Bankers, Industrialists, and their Cliques: Elite Networks in Mexico and Brazil during Early Industrialization

ALDO MUSACCHIO
IAN READ

The historiographies of Mexico and Brazil have implicitly stated that business networks were crucial for the initial industrialization of these two countries. Recently, differing visions on the importance of business networks have arisen. In the case of Mexico, the literature argues that entrepreneurs relied heavily on an informal institutional structure to obtain necessary resources and information. In contrast, the recent historiography of Brazil suggests that after 1890 the network of corporate relations became less important for entrepreneurs trying to obtain capital and concessions, once the institutions promoted financial markets and easy entry for new businesses. Did entrepreneurs in Brazil and Mexico organize their
networks differently to deal with the different institutional settings? We examine whether in Mexico businessmen relied more on networks of interlocking boards of directors and other informal arrangements to do business than in Brazil. Our hypothesis is confirmed by three related results: (1) the total number of connections (i.e., the density of the network) was higher in Mexico than Brazil; (2) in Mexico, there was one dense core network, while in Brazil we find fairly dispersed clusters of corporate board interlocks; and most importantly, (3) politicians played a more important role in the Mexican network of corporate directors than their counterparts in Brazil. Interestingly, even though Brazil and Mexico relied on very different institutional structures, both countries had similar rates of growth between 1890 and 1913. However, the dense and exclusive Mexican network might have ended up increasing the social and political tensions that led to the Mexican Revolution (1910–1920).

Social scientists usually agree that institutions are an essential requisite for economic growth. Generally, institutional theorists argue that when formal or codified institutions regularize patterns of behavior that define and protect property rights and minimize transaction costs, economies tend to grow faster. Yet, we observe many cases of countries with weak or arbitrarily enforced institutions that grow at a breakneck pace. The implication is that in those countries there must have been substitutes for formal institutions that preceded and promoted growth. Specifically, Mexico and Brazil give us a glimpse of two economies that differed in their institutional settings and achieved similar levels of economic growth before World War I. Yet, it is not clear how entrepreneurs interacted with these differing institutional settings and achieved similar results.

The historiographies of both Mexico and Brazil have implicitly stated that business networks were crucial for the initial industrialization of these two countries. For instance, the literature on early Mexican businessmen argues that entrepreneurs relied heavily on an informal institutional structure to obtain necessary resources and information. Sources of capital, for example, were often found through
friends and personal connections.¹ For Brazil, the story has been less straightforward. Some historians have argued that networks of businessmen and politicians were vital for the early industrialization of the country.² The recent historiography of Brazil, however, suggests that when institutions were created to promote financial markets and easy entry for new businesses after 1890, the network of corporate relations became less important for entrepreneurs trying to obtain capital and concessions. Moreover, these recent works argue that the bulk of investment in manufacturing and transportation ventures was raised through the stock and bond markets and not through loans obtained through personal connections.³


2. See, for instance, the trilogy of John D. Wirth, Minas Gerais in the Brazilian Federation, 1889–1937 (Stanford, Calif., 1977); Robert M. Levine, Pernambuco in the Brazilian Federation, 1889–1937 (Stanford, Calif., 1978); Joseph LeRoy Love, São Paulo in the Brazilian Federation, 1889–1937 (Stanford, Calif., 1980), or the work of Flávio A. M. Saes, As Ferrovias de São Paulo, 1870–1940 (São Paulo, 1981) and A grande empresa de serviços públicos na economia cafeeira (São Paulo, 1986).

Did entrepreneurs in Brazil and Mexico organize their networks differently to deal with the different institutional settings? How can we compare the impact of the institutional structure of Mexico and Brazil on the networks of entrepreneurial finance and entrepreneurship in general? We attempt to answer these questions by looking at the networks of interlocking boards of directors of major joint-stock companies in Brazil and Mexico in 1909.4

We hypothesize that personal connections among people in firms, banks, and the government were more important in Mexico than in Brazil. This arrangement allowed Mexican businessmen and politicians to access information and capital in Mexico without relying heavily on the legal system, “arm’s-length lending,” and other formalized institutions. Corporations in Brazil, on the other hand, relied more on formal institutions to access information and credit.5 In the following section we summarize the historiography that serves as basis for these hypotheses.

In this paper, we argue that networks can substitute for some formal institutions. In our view, businessmen can use networks to monitor one another, and negotiate within a system that relies more on convention than on publicly declared rules to function.6 Also, we explore the role of politicians within the networks of corporate directors. This is because networks may also allow entrepreneurs to break deals with public officials, who themselves may be network members. In return, network membership may allow public officials to claim some of the rents generated by businessmen.

This paper contributes to the literature on elites in Latin America by providing a methodology to systematically study networks. There

---


5. This argument complements Haber, “Efficiency Consequences” and Musacchio, “Law and Finance in Historical Perspective.”

6. We define networks as patterns of relationships in which two or more actors share a type of social activity over a definite period of time. They are also organizational features that can regularize and legitimize certain patterns of behavior such as, the enforcement of contracts, access to credit, and the exchange of information. According to Mark Granovetter, networks may be more important when certain institutional features are weak or absent. This may include the lack of third-party enforcement when such contracts are informally enforced through embedded relationships. Mark Granovetter, “Economic Action, Social Structure, and Embeddedness,” *American Journal of Sociology* 91 (Nov. 1985): 9, 27.
is a large literature in social and business history dealing with the relationship between businessmen and politicians that has not been systematic in its approach. Even past forms of economic and social analysis, including the dependency school of thought, have argued that elite collusion had institutional and developmental effects. New and more formalized studies on the role of the stock market and banks in Brazil and Mexico have continued to look closely at the role of networks of directors. Unfortunately, business networks have not been clearly defined, nor have they received systematic analysis. Families and personalities that were part of the Mexican or Brazilian elite have often been studied on an ad hoc basis, selected through ex-post knowledge. Our methods help determine the most important players and how networks developed within different societies.

Our hypothesis that Mexican business networks were more important substitutes for formal institutions than Brazilian networks is largely confirmed by three related results: (1) the total number of connections (i.e., the density of the network) was higher in Mexico than Brazil; (2) in Mexico there was one dense core network, while in Brazil we find fairly dispersed clusters of corporate board interlocks; and most importantly, (3) politicians played a more important role in the Mexican elite network than their counterparts in Brazil.

The results for the Mexican case confirm much of what has already been stated by other business and economic historians, especially regarding the number of strong connections between banks and firms. Given that Mexico relied heavily on an informal set of rules that mediated the relationship between the economic and political elites, firms, banks, and the government functioned symbiotically. The main

7. For business and social history approaches to business and elite networks see Eul-Soo Pang, Bahia in the First Brazilian Republic: Coronelismo and Oligarchies, 1889–1934 (Gainesville, Fla., 1979); Saes, As Ferrovias de Sao Paulo and A grande empresa de servicios públicos na economia cafeeira; Mario Cerutti, Burguesía y capitalismo; Diana Balmori, Notable Family Networks in Latin America (Chicago, 1984); Mark Wasserman, Capitalists, Cabiques, and Revolution: The Native Elite and Foreign Enterprise in Chihuahua, Mexico, 1854–1911 (Chapel Hill, N.C., 1984); Leonor Ludlow and Carlos Marichal, eds., Banca y poder en México, 1800–1925 (México, 1986); Mario Cerutti, Burguesía, capitales e industria en el norte de México (México, 1992); Leonor Ludlow and Alicia Salmerón, La emisión de papel moneda en México: Una larga negociación político-financiera (México, 1997); and Zephyr Frank, “Elite Families and Oligarchic Politics on the Brazilian Frontier: Mato Grosso, 1889–1937.” Latin American Research Review 36 (Spring 2001): 49–74. For works that have tried to systematize business networks, the most notable exception for Brazil is Hanley, “Is It Who You Know?” See also the trilogy of Wirth, Minas Gerais; Levine, Pernambuco; and Love, São Paulo. For Mexico, Mario Cerutti has made great contributions to systematizing the relationship among families of the north of Mexico. See, Cerutti, “Produccion capitalista,” 149–92.
personalities in the Mexican business network were often prominent politicians who helped firms to get charters and privileges. These politicians facilitated the exchange of information among firms by serving on many boards at the same time.

In contrast, Brazil had a relatively more standardized and open set of institutional rules. The Brazilian network of directors was more fragmented into clusters, had fewer ties between companies, and showed little political presence. We are not arguing that political connections were unnecessary for entrepreneurs in Brazil, rather, that politicians were less central for business networks. We were surprised by this final finding because the Brazilian literature on elite networks has traditionally seen politicians as playing an important role in business. For example, the trilogy of monographs by John Wirth, Robert Levine, and Joseph Love implicitly defends the idea that the network of political elites was extremely dense, with strong connections between politicians and businessmen. Therefore, we expected to find many of those politicians in our network of directors.8

For three reasons, Mexico and Brazil are good cases by which to test our hypothesis. First, within Latin America, they are two of the richest countries and have the largest populations. Both countries accelerated their growth rates after 1890. The best GDP estimates available show that Mexico grew at an annual compound growth rate of 3.2 percent between 1900 and 1910, while Brazil grew at 4.2 percent.9 Moreover, both countries relied on exports as the main source of growth during this period. Second, both countries adhere to the Civil Law tradition and were colonized by Catholic countries, with a low ratio of colonizers to indigenous and slave populations.10 Third, when

8. See Wirth, Minas Gerais, 140–63; Levine, Pernambuco, 89–90; Love, São Paulo, 152–75; and others like Linda Lewin, Politics and Parentela in Paraíba: A Case Study of Family-Based Oligarchy in Brazil (Princeton, N.J., 1987), 10–11. According to Hanley, “Is It Who You Know?” this might have depended on the time-period studied, given that networks became less relevant for doing business after 1890.


the British company that edited the yearbooks we are using for the present analysis compiled the data, both countries were undergoing an industrial transition at a heightened pace. By choosing two cases that share a number of structural and historical commonalities, we hope to hold constant a maximum number of variables.

This paper avoids theorizing about a strong causal relationship between networks and institutions because our results cannot conclusively show whether the absence of institutions led to stronger economic reliance on networks or if the long tradition of economic agents operating through informal networks weakened the establishment of formal institutions. The line between these two systems of human organization is never clear, as we find to be the case in Mexico. Institutional frameworks that support strong informal interaction via networks benefited those in a position to rewrite laws. Mexican lawmakers were often those who were most embedded in the networks and who profited most from those networks, and they designed laws that could perpetuate a weak formal institutional structure.

In the case of Brazil we have a clearer, although not definitive, idea of causality from institutions to network configurations. According to Anne Hanley, companies had very dense networks of interlocking directorates before 1890, but with the advent of the republic in 1889 it is not clear if those same elites were in charge of rewriting all the new laws regulating economic activity that were passed in the early 1890s. Our findings show how after these institutional reforms the Brazilian network of company directors was weakened and ended up having low density and low political participation by 1909.

This paper is divided into four sections. In the next section, we explain the institutional differences between Mexico and Brazil. The 2001): 1370. According to these theories we would expect Mexico and Brazil to have similar institutional structures by 1913. Moreover, we might expect Civil Law countries to have very similar protections to investors throughout history, which would lead to very similar development of financial markets. Rafael La Porta, Florencio Lopes-de-Silanes, Andrei Shleifer, and Robert Vishny, "Legal Determinants of External Finance," *Journal of Finance* 52 (July 1997): 1131–50; Rafael La Porta, Florencio Lopes-de-Silanes, Andrei Shleifer, and Robert Vishny, "Law and Finance," *Journal of Political Economy* 106 (Dec. 1998): 1113–55.

11. Paul Windolf, in his recent comparison of corporate networks in Europe and the United States, argues that national corporate networks were products "of an adaptation process to social and political institutions." Thus, institutional changes influenced by cultural variables caused networks to alter their structure. Paul Windolf, *Corporate Networks in Europe and the United States* (Oxford, U.K., 2002). This theoretical model does not fit our results, since changes in networks probably altered institutions, especially in Mexico. For example, several of the top elite in Mexico worked together to change banking and finance laws.

second section presents the methods we used to study and compare networks of board interlocks. In the third section, we present our results, and the fourth section concludes.

Institutions and Politics in Brazil and Mexico

Brazil and Mexico had different political histories during the nineteenth century, a fact reflected in the legal frameworks that regulated their economic activity. After independence, Brazil established a constitutional monarchy with some checks and balances. This provided stability during most of the nineteenth century. Brazil’s constitutional monarchy ended in 1889, when this long-standing system was overthrown by a nonviolent republican revolution. Between 1889 and 1891, a provisional government was established. The new republican government drafted a constitution, modified the banking laws, and enacted a comprehensive law on joint-stock companies. The Republic was democratic but had very low political participation. Nevertheless, the federal system created through the 1891 constitution allowed far more competition of elites for representation within the federal government and competition among the states to attract business and investment. For example, states such as Minas Gerais and São Paulo competed to get the best railroad network to export coffee and agricultural goods. Also, political representation of state elites alternated during much of the first republic. The famous café com leite arrangement occurred for many years, when the republican elite of São Paulo largely alternated control of the presidency with the republican elite of Minas Gerais between 1891 and 1930.

Mexico followed a different path. It experienced long periods of instability after its independence from Spain, and the sequence of civil wars and coups d’états did not end until 1876 when Porfirio Díaz enacted a dictatorship. Before Díaz, power resided mostly in the hands of caciques, or regional bosses, who sharply curtailed the power of the federal government. State power during the porfiriato (1876–1910) was consolidated and centralized for thirty years, usually at the expense of the caciques. Even though both governments had

similar liberal regimes, albeit less democratic in Mexico, they operated with crucial differences. One important difference is that in Mexico there was a higher level of state instability throughout the nineteenth century. As formal and recognized government power changed hands many times at the highest levels in the Mexican government, this may have slowed a subsequent establishment of a strong rule of law.

The political histories of these two countries are interwoven with their different institutional settings, especially in relation to the enforcement of property rights. Although few have done systematic studies on the topic, Noel Maurer and Tridib Sharma argue that one reason for the existence of elite networks in Mexico is the poor protection of property rights.15 Since collateral was hard to repossess in case of default, banks and firms developed entrepreneurial groups to closely monitor their activities and enforce credit contracts. A similar argument is maintained by Stephen Haber, Armando Razo, and Noel Maurer, who argue that, given the poor protection of property rights in Mexico, the government and the elites developed an implicit regulatory pact. In their notion of “vertical political integration,” the government and the elites became partners in the distribution of privileges and rents, while guaranteeing the enforcement of property rights to selected groups that gave political support and loyalty to Porfirio Díaz.16

For Brazil, there are even fewer historical studies of contract enforcement and the protection of property rights. The information available shows a striking contrast with what is known about Mexico. For example, the rights of creditors to their collateral were often enforced by the courts during bankruptcy cases in Brazil between 1850 and 1916. This helped the development of a large and relatively impersonal source of funding: the bond market.17

Entrance to the market was very different in Brazil and Mexico. In Mexico, even though chartering procedures were simple after the Commerce Code of 1889, entrance to banks was very limited.18 Therefore, perhaps the most important barrier to entry in Mexico was access to finance. Since financial markets were underdeveloped

and the institutional settings did not allow banks to do arms-length lending, new firms entering the market in Mexico depended on family and personal connections to obtain funding. Stephen Haber has shown that between the end of the nineteenth century and 1940, the textile industry encountered more difficulties growing in Mexico than in Brazil. He argues that limitations on financing options hindered the development of the Mexican industry. In part, these limitations on finance were a consequence of the chartering laws for banks.

Chartering policy in Mexico restricted access to entry for banking institutions. To even begin operations, an emission bank had to prove that it held between a quarter million and half a million dollars (about $4.7 million to $9.4 million today), while commercial banks were required to have approximately between $100,000 to $150,000 (between $1.8 and $3 million today). The first bank that chartered in each state received a quasimonopoly for note circulation for that state. For nonfinancial firms, the capital requirements to charter a business were less onerous. If an entrepreneur wished to create a business that could compete with one of the state-protected private monopolies (such as the dynamite industry), they were likely to be denied charter.

In Brazil, chartering was an administrative procedure that carried far fewer obstacles. After 1882, the paid-up capital required to establish a firm was 10 percent of total capitalization. The approval of the charter depended only on the decision of the local Junta Comercial, the local commercial office. For banks, charters were relatively easily approved, except when their objective was to issue notes. In this case, bank charters needed approval of the Minister of Finance. Moreover, the rules under the federalist political system in Brazil allowed more competition between the states to charter banks. Conversely, in Mexico, a strong central government under Diaz helped integrate local quasimonopolies with a system of privileges, and reduced the number of Mexican banks. The banking sector during Mexico’s Porfirian period was based on two large national banks that had privileges of branching and note circulation.

Brazil had a longer history of attempts to create a banking system, and this experience added to the number and strength of Brazilian banks. The richest states began chartering one or several state banks as early as the 1830s, but those efforts were not too successful until

20. Haber, Razo, and Maurer, Politics of Property Rights, 87.
the end of the nineteenth century. By the end of the 1880s, though, the Brazilian banking system was growing in importance, and several state banks began to appear far away from the country’s capital. With the establishment of a federalist republic after 1891, a federalized banking system emerged, mostly composed of many state banks. Some of these banks had national branches, such as Banco do Brasil, the British Bank of South America Ltd., and the London and River Plate Bank Ltd.21 By 1909, the Mexican banking system was composed of two big national banks, the Banco de Londres y Mexico, and Banco Nacional de Mexico (Banamex), and many state banks, generally one or two per state (around 40 banks totally). In practice, given the prohibitive taxes on notes issued by second-comer banks, only the first state bank to charter was able to successfully issue notes, which limited entry to further competition.22

Brazilian firms had more formal options of getting funds besides from the banks. Financial markets were more developed, and the federal system promoted the creation of stock markets in many states. For example, in Mexico there is evidence of a fairly important stock exchange for mining ventures in Mexico City. The stock exchange for joint-stock company shares in this capital, however, had very low participation. The list of quotations published in the financial journals of the time shows only a handful of securities that investors actively traded in. Other, smaller stock exchanges operated in cities like Guadalajara, but the journals give little information about the activities of these financial centers. As for the bond markets, Mexico depended on foreign financial markets because there was no domestic market for such securities. There is no evidence that Mexican companies were able to place bond issues in the Mexican stock market. Some companies, such as the Compañía Industrial de Atlixco tried to develop an active market for its bonds in Mexico during the 1890s.

21. The number of banks in each country is difficult to trace throughout the nineteenth century. For Brazil see Carlos Manuel Pelaez and Wilson Suzigan, *Historia monetaria do Brasil* (Brasília, 1976); and Almanak Administrativo, *Mercantil e Industrial* (”Almanak Laemmert”) (Rio de Janeiro, 1889–1914). This later source shows that in Brazil, by 1909, there were between one or two state banks in most Brazilian states, as well as a system of national branches for many Rio de Janeiro banks. For Mexico, we base our accounts on Noel Maurer, “Finance and Oligarchy: Banks, Politics, and Economic Growth in Mexico, 1876–1928” (Ph.D. diss., Stanford University, 1997). For advertisements of foreign banks in Brazilian newspapers, see *Journal do Commercio* (Rio de Janeiro, 1889–1930).

22. Noel Maurer estimates the actual cost of taxes on notes to show that it was not profitable for late entrants to be a part of the issuing business. Maurer, “Finance and Oligarchy,” 48–49.
The bond issue of this company, however, was unsuccessful and the bond market disappeared altogether.\textsuperscript{23}

Brazilian bond and stock markets were relatively active before World War I. The Rio de Janeiro Stock Exchange listed more than 100 stocks and more than 50 bonds throughout the period. The stock of bonds in the Rio de Janeiro Stock Exchange represented 18 percent of the GDP in 1914, the peak year (even higher than bond market capitalization in the 1990s). The capitalization of all the equity listings in the São Paulo and Rio de Janeiro Stock Exchanges represented 20 percent of the GDP (its highest level until the early 1990s). If the equity listings in the relatively small stock exchanges in Recife, Salvador, and Santos were added, the overall bond and stock market capitalizations would be even larger.\textsuperscript{24}

Because Mexican entrepreneurs were fairly restricted in accessing funds other than from banks, they needed connections to certain important people in order to access large amounts of capital. Personal elite connections were crucial to get equity buyers or bank credit. For instance, manufacturing firms showed very low debt-equity ratios, and researchers who have studied this phenomenon have emphasized the importance of the network in substituting for financial markets. Maurer and Sharma argue that since the protection of property rights was poor in Porfirian Mexico, groups of entrepreneurs, particularly textile firms, emerged to enforce property rights through a reputation mechanism that would allow them to get credit from banks. Their study argues that credit through impersonal mechanisms was not common in Porfirian Mexico.\textsuperscript{25}

Evidence from Brazilian historiography is less broad, but generally, scholars have argued that more impersonal sources of finance

\textsuperscript{23} We thank Graciela Marquez at El Colegio de Mexico for sharing the story of the Compañía Atlixco with us.

\textsuperscript{24} For a comparison of Brazil and Mexico, see Stephen Haber, “Financial Markets and Industrial Development: A Comparative Study of Governmental Regulation, Financial Innovation, and Industrial Structure in Brazil and Mexico, 1840–1930,” in \textit{How Latin America}, ed. Haber, 158–59. For Brazil, the argument has been complemented with detailed data on capitalization and number of firms traded in Hanley, “Business Finance,” 116 and Musacchio, \textit{Law and Finance in Historical Perspective}, 52–57.

generated less collusion between firms and entrepreneurs to get credit. One study looked closely at the textile industry and found that commercial and financial regulations in Brazil’s textile industry facilitated entry and access to credit.\textsuperscript{26} As a consequence, textile firms grew rapidly, especially when funding came through the stock exchange. Even though banks did not play a strong role in financing the industrialization of Brazil, the stock exchange was important in providing firms with finance through either equity or bond issues.\textsuperscript{27} Institutional frameworks, including political considerations, chartering and banking laws, and foreign participation, differed greatly between Mexico and Brazil.

Given the differences in the institutional frameworks of Mexico and Brazil, we would expect to find significant differences in the networks of interlocking boards. In Brazil, where formal institutions eased the regulation of entry, reduced the costs of information, facilitated access to credit, and enforced contracts through court intervention, we would expect a more dispersed network of directors. This is because under these institutional settings, we would not expect to find entrepreneurs relying heavily on networks to substitute for formal institutions. In contrast, we would expect to find that in Mexico the authoritarian environment, the lack of third-party contract enforcement, and the complications in accessing credit and information led companies to rely on networks to substitute for those institutional failures.

Sources and Methodology

Network analysis has a long tradition within the social sciences, and its origins can be traced to George Simmel’s sociological and philosophical work on dyads and triads at the turn of the twentieth century. In the last few decades, scholars have begun to refine computational models for network analysis, and large datasets, previously too large to graph and measure, are now being used. This type of analysis, developed primarily by economic sociologists, has been a useful tool in exploring the economic and social relationships among firms, and leadership and power relations among company employees. There are two types of networks we study as defined in the economic sociology literature. First, we analyze “corporate

\textsuperscript{26} Haber, “Financial Markets and Industrial Development,” 146–78.
networks,’’ with connections between firms that share members of boards of directors. If one or more people sit on two boards of directors of two different firms, then one or more links between the latter are created. Second, we look at “elite networks,’’ with connections between individuals who sit on the same boards of directors. The network in both cases is the total “web’’ of relationships between these actors (companies or directors). We use quantitative techniques to study the density of the networks and the frequency of interlocking boards among companies. Additionally, we plot some of these webs into a bidimensional space in order to visualize the structure of the network and give the researcher a chance to observe patterns undetected in the data.

To test our hypotheses, we use a dataset of 98 Mexican firms and 371 Brazilian firms that shared board members in 1909. A company or bank becomes part of a network when one or more of its board members sit on the board of another company. This creates Mexican and Brazilian networks of 1,206 and 1,039 connections, respectively. We also create networks of company directors, where a relationship or tie is established between two individuals when they share a seat on the same board(s) of directors.

We create a database with director names and company information from the Mexican Yearbook and the Brazilian Yearbook for the year 1909. These books present a list of joint-stock companies, their boards of directors, objects of the firm, capital, some stock prices in the previous year, and the size of the debenture issues (long-term senior secured bonds). Qualitative and fragmentary evidence of the prominent actors of these companies is drawn from a wide variety of biographies and secondary sources.

It should be acknowledged that our data is of joint-stock companies only. There is no data on how smaller firms, mainly partnerships, organized their networks in Brazil and Mexico. There is even less information to compare the networks of partnerships in these two countries. Recent research on the role of immigrant and family networks shows that partnerships in both countries had dense

---

28. Unfortunately, the British who wrote the Brazilian Yearbook did not publish any earlier or subsequent yearbooks. The Mexican Yearbook has a wider length of publications, and one interesting extension of this project would be to add both a temporal component and data from the 1913 yearbook. In that year, many of the personalities who figure prominently in our networks for 1909 are gone due to the Mexican Revolution. Many, such as Porfirio Diaz, Jr., had taken up comfortable exile in Paris. Brazilian Yearbook (London, 1909); Mexican Yearbook: A Statistical, Financial, and Economic Annual, Compiled from Official and Other Returns, 1909–1910 (London, 1910).
networks of relations. However, there is no way to compare the networks of partnerships across countries. The joint-stock company was an important form of business organization in both countries. In Mexico, estimates of all business registrations in Mexico City show that corporations represented 93 percent of capital chartered and almost 30 percent of the total number of businesses registered. In Brazil, just the industrial companies chartered in the Rio de Janeiro Stock Exchange in 1912 represented around 80 percent of the total capital of industrial businesses surveyed in the census.29

The first step for analyzing and comparing our networks was to look at their densities. This is a ratio of the total number of ties (interlocks) between actors (companies) to the total number of possible ties that companies could have (the total number of directorships). In other words, density is an important indicator of the reliance of companies on interlocks.

We then turn to the analysis of elite networks by looking at the web of connections between company directors through board interlocks. We tabulate the connections between directors and then use a network visualization program called Pajek to plot the networks.30 This technique is important for demonstrating specific structures of the network that are not obvious through either the cross-tabulation tables or the centrality measures. For instance, cliques of directors hidden in the data may be revealed through their visualization.

The simplest way to measure centrality is by looking at “degree” or “degree of connections.” This is the total number of connections to a single point. We present the average number of connections per sector, and the number of firms with interlocks as a first approach to differentiate the Brazilian and Mexican networks. These simple measures can tell us how much firms relied on interlocks to do business.


In this paper, we do not present all the results of our analysis of directors’ centrality, but we show the 15 most-connected directors in our networks for both Brazil and Mexico. Degree, or the number of interlocks is a very “local” measure of centrality, because it does not take into account the directors who have ties to well-connected individuals. Therefore, when we rank directors according to their centrality we use eigenvalue centrality. Eigenvalue centrality is perhaps the most robust measure of centrality because it recursively takes into account the number of connections of a personality and the connections of those to whom that personality is connected as repeated throughout the whole network. In other words, instead of determining what node has the most connections, this measure weights in the number of connections to other well-connected nodes. This is perhaps one of the most commonly used measures in network analysis.31

One possible weakness of relying strongly on one type of link between firms or directors, such as corporate board interlocks, is that this study excludes other networks that may have connected entrepreneurs, such as kinship, clubs, or friendship relations. For two reasons, we do not believe this study is hindered. First, we systematically document the friendships and working relationships between people who partly owned and managed joint-stock companies when possible. This, of course, raises the question about how often it is possible—and whether there were systematic differences between the well-and less-documented firms. Our best efforts to trace connections, even if not mapping the entire universe of possible relations, yield useful and relevant results.32

In the period we study, company directors represented a set of shareholders who were usually more interested in the performance of the firm than any other stockholder. In most companies, owning

31. In fact, Google uses a version of this measure to rank pages for its search engine, and many antivirus programs measure vulnerability of virus spread using eigenvalue centrality. For a broad survey of network methods and theoretical applications, see Stanley Wasserman and Katherine Faust, Social Network Analysis: Methods and Applications (New York, 1997) or Meter Carrington, John Scott, and Stanley Wasserman, Models and Methods in Social Network Analysis (New York, 2005).

32. In the case of Brazil, for example, Anne Hanley found systematic networks of directors for the late nineteenth century. While her data did not cover the post-1900 period to the same degree, she hypothesized that the strong network ties should weaken after the intense period of institutional change of the 1890s. This is precisely what we find. Hanley, “Is It Who You Know?” Second, because other studies on kinship and association ties have found similar patterns to the networks that we find between directors, it is likely that the results would be strengthened through the inclusion of kinship and association ties.
a certain number of shares was an explicit requirement to be a director and the director’s shares would have to be deposited with the company as a guarantee. This is why we believe that these boards represented people who were more likely to be active in obtaining resources and information for the company. A close examination of the relationships between shareholders would have also shown an interesting web of links, but minority shareholders are not always compelled to work for the well being of the firm. Since board members are often shareholders who have a high stake in the profits of the firm, the exclusion of shareholder networks is partly compensated for by the fact we are studying directors, who were shareholders with a stake in the company. Also, we posit that boards of directors are elected not only because of the managerial capacity of their members, but also by the resources (e.g., capacity to get loans), information, and political connections these individuals may secure for the firm.

There is a large sociology literature that discusses the functions of interlocking boards of directors. Borrowing from the resource dependence perspective of organizational behavior theory, we maintain that interlocking boards were used both to regulate the exchange of resources and to allow the government, corporations, and financial institutions to monitor one another. The central proposition of the theory of resource dependence is that “organizational survival hinges


on the ability to procure critical resources from the external environment. To reduce uncertainty in the flow of needed resources, organizations will try to restructure their dependencies with a variety of tactics . . .” Among those tactics, for instance, “cooptation of the dependent organization stabilizes the flow of valued resources by socializing members of the constraining organization or through the exchange of other valuable goods, such as status, friendship, or information.”35

In our networks, we assume that information that could influence firm decisions was passed from bank to firm or government to firm. At the same time, banks could obtain information about the firm through interlocks, and they could monitor what borrowing companies were doing with their loans. While different networks did not always serve the same function, we strongly believe that they can, at the very least, indicate structural differences between Brazil and Mexico.

Findings

We found that connections among firms, banks, and the government were more numerous and important in Mexico than in Brazil. When the total number of firms with board interlocks in Brazil and Mexico is measured by sector, we find that board interlocks were important in both countries. Table 1 shows the sector averages of the number of connections per firm in Brazil and Mexico. We can see that Mexican firms shared approximately three directors with other firms’ boards of directors, while the average for Brazil was about two. Banks, railroads, and utilities exemplify this trend. For nearly all three of these important sectors, Mexican firms had twice as many interlocks as Brazilian firms. For all the companies in our database, 60 percent of the Mexican firms and banks had two or more interlocks, while 65 percent of the Brazilian businesses shared only one interlock.

In the last column of table 1 it is easy to see that Mexican firms relied on interlocks more heavily. While only 67 percent of Brazilian firms, on average, had interlocks, in Mexico 79 percent of firms used them. In Brazil, some sectors such as railways, shipping, ports, coffee exporters, and banks had over 70 percent of the firms with interlocks. These levels, however, do not compare to what we find for Mexico, where most sectors had over 80 percent connected through interlocks.

Table 1: Average Number of Interlocks per Firm by Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Mexico</th>
<th></th>
<th></th>
<th>Brazil</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average number of interlocks</td>
<td>Number of firms with interlocks</td>
<td>% of firms with interlocks</td>
<td>Average number of interlocks</td>
<td>Number of firms with interlocks</td>
<td>% of firms with interlocks</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1.2</td>
<td>8</td>
<td>57</td>
<td>2.1</td>
<td>31</td>
<td>72</td>
</tr>
<tr>
<td>Banks</td>
<td>3.8</td>
<td>28</td>
<td>82</td>
<td>0.8</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Capital goods</td>
<td>10.0</td>
<td>1</td>
<td>100</td>
<td>0.8</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Coffee</td>
<td>2.4</td>
<td>6</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>2.0</td>
<td>8</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>1.0</td>
<td>1</td>
<td>100</td>
<td>1.2</td>
<td>5</td>
<td>56</td>
</tr>
<tr>
<td>Import/export</td>
<td>0.3</td>
<td>1</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>1.9</td>
<td>25</td>
<td>71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3.2</td>
<td>5</td>
<td>100</td>
<td>1.3</td>
<td>21</td>
<td>66</td>
</tr>
<tr>
<td>Mining</td>
<td>1.6</td>
<td>23</td>
<td>68</td>
<td>1.3</td>
<td>14</td>
<td>45</td>
</tr>
<tr>
<td>Oil</td>
<td>3.3</td>
<td>1</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ports</td>
<td>7.0</td>
<td>1</td>
<td>100</td>
<td>3.1</td>
<td>7</td>
<td>78</td>
</tr>
<tr>
<td>Railroads</td>
<td>4.4</td>
<td>17</td>
<td>89</td>
<td>2.2</td>
<td>24</td>
<td>77</td>
</tr>
<tr>
<td>Rubber</td>
<td>0.4</td>
<td>4</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>0.4</td>
<td>3</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shipping</td>
<td>2.0</td>
<td>10</td>
<td>83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telegraph/telephones</td>
<td>0.5</td>
<td>1</td>
<td>50</td>
<td>0.8</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>Textiles</td>
<td>3.0</td>
<td>7</td>
<td>100</td>
<td>1.7</td>
<td>51</td>
<td>77</td>
</tr>
<tr>
<td>Utilities</td>
<td>4.3</td>
<td>6</td>
<td>75</td>
<td>1.7</td>
<td>25</td>
<td>63</td>
</tr>
<tr>
<td>Totals</td>
<td>3.19</td>
<td>91</td>
<td>79</td>
<td>1.7</td>
<td>248</td>
<td>67</td>
</tr>
</tbody>
</table>

In many sectors of the Mexican economy, such as textiles, ports, and manufacturing, 100 percent of the corporations were connected through board interlocks.

Table 2 compares the Mexican and Brazilian network densities. We find that out of the total set of possible connections between Brazilian enterprises, 2 percent were made. For Mexico, the percentage was five times higher: 10 to 15 percent of possible interlocks were made. This effectively demonstrates that the members of boards of directors in Mexico were much more likely to join another board than their Brazilian counterparts.

The network of banks and manufacturing firms for the two countries were structurally different. Fairly large clusters appear for Rio de Janeiro and São Paulo firms, but these groups are relatively independent. Many additional clusters represent firms from other states such as Rio Grande do Sul, Maranhão, and Bahia. For example, Progresso Industrial, a firm that produced textiles, manufactures in Rio Grande do Sul, and is connected to two banks in that state. Interestingly, banks do not play a central role in these clusters, perhaps because, as some have claimed, banks did not participate actively in
Table 2  Density of the Corporate Network of Interlocks

<table>
<thead>
<tr>
<th></th>
<th>Mexico</th>
<th>Brazil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of interlocks</td>
<td>1206</td>
<td>1039</td>
</tr>
<tr>
<td>Density (binary) (%)</td>
<td>9.53</td>
<td>1.35</td>
</tr>
<tr>
<td>Density (All interlocks) (%)</td>
<td>14.41</td>
<td>1.79</td>
</tr>
</tbody>
</table>

Source: Tables 1 and 2 estimated by the authors using data from the Brazilian Yearbook 1909 and the Mexican Yearbook 1909. Densities estimated using UCINET network density function. S.P. Borgatti, M.G. Everett, and L.C. Freeman, UCINET 6.0 Version 1.00, (Natick: Analytic Technologies, 1999). Density is estimated as the total number of interlocks over the total number of directorships in two ways. First, binary density restricts the possible number of connections between companies to one interlock. In other words, if two companies share two directors, binary density considers this to be only one connection. Second, nonbinary density (i.e., “all interlocks”) count two directors shared by two companies as two connections.

the funding of Brazil’s industrialization during this period.36 This is even more striking if we consider that in both countries there is no strong evidence that banks were providing long-term financing.37

In Mexico, manufacturing companies worked closely with banks. Of the twelve manufacturing and textile firms represented in the Mexican network, eight are closely tied to multiple banks, and four firms are located on the periphery of the main core cluster. There is a strong cluster of large Mexico City banks at the center of our network. It includes most of the banks with privileges to branch-off nationally, such as, Banco Nacional de Mexico, Banco de Londres y Mexico, Caja de Prestamos, and the Banco Central. There was a core structure of elites connected, through Banco Central, to a smaller cluster of banks and manufacturers that included Banco Minero and the Compañía Industrial la Laguna. Other banks from the interior, Banco de Querétaro, the Banco Internacional Hipotecario, and the Banco de Hidalgo, were linked to the core group of Mexico City bankers through the cigarette manufacturer El Buen Tono.

Looking in detail at the interlocking boards by sector in Mexico we find that, as expected, banks were strongly connected with most sectors of the economy. Table 3 shows a symmetric matrix with the number of interlocks among sectors. We see that banks had 405 interlocks with other sectors. They were strongly linked within the banking sector (with 180 interlocks), with railway companies,

37. For instance, manufacturing firms show very low debt-equity ratios, and researchers who have studied this have emphasized the importance of the network in substituting financial markets. See for instance, Haber, Industry and Underdevelopment, and Gomez-Galvarriato, “Impact of the Revolution.”
manufacturing firms, and mining corporations. Other sectors were also strongly connected to banks. As expected in any network of corporations, many of the corporate interlocks were of companies operating in the same sector. The diagonal of the matrix in table 3 shows these links within sectors.

Another way of looking at the networks is to construct a web of connections among the directors instead of among firms. While this may give less information on how the network was organized across economic sectors, the central figures in these networks are distinguishable. Figures 1 and 2 show total elite networks of Brazil and Mexico connected by directors. For the sake of clarity, we have excluded names from these graphs to emphasize structural differences. These two graphs show the striking differences in network structure between Mexico and Brazil. Both graphs repeat the results of the interfirm networks in that the Mexican core network is dense while the Brazilian network is clustered. The small cluster protruding from the Mexican core in figure 1 is a group of English financiers who invested heavily in Mexican railroads and mines.

Table 4 shows the most-connected Mexican directors according to eigenvalue centrality. It is important to notice that the most central company directors were also important politicians. Many were congressmen and top authorities in Mexico City. In fact, most of these personalities were congressmen who had participated in drafting important financial laws, such as the banking law of 1897. Some, such as Pablo Macedo and Joaquín Casasús, were lawyers who offered legal advice to the firms they represented. These lawyers were so connected to the companies they interacted with that they automatically became important brokers of privileged information on many
sectors of the economy. Furthermore, given they helped to draft most of the commercial laws issued during the porfiriato, they guaranteed excellent lobbying possibilities for firms. Other personalities found in our list of top directors were the financial representatives of banks and companies who offered financial information, served as monitors for the banks, and offered credit connections to the firms. For example, the Banco de Londres y México and the Banco Nacional de México (Banamex) were the only banks with the right to issue notes used as legal tender nationwide. Banco de Londres y Mexico was legally
represented by Joaquín Casasús, who fought a stiff political and legal battle against Banamex to win this privilege. Casasús, Pablo Macedo, Guillermo Landa y Escandón, Hugo Scherer, and Fernando Pimentel y Fagoaga (our top directors in table 4) led the Monetary Commission, which between 1903 and 1905 had to decide whether to place Mexico on the gold standard.

Friendship and kinship ties were also important in determining the structure of the Mexican network. For instance, Pablo Macedo and

Table 4 Most Central Mexican Directors and Their Political Careers (ranked according to eigenvalue centrality)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Political position</th>
<th>Occupation or family tie</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pablo Macedo</td>
<td>Congressman</td>
<td>Lawyer</td>
</tr>
<tr>
<td>2</td>
<td>Guillermo Landa y Escandón</td>
<td>Senator for 3 states (1878–1911); Mayor and Governor (Mexico City)</td>
<td>Politician</td>
</tr>
<tr>
<td>3</td>
<td>Hugo Scherer</td>
<td>Member of Commission drafting monetary and banking laws</td>
<td>Financier</td>
</tr>
<tr>
<td>4</td>
<td>Ernesto Brown</td>
<td>Mayor of Mexico City and government advisor</td>
<td>Lawyer</td>
</tr>
<tr>
<td>5</td>
<td>Luis Elguero</td>
<td>Mayor of Mexico City and member of the Monetary Commission</td>
<td>Lawyer</td>
</tr>
<tr>
<td>6</td>
<td>Fernando Pimentel y Fagoaga</td>
<td>Mayor of Mexico City and member of the Monetary Commission</td>
<td>Lawyer</td>
</tr>
<tr>
<td>7</td>
<td>Jose Signoret</td>
<td>Congressman and Governor of Chihuahua; Mexico’s ambassador to the US; Minister of Foreign Relations; Pres., Mex. Banker’s Assoc., and others</td>
<td>Financier Married to the daughter of Chihuahua’s governor, J. Terrazas</td>
</tr>
<tr>
<td>8</td>
<td>Enrique Creel</td>
<td>Congressman and Governor of Chihuahua; Mexico’s ambassador to the US; Minister of Foreign Relations; Pres., Mex. Banker’s Assoc., and others</td>
<td>Financier Married to the daughter of Chihuahua’s governor, J. Terrazas</td>
</tr>
<tr>
<td>9</td>
<td>Luis Riba</td>
<td>Congressman for the State of Mexico; brother of Joaquín Casasús, (below)</td>
<td>Financier</td>
</tr>
<tr>
<td>10</td>
<td>J B Body</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Carlos Casasús</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Henri Tron</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Porfirio Díaz Jr.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Joaquín Casasús</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Roberto Nuñez</td>
<td>Subsecretary of Finance</td>
<td>Lawyer</td>
</tr>
</tbody>
</table>

Sources: Ludlow and Salmerón, La emisión de papel moneda 1997, Haber, Industry and Underdevelopment, 1986, and Peter Smith [producer], Political Elites in Mexico, 1900–1971. Rank given according to eigenvalue centrality. Centrality estimated using UCINET.
Hugo Scherer Jr. were partners of the Minister of Finance, Jose Yves Limantour, in several businesses. The Limantour family had important interests in many of the companies that appear at the core of our network, such as, the Banco de Londres y México, the San Rafael Paper Company (an industrial monopoly), the cigarette manufacturer El Buen Tono, and others. Close friends of the Minister of Finance were also business associates including Pablo Macedo, who directed a newspaper sponsored by Limantour, and Hugo Scherer Jr., who together with Julio Limantour—brother of the Finance Minister, were partners in an investment bank in Mexico City.  

Perhaps the best example of the union of politics and business in Mexico was Porfirio Díaz Jr., the son of the long-ruling Dictator, Porfirio Díaz. Diaz Jr. served on the boards of many important companies, including two banks, El Buen Tono, the Mexican Eagle Oil Company, one railroad company, and the biggest utility company in Mexico. Interestingly, Diaz Jr. also sat on the board of the Banco Internacional e Hipotecario de México with Minister of Finance, Limantour. Finally, the Vice-Minister of Finance, Roberto Nuñez, who appears with Diaz Jr. on the board of El Buen Tono, worked for Banco Nacional de México and Caja de Préstamos, two of the biggest financial institutions at this time. There are many more examples that reflect the finely meshing gears of finance and politics in Mexico.

The role of these politicians in the elite network was very important since information and concessions, or privileges, were passed mostly from politicians to the companies they represented. Without these top political figures, economic survival could have been quite difficult during Porfírian Mexico. Thirty-seven percent of the total firms were represented by at least one of the top fifteen directors included in table 4, and this group of top political elite also worked for firms that controlled 50 percent of the total capital of joint-stock companies in our sample for Mexico. If the foreign firms were excluded, this figure would be much higher. The top political elite also had the largest presence in banking and manufacturing. In banking, they controlled 35 percent of banks, accounting for 65 percent of total commercial and mortgage bank capital in Mexico. In manufactures, they controlled nine of the twelve firms in our database, accounting for 80 percent of total manufacturing capital.

The top political elite also personally influenced business when foreign firms were involved. Many of the foreign firms, such as the big

railroad companies, were legally required to have an overseeing board in Mexico. A majority of foreign firms (chartered and managed abroad) also included these top personalities in their overseeing boards in Mexico. For foreign companies, having these “top directors” seated on their boards lowered the costs of dealing with the government. In turn, the Mexican political elites were able to control important business and financial information, even when they were originally foreign owned. The Mexican Eagle Oil Company exemplifies this arrangement. It was incorporated in Mexico by Sir Weetman D. Pearson, who later became an oil tycoon and one of the richest British investors. Pearson later sold the company to a new group of entrepreneurs but maintained a stake in the company. A new board was formed, which included Guillermo de Landa y Escandón, John B. Body, Enrique Creel, Porfirio Díaz Jr., Luis Elguero, Pablo Macedo, Fernando Pimentel y Fagoaga, Luis Riba, Enrique Tron, and Pearson himself. All these directors are in the top fifteen list we present, while Pearson was the sixteenth-most central figure. The Mexican Eagle Oil Company later became one of the two largest oil companies during Mexico’s oil boom from 1910 to 1925.

Turning now to Brazil, we see far less evidence of political participation. No single Brazilian family or individual was able to attain the same level of business and political power or the same independence and influence over the national government as the Mexican elite during the same period. This is not to say there were no powerful businessmen who used connections with politicians to advance their goals, but rather that power, at least in terms of resources exchanged via interlocking boards of directors, was far more separated into semi-independent political and business spheres and reinforced by a less personal institutional finance system.

For the case of Brazil, we find an overall low level of direct political involvement in business. When lists of directors are compared with comprehensive lists of all federal and state Congress members as well as with lists of top cabinet members, only four directors were involved in politics. First, we found Antônio Carlos Ribeiro de Andrada, who was Minister of Finance of the state of Minas Gerais.

---

40. We mainly used the appendices with state political figures from Wirth, *Minas Gerais*; Levine, *Pernambuco*; and Love, *São Paulo*. We also had to look through comprehensive lists of congressmen such as Brasil, Congresso Nacional, Câmara dos Deputados, *Mesa da Câmara dos Deputados, 1826–1982: composição e relação de membros* (Brasília, 1983) and the lists of public officials available in the *Brazilian Yearbook 1909* and the *Almanak Administrativo, Mercantil e Industrial* (“Almanak Laemmert”) (Rio de Janeiro, 1889–1914).
(1902–1905) and Mayor of Belo Horizonte (1905–1906) and was elected to the State Senate in 1907. In 1909, he served on the board of the Companhia Mineira de Electricidade, a utilities company in the state of Minas Gerais. Second, Antonio Maia served on the Congress and as Secretary of Agriculture of Brazil in 1892. Maia was a director of the Textile Mill, Santo Aleixo, one of the most important mills in Rio de Janeiro. Third, Manuel Py served on the Second National Legislature (1892–1896) for Rio Grande do Sul. Py was a prominent politician in Rio Grande do Sul, where he also served on the boards of a textile mill, Fiação e Tecidos Porto Alegrense; a shipping company, the Companhia Fluvial; and an insurance company, the Sociedade de Seguros Marítimos e Terrestres Porto Alegrense. Finally, Possidonio Manso da Cunha, Jr., also served this state on the Third National Legislature (1897–1899). Manso da Cunha was on the boards of the utilities company Força e Luz Porto Alegrense; the Real Estate and Development Company, Companhia Predial e Agrícola; and two insurance companies, Seguros Marítimos e Terrestres “Phenix de Porto Alegre”, and Seguros Providencia. Overall, we found very few politicians represented on the boards of directors.

At the national level, we see differences in divisions of labor within the elite between Mexico and Brazil. Many of the strong regional political elite from the northern states of Mexico were also businessmen and served on numerous boards of directors. Mexican politicians on boards are exemplified by Juan Terrazas in Chihuahua, Ernesto Madero in Nuevo Leon, and Lorenzo Torres in Sonora. In general, Mexico has more national politicians who also served as company directors in regions distant from the capital, while Brazilian politicians serving at the federal level were less likely to serve on company boards in states far from Rio. A stronger political career tradition developed in Brazil, in which men dedicated their entire working lives to politics. Possibly because Mexico experienced greater political instability during the nineteenth century, the civil service career tradition was less developed.41

The most central actors of our network are railroad and port entrepreneurs linked to Brazilian engineer Teixeira Soares and to

41. Hewlett and Weinert make a similar argument for the impact of nineteenth-century political instability on the economic development of these two countries: “The first historical contrast centers on Mexico’s constant crisis—corrupt governments, civil wars, the loss of national territory, and frequent humiliation at the hands of foreign invaders. Brazil, on the other hand, preserved a stable political legitimacy following independence under the rule of a branch of the Portuguese royal family.” Ann Hewlett and Richard S. Weinert, Brazil and Mexico: Patterns in Late Development (Philadelphia, 1992), 14.
American Percival Farquhar, a railroad and port tycoon, shown in figure 2. Table 5 shows the top fifteen directors of the network that contains directors with more than two interlocking boards. The most central actor is João Teixeira Soares, an engineer from the state of Minas Gerais, who began to profit from railroad development since 1890. In 1909, Teixeira Soares appears on the board of directors of the railroad companies Compagnie Auxiliere des Chemins de Fer du Bresil, Estrada de Ferro de Goias, Estrada de Ferro Noroeste do Brasil, Estrada de Ferro Vitoria a Minas, the São Paulo-Rio Grande Railway, and the Sorocabana Railway. He was also on the board of the Companhia Força e Luz Cataguazes (utilities) and the Companhia Paulista Fabril (textile mill in São Paulo). He became famous for developing the railroad that linked the port of Santos to the city of São Paulo, a railroad that was a technological marvel of its day because it used three stationary engines to pull locomotives over 3,000 feet with tracks at a very steep slope. He was also a pioneer railroad promoter in the financial circles of France and Belgium. His record as an engineer also contained mixed results, given that he was famous for developing a zigzagging segment for the railway line between São Paulo and Rio Grande do Sul (the zigzagging tracks increased the length of the railway line and with it government subsidies).

### Table 5 Most Central Brazilian Directors (ranked according to eigenvalue centrality)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>João Teixeira Soares</td>
</tr>
<tr>
<td>2</td>
<td>Percival Farquhar</td>
</tr>
<tr>
<td>3</td>
<td>Carlos Sampaio</td>
</tr>
<tr>
<td>4</td>
<td>Alexander Mackenzie</td>
</tr>
<tr>
<td>5</td>
<td>Malcom Hubbard</td>
</tr>
<tr>
<td>6</td>
<td>B. H. Binder</td>
</tr>
<tr>
<td>7</td>
<td>Alfredo Maia</td>
</tr>
<tr>
<td>8</td>
<td>Ernesto Genty</td>
</tr>
<tr>
<td>9</td>
<td>Hector Legru</td>
</tr>
<tr>
<td>10</td>
<td>F. S. Pearson</td>
</tr>
<tr>
<td>11</td>
<td>Eduardo Quellennec</td>
</tr>
<tr>
<td>12</td>
<td>Julien Decrais</td>
</tr>
<tr>
<td>13</td>
<td>Comte du Chaylard</td>
</tr>
<tr>
<td>14</td>
<td>Rodney Chipp</td>
</tr>
<tr>
<td>15</td>
<td>Will L Bull</td>
</tr>
</tbody>
</table>

After 1905, he was closely linked to the railroad empire of Percival Farquhar, our second-most-connected director.  

Percival Farquhar was an American who engaged in a string of railroad investments in Cuba and Guatemala before turning to railroads, ports, and utilities in Brazil. He got his first big break in 1904 when he created the Rio de Janeiro Tramway, Light and Power Company. In this venture, Farquhar established a long-lasting partnership with F.S. Pearson (the tenth-most central actor) and Alexander Mackenzie (fourth-most central actor), both of whom were from Toronto, Canada. Pearson and Mackenzie had opened the São Paulo Tramway Company in 1899 and helped Farquhar to enter the Brazilian market. Mackenzie was also an influential lawyer with connections to the government. This small network, which relied on informal connections with politicians who were not board members, opened resources to Farquhar, such as additional concessions to build ports, railroads, and utility companies. Farquhar, Pearson, and Mackenzie together controlled the Bahia Tramway Light and Power Company; the Rio de Janeiro Tramway, Light and Power Co.; the Brazil Railway Company; the Sorocabana Railway; the São Paulo-Rio Grande Railway; the Port of Para (in the Amazon); and the Compagnie Francaise du Port do Rio Grande (port of Rio Grande, in Rio Grande do Sul).

Farquhar’s business empire in Brazil centered on railroads. He created a railroad holding company, the Brazil Railway Company, that he used to buy other concessions (like the São Paulo-Rio Grande Railway), to lease railways from the government (such as the Sorocabana Railway leased from the state of São Paulo), or to buy large equity stakes in other railroads (such as the Estrada de Ferro Paulista and the Estrada de Ferro Mojiana). His idea was to create a national railroad network that would link the South of Brazil to the state of Bahia and the Bolivian border to Rio de Janeiro.  

Ports were also one of the central developments of the clique of entrepreneurs linked to Farquhar. Port works were usually too expensive for local or national financing and required capital from abroad. Farquhar bought the concession to build a port in Belém, in the northern state of Pará, on the delta of the Amazon River. Pará was famous worldwide because the provincial rubber was the most profitable kind of natural rubber well into the twentieth century. For Farquhar’s Amazonian Port, money was raised by selling bonds in

---

43. Ibid., 164, 176–78.
Paris, Brussels, London, Toronto, and New York. His bankers in Paris included Hector Legru (the ninth-most central actor), who gathered a great deal of money to finance Farquhar’s projects. Legru lent the money and also sat on the board of directors of some of Farquhar’s companies to guarantee close monitoring of the projects. Another top director in our network is William L. Bull (the fifteenth-most central director). Bull was a New York financier who worked closely with Farquhar and his associates to find Wall Street financing. As was common for investment bankers of the time, Bull also sat on the board of directors of many of Farquhar’s companies.

Readers familiar with Brazilian business history are probably not surprised to find that the members of the Farquhar “business empire” were so prominent. Our methodology explicitly ranks connected people higher, more so when they are connected to central actors. In addition, Farquhar’s network of directorships was impressive on any count. Farquhar truly controlled the largest network of railroad, tramway, and port companies in Latin America. Moreover, the fact that he and many of the members of his network were foreigners should not be a surprise either. Foreigners knew that networks were a successful way to access resources and information in their home countries. Farquhar himself was trying to reproduce in Brazil the network of directors and pyramidal ownership structures he observed in the United States.

The projects promoted by Farquhar, Pearson, and Mackenzie had to include engineers their investors trusted. For instance, Teixeira Soares became a close ally of Farquhar, shared many board interlocks with his clique, and served an important role as the chief engineer. For the Rio Grande do Sul port works French bankers suggested engineer Eduard Quellenne to lead the project. Quellenne also became a director of many companies in Brazil (he is the eleventh-most central director in the Brazilian network).

The port at Belém, State of Bahia, exemplifies many of the large utility, mining, and railroad projects in Brazil, all of which generally followed three stages. First, the federal government issued concessions that were not always immediately bought because of

44. Ibid., 18, 67, 75, 90, 93, 190–93.
45. For networks in European countries, see, for example, Windolf, Corporate Networks in Europe. For Railway networks in the United States, see Solomon Huebner, “The Distribution of Stockholdings in American Railways,” Annals of the Academy of Political and Social Science 22 (Nov. 1903): 63–78.
high capital requirements.\textsuperscript{46} When they were purchased, many of the buyers were not local elite but businessmen with connections to European or American capital, and who lived in Rio or São Paulo. These wealthy entrepreneurs only occasionally visited the projects, preferring the luxuries and comfort found only in the richest Brazilian cities or to facilitate the coordination of diverse business activities. Men such as Percival Farquhar had connections to the federal elite but almost never invited these politicians to sit on the board of directors of their companies. Therefore, the projects these wealthy entrepreneurs built often faced great opposition by local elites, who could interact with some local governments more closely. For instance, the Guinle brothers, famous for the development of the port of Santos (the main coffee-exporting port in the State of São Paulo), ably used their political connections against Farquhar to drive him out of the tramway business in the State of Bahia.\textsuperscript{47} Eduardo Guinle was the forty-fourth-most central director in our network of top directors, and despite his ranking he was a well connected and influential businessman. This example adds two important points to our analysis. First, network centrality was not the only factor determining business success. Second, Brazilian directors were able to rely on political connections and political moves to weaken their competitors, but unlike their Mexican counterparts, they did not do it in a generalized way through board seats.

Businesses in Brazil, then, did not directly recruit politicians for their boards as often as in Mexico. Instead, company boards included able lobbying entrepreneurs and lawyers. From our top list of directors, at least three of such lobbying directors were helping Farquhar and his clique deal with the Brazilian government. First, Alexander Mackenzie was well connected in Rio de Janeiro and proved very able when it came to acquiring new concessions or securing government approval for new projects. For example, the Rio de Janeiro Tramway Company was finally approved thanks to

\textsuperscript{46} This again points to the lack of national sources of credit available for entrepreneurs. In Santos, local elite bought the first port works concession but could not begin construction because they lacked capital. Only when Guinle and Gaffrey, two elites from Rio with contacts among British financiers, bought the concession did construction begin. Interestingly, the port at Santos (by then the second busiest in the Republic) was not completed until thirty years after a railway scaled the enormous coastal escarpment to connect the port city to São Paulo and the coffee-fertile interior. This lag seemed to be endemic to most Brazilian ports, and there is evidence that ports, modernized long after the railroads had been laid, caused considerable congestion throughout Latin America.

\textsuperscript{47} Gauld, \textit{Last Titan}, 84.
his negotiations with the Mayor of Rio de Janeiro. Second, Carlos Sampaio (the third-most central director in our network) represented the Bahia Tramway Light and Power company in the capital of the country, Rio de Janeiro, and was also a director of the Brazil Railway Company, the Port of Para, the São Paulo-Rio Grande Railway, and the Sorocabana Railway. In 1910, he was in charge of mobilizing a legal team to sue the State of Bahia for damages done to the property of the Tramway Company. Finally, Alfredo Maia (the seventh-most central director) was active in lobbying and protecting Farquhar’s business in the press. He was also a director of the Brazil Railway Company, the Sorocabana Railway, and the Rio de Janeiro Tramway, Light and Power Co.

Another group of highly connected Brazilian board members included Nicola Puglisi Carbone, Rodolfo Crespi, Engidio Falchi, and Edward Wysard (shown in Figure 2). These men served on multiple boards of directors, including the Internacional de Armazens Geraes (warehouses), Fabrica de Cimento Italo-Brazilileira (cement), the Tecelagem de Seda Italo-Brazilileira (silk weaving), and the Banco Commerciale Italo-Brasiliano (banking). Nicola Puglisi Carbone also was part of the board of the Refinadora Paulista and the Banco Francês e Italiano. The most influential of this group was Edward William Wysard, who represented European interests in many businesses such as the Companhia de Industria e Commercio, the Societé Financiere et Commerciale Franco-Bresilienne, the Companhia Internacional de Armazens Geraes, the Refinadora Paulista (wheat mill), the São Paulo and Minas Railway Company Ltd., and the São Paulo Match Factory.

Nicola Carbone and his brother Giuseppe imported wheat flour to São Paulo until they built their own mills and could sell flour at a higher profit. This was a successful venture, and they were able to expand into other areas such as silk weaving, hat manufacturing, sugar refining, and banking. In 1906, they took the helm of the Banco Francês e Italiano, a bank founded by Francisco Matarazzo, another powerful early Brazilian industrialist and fellow Italian. 48 The Carbones found additional investors in Italy willing to grant the

48. Francisco Matarazzo is to many the most prominent and influential of Brazilian entrepreneurs in the last two hundred years. He does not figure as a top director in our network because many of his businesses were kept as private companies or partnerships. Our database only looks at corporations that were publicly traded. Matarazzo became a central figure in the business world of Brazil and dominated the business world during most of the twentieth century. See, for example, Warren Dean, The Industrialization of São Paulo (Austin, Texas, 1969), 31–32, 61–64, 219–21.
bank a sizable transfer of funds. By 1909, the two Carbone brothers had already created several of the crucial connections that would serve in attaining these goals. The next year, the Banco Francês e Italiano formed a partnership with the Banque de Paris et des Pays-Bas, effectively increasing the bank’s capital more than fourfold. Sitting on the board was Emgidio Falchi (a biscuit manufacturer), Alexandre Siciliano (a machinery maker), while Edward Wysard represented the European interests. Historian Warren Dean claims that the bank was “clearly well connected politically” because it won a concession to lend the municipality of São Paulo $3 million at a profitable 7 percent interest “with an option on all future loans until it was repaid.”

Nonetheless, this lending right was obtained without the need for local or national politicians to serve on its board of directors.

In sum, our results have shown (1) that interlocking boards were denser and more common in Mexico, (2) that politicians were more active in the Mexican networks and were largely absent in Brazil, and (3) that in Brazil there is a surprisingly low proportion of politicians playing a part in the network of company directors. These results allow us to conclude that the institutional differences coincided with different network layouts. In Mexico, networks were substitutes for some of the formal institutions available in Brazil.

The Role of Geography

One factor that could be important to determine the differences in corporate networks in Brazil and Mexico is how geographically spread-out was the population in these two countries. In the United States, geographical factors have been identified as important factors shaping networks of interlocking boards of directors. In 1908, approximately 20.5 million Brazilians lived in a country of 8.6 million square kilometers. This same year, the Mexican population numbered 15.2 million within an area of 2.0 million square kilometers. Clearly,

49. Dean, *Industrialization of São Paulo*, 57–58. Dean also describes the relationship between the Puglisi Carbone brothers and Matarazzo, see pp. 31, 57–58.

population densities varied widely between the two countries: 2.39 people per square kilometer in Brazil, and 7.63 per square kilometer in Mexico.

Yet, since Mexico and Brazil were agricultural economies, the differences in population density in the cities is what should determine the differences in network structure. If this is the case, we would expect to find Brazil had more dense networks than Mexico because it had larger cities, which were also very close to each other. In contrast, Mexico had less population in the capital city than Brazil, and had other industrial towns such as Monterrey or mining towns like Chihuahua far away from the capital. The population of Mexico City was close to half a million people around 1910. In contrast, Rio de Janeiro, the Federal District of Brazil, had a population of over 750,000 people during the same period. Brazil’s second largest metropolis, São Paulo, rapidly became a prominent city at the turn of the twentieth century when it began to attract settlers and the lucrative coffee trade. By 1920, it had over 600,000 inhabitants and was rivaling Rio de Janeiro in exports.

If the determining factor was geographical distance we would expect to find a Brazilian network with clear clusters of regional boards of directors largely disconnected from one another and a Mexican network with a more cohesive set of relationships between regional and Mexico City elites. But, if population densities in the cities where most factories were located are the determining factor, then we would actually expect to find a denser network in the southeast of Brazil than in Mexico.

We do not believe geography is the main determinant of network structure in these two countries. According to our analysis, the Mexican network was significantly denser than its Brazilian counterpart (see table 2). Therefore, we discard population density in the main economic centers as the main determinant of network structure. Also, geographic distance does not seem to have created a dispersed structure for the Brazilian network of corporate interlocks. We find that clusters with companies from the state of Minas Gerais (central part of Brazil) are adjacent and connected to the clusters that included firms and banks from Rio Grande do Sul (far south) and Rio de Janeiro (southeast). In a similar pattern, we find companies of Rio de Janeiro with connections to clusters of firms of northern states, such as Pernambuco and Bahia. Banks were, in many instances, important bridges between the companies of these different regions. One of the top central actors was the Banco de Crédito Rural e Internacional, a bank from Rio de Janeiro that played an important role linking a large group of São Paulo companies with the web of interlocks of the rest
of the country. Still, many clusters from distant states like Maranhão tended to be isolated from the rest of the country. Since the clusters are not always grouped by region, geography cannot be the only factor influencing the network structure.

Even when we compare the network of connections in the southeast of Brazil with that of Mexico we find the same results. The network density for the southeast of Brazil is slightly higher than the national average, but far below that of Mexico. Moreover, political participation was also much lower in Brazil. Therefore, there is no evidence that the center-south region resembled Mexico in terms of corporate board interlocks and political involvement.

Conclusion

This paper has looked at the interaction of networks and institutions at the national level of two large Latin American societies during their initial stage of industrialization. Business networks are shown to be more important for entrepreneurs, bankers, and politicians in Mexico. Indeed, the network seemed to supplant formal institutions to the great benefit of connected Mexican elite. These businessmen and politicians could access information and capital despite the absence of many formal mechanisms such as a stock market. In other words, when informal monitoring and enforcement were superseded by a relatively weak rule of law, networks compensated.

Beyond a basic confirmation of our hypothesis, our results gave us two additional surprises. Politicians were numerous in the Mexican elite network but uncommon in the Brazilian network. And while that finding fits nicely with the state/business codependence model that has been theorized in the historiography of Mexico, it contradicts some interpretations of Brazil’s political economy. The second surprise was the degree to which Mexican elite personalities participated in a core pattern of relationships. These patterns repeated themselves in the network of every sector of the economy.

Finally, Mexico and Brazil actually grew at a very similar pace between the 1880s and 1910. This paper shows that at low levels of development there may be little difference in how a country grows, either through strong formal institutions or by substituting for some of those institutions with networks. Politically and socially, on the other hand, the Brazilian model may be preferred. Scholars have long stressed nineteenth-century institutions and social networks when they considered the important historical events that followed the period we study here. The links and causal relations between
networks and institutions, institutions and development, and uneven development and revolutions remain tantalizing subjects for research. For example, in 1910, revolution erupted in Mexico largely because several strong and militant groups that had long felt excluded from the *porfiriato* resorted to violence in order to oust the small group of elite that had brought the country prosperity with social disruption and dislocation. In Brazil, when Getúlio Vargas ousted President Washington Luís and his heir-apparent Júlio Prestes in 1930, he also drew strength from groups that had felt excluded from the republican coalition. In Mexico, over one million people died in the revolution. The Brazilian coup brought about by Vargas and his supporters was relatively bloodless.

The fact that these two economies grew at relatively similar paces does not imply that formal institutions are not necessary. We provide evidence that supports the idea that networks can successfully substitute some institutions and generate the credible commitments that are necessary for the expansion of markets. The networks that we describe in Mexico did not grow from an environment devoid of formal institutions. For example, there were relatively modern chartering, company and bankruptcy laws regulating the operation of corporations. But when formal institutions were lacking or were incomplete, the networks appear to have substituted. This economy looked very much like the United States in the early nineteenth century; formal institutions provided a base, while networks reduced the transaction costs for businesses when the institutions were insufficient. In sum, networks substituted some institutions, but complimented the formal institutional matrix of the country.51

Bibliography of Works Cited

*Books*


**Articles and Essays**


_____. “Financial Markets and Industrial Development: A Comparative Study of Governmental Regulation, Financial Innovation, and


**Newspapers and Reports**


**Brazilian Yearbook**. London, 1909.


**Unpublished Sources**


**Online Sources**
