined in Table 1. The dependent variable Spread is the yield less the prevailing yield on British government bonds. Time is the number of years since 1870. FBond is an indicator variable which equals to unity if the firm has a bond foreign listing in London and zero otherwise. Large is an indicator that equals unity if the firm's assets are larger than the year and region median, and zero otherwise. Other variables are defined in Table 3. These regressions do not include year fixed effects. The t-statistics are in parentheses.

Table 9
Investment-cash flow sensitivity regressions across U.S. regions

Panel A: Investment-cash flow sensitivity by region

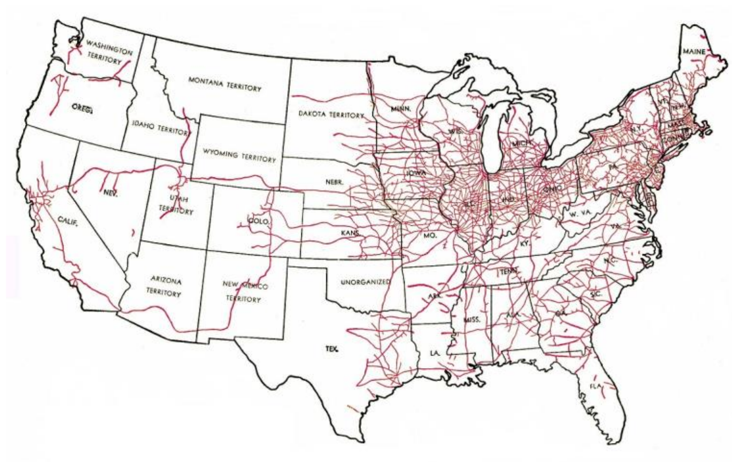
	NORTH	CENTRAL	SOUTH	WEST
ROA	0.158	0.717	1.420	1.434
	(1.24)	(7.57)	(7.51)	(11.90)
Log (Revenue)	-0.002	-0.002	0.002	-0.001
	(-1.43)	(-1.35)	(0.89)	(-0.60)
Revenue growth	0.107	0.080	0.134	0.131
	(5.65)	(5.52)	(6.08)	(8.80)
Asset turnover	0.094	-0.066	-0.33	-0.300
	(1.80)	(-1.74)	(-5.71)	(-5.55)
Default Rate	0.006	0.004	-0.004	-0.009
	(0.94)	(0.75)	(-0.50)	(-1.50)
Default	0.020	-0.013	0.023	0.017
	(1.12)	(-0.51)	(0.93)	(1.33)
Obs.	766	1,220	644	1,221

Panel B: Foreign bond listing effect on investment

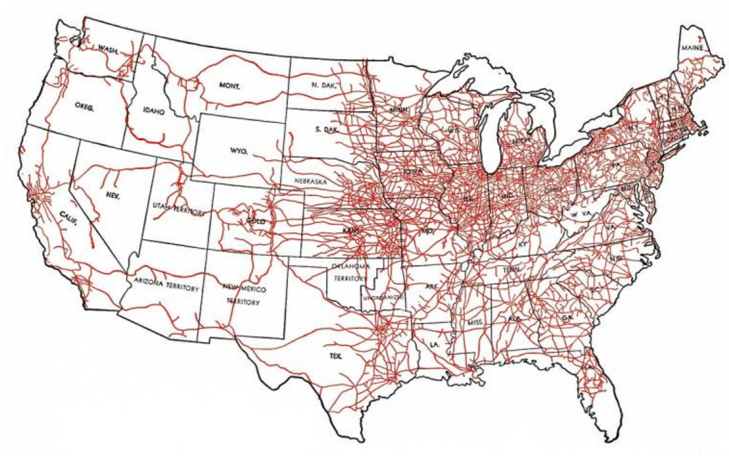
	NORTH	CENTRAL	SOUTH	WEST
ROA	0.355	0.959	1.452	1.551
	(2.27)	(8.53)	(6.99)	(11.27)
FBond	0.013	0.023	0.004	0.014
	(1.32)	(3.52)	(0.35)	(1.83)
FBond × ROA	-0.338	-0.468	-0.083	-0.267
	(-2.28)	(-3.96)	(-0.38)	(-1.71)
Controls	Yes	Yes	Yes	Yes
Obs.	766	1,220	644	1,221

This table reports the estimates of an investment-cash flow sensitivity model following Fazzari, Hubbard, and Peterson, (1988) and Lins, Strickland, and Zenner (2005). The sample includes 3,931 firm-year observations. The U.S. regions are defined in Table 1. The dependent variable is the annual change in total firm assets. Panel A shows the investment-cash flow sensitivity tests by each region, while Panel B tests the foreign bond listing effect. FBond is an indicator variable which equals to unity if the firm has a bond foreign listing in London and zero otherwise. 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: Revenue, which is the natural logarithm of total revenue, Revenue growth, which is the annual change in total firm revenue, Asset turnover, which equals to the total annual revenue divided by the total assets, and Default Rate, which is the annual default rate of corporate bonds from Giesecke, Longstaff, Schaefer, and Strebulaev (2011). Each regression includes an unreported intercept. The t-statistics are in parentheses.

Plot A: 1870



Plot B: 1880



Plot C: 1890

Figure 1. Historical railroad maps of the United States. This figure shows the U.S. railroad maps in 1870 (Plot A), 1880 (Plot B), and 1890 (Plot C). The source: "American Railroads: Their Growth and Development," The Association of American Railroads, 1951. http://www.cprr.org/Museum/RR_Development.html.

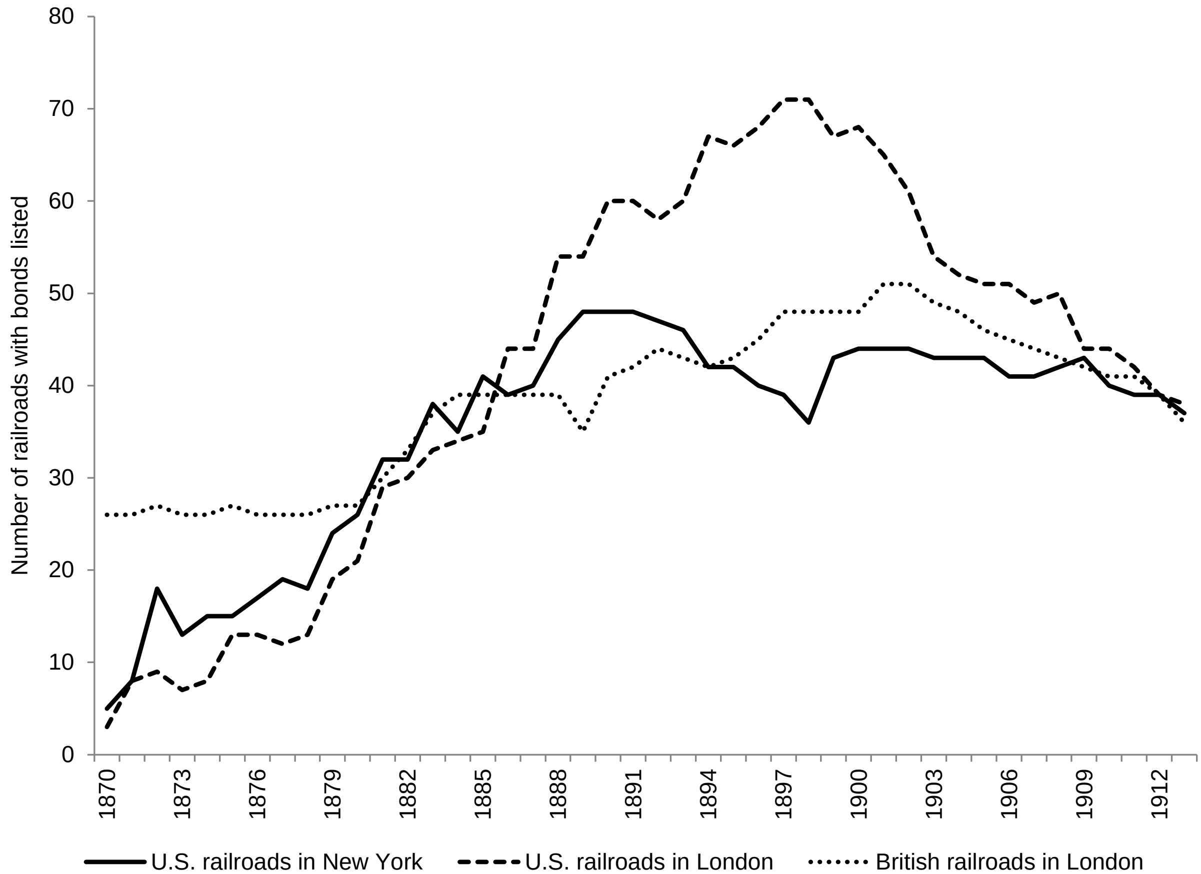


Figure 2. Frequency of railroads with bonds listed in London and New York. This figure shows the total number of U.S. railroads listed in each of New York and London, and the number of British railroads listed in London between 1870 and 1913.

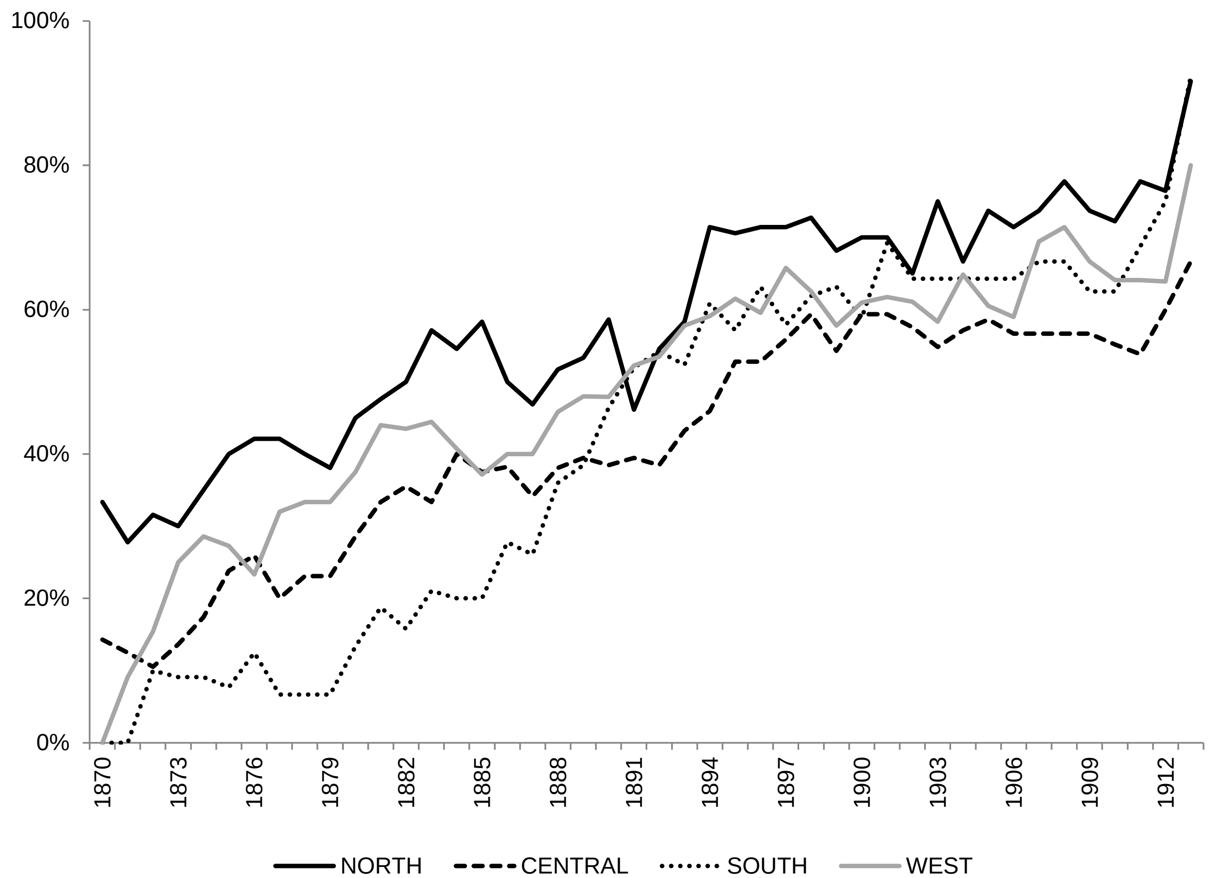
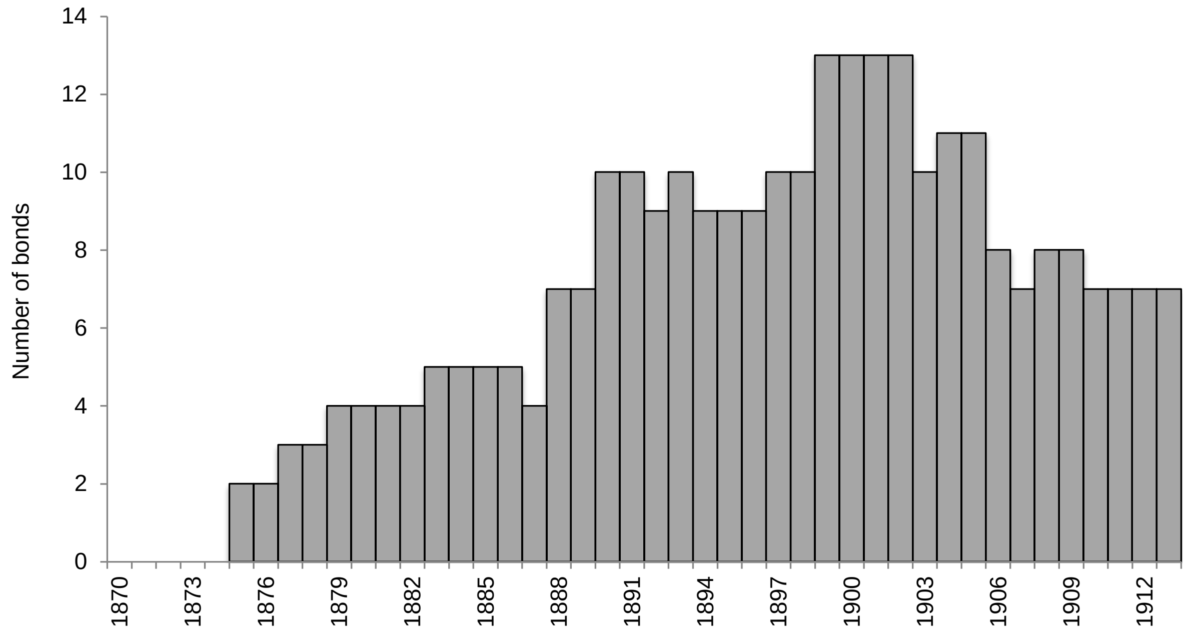
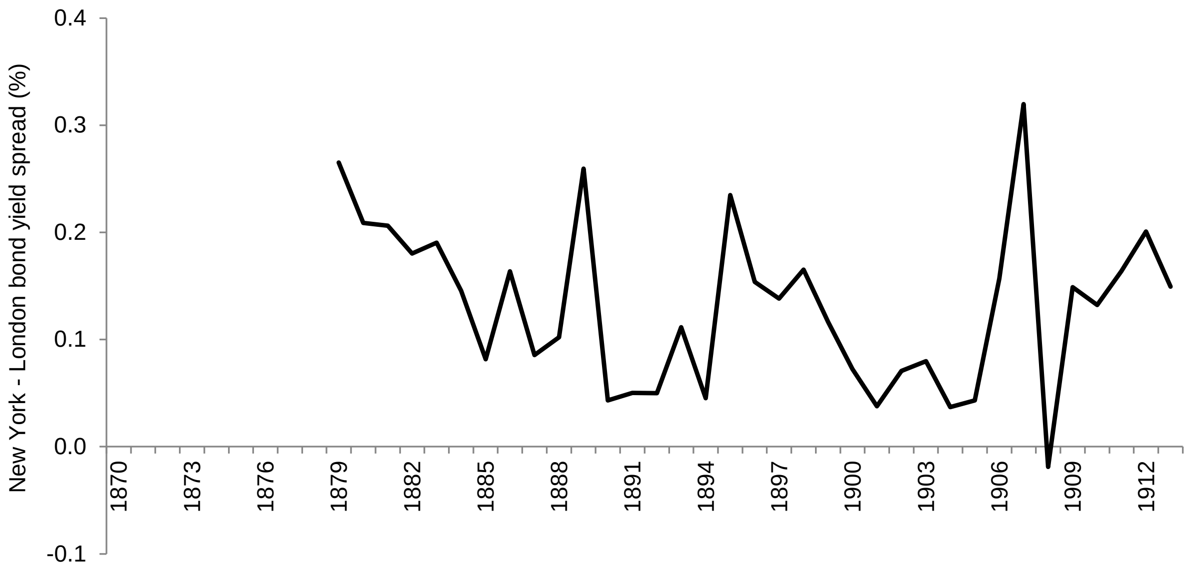


Figure 3. Annual penetration of U.S. railroads by region listed in London. This figure shows the average annual percentage of U.S. railroads by region with bond listings in London over the period from 1870 to 1913. Regional definitions are provided in Table 1.



Plot A: Frequency distribution of the number of bonds traded in both New York and London



Plot B: New York – London spread in bond yields traded in both New York and London

Figure 4. Matched bond pairs listed in both New York and London. This figure shows the number of bonds and the yield spread for the sample of 27 railroads with bonds traded in both New York and London in the same year between 1870 and 1913. Plot A gives the yearly frequency distribution of the number of such bonds traded in both cities. Plot B shows the corresponding New York – London spread in bond yields over the sample period covering more than two bond yield observations.

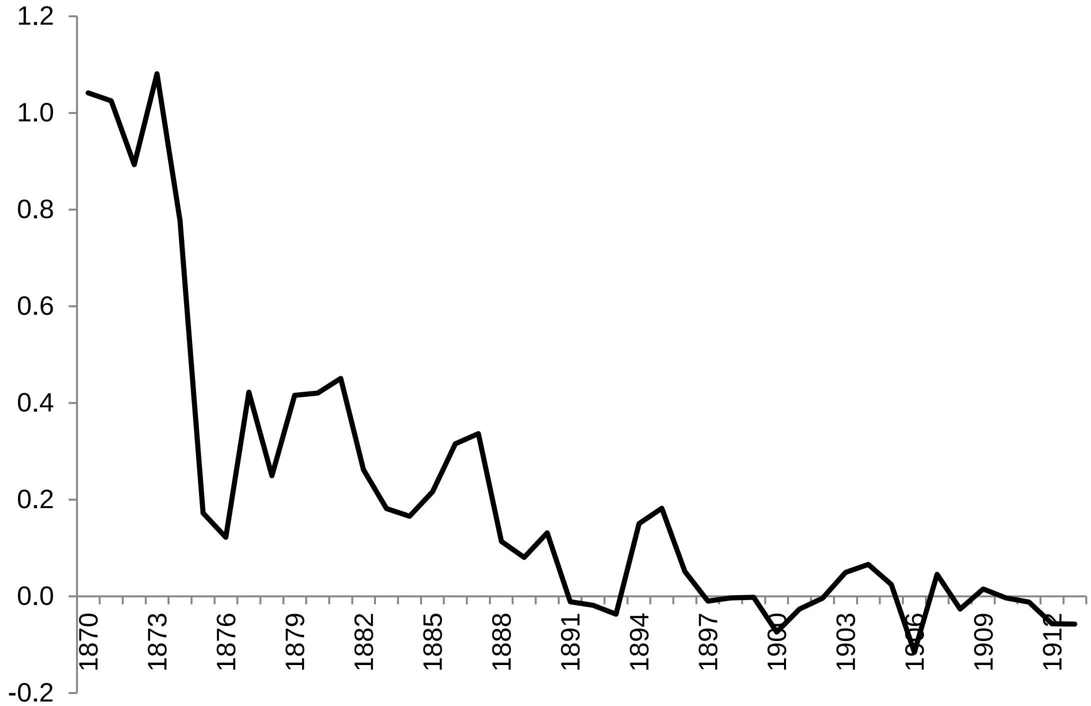


Figure 5. Foreign listing gain by year. This figure plots the coefficients on the interaction terms of FBond with dummies for each year between 1870 and 1913, where we substitute the decade dummy variables with year dummies in Regression (7) in Panel A of Table 6. We flip the negative sign of the coefficients to illustrate the decline in the premium resulting from listing in London.

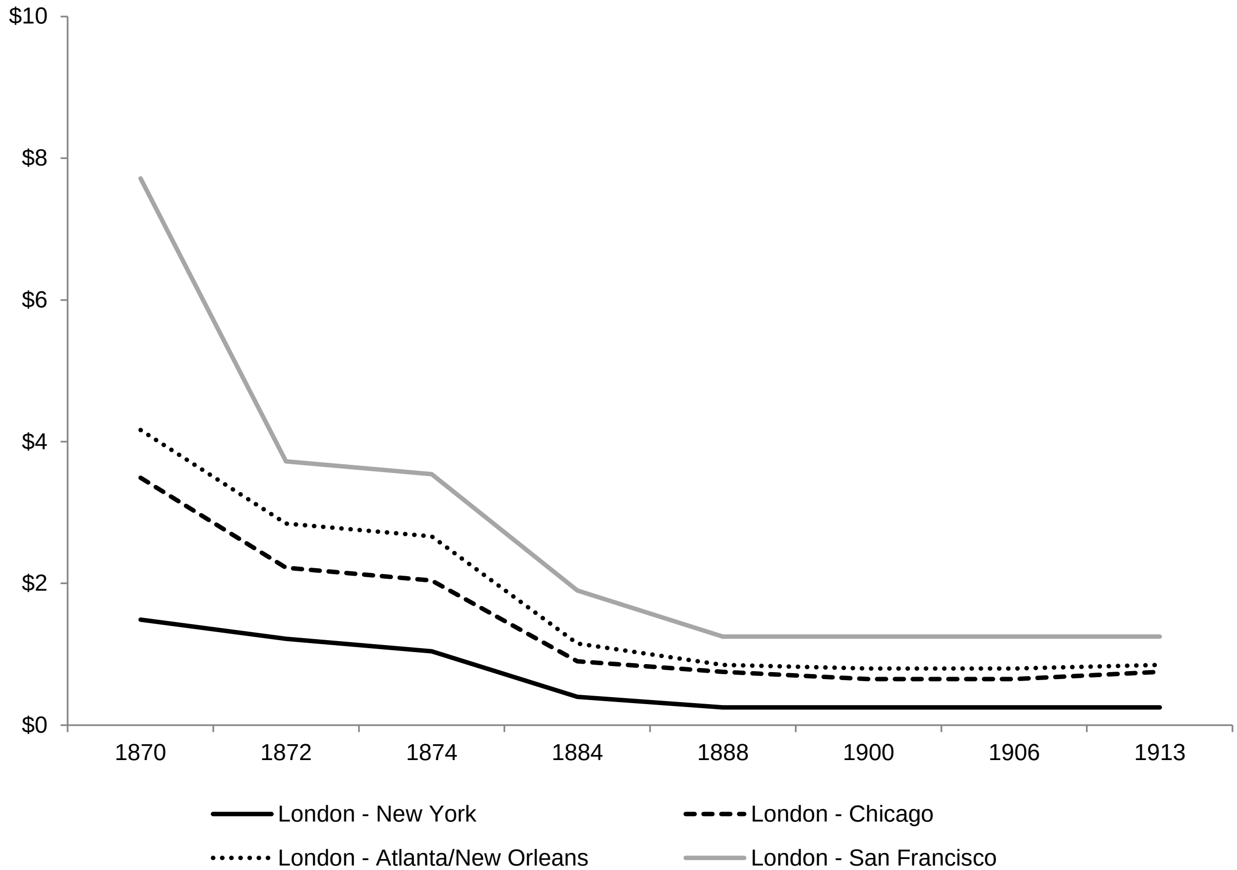


Figure 6. Telegraph communication rates from London by destination city. This figure shows the telegraph communication rates from London to the centers of four U.S. regions. Rates are the cost of transmitting the first 10 words of any message. The source data for London to New York is published in the Historical Statistics of the United States: Colonial Times to 1970 Part 2, U.S. Department of Commerce, 1975, based on documents from the U.S. Federal Communications Commission and other sources specified in the report. The rates from New York to Chicago, San Francisco, and the average of the rates from New York to Atlanta and New Orleans are from Honsowetz (2014). The rates from London to Chicago and to San Francisco and the average of the rates from London to Atlanta and New Orleans are estimated by adding the London – New York rate to the rate between the destination city and New York. Data points between some observations are interpolated.

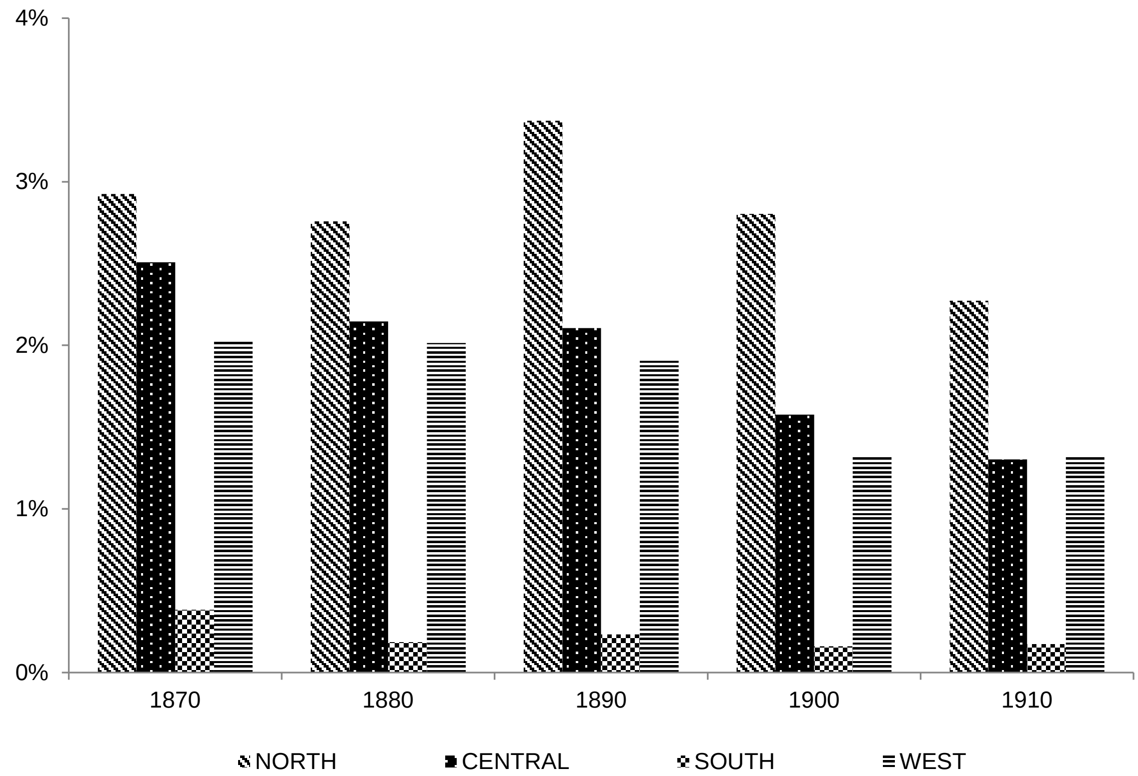


Figure 7. Regional shares of total British immigration to the United States. This figure shows the percentage of British immigrants in each of the four U.S. regions normalized by the total regional population for each decade between 1870 and 1910. Immigration data are taken from the Integrated Public Use Microdata Series (IPUMS) at the University of Michigan.