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Related Lending and Economic Performance: Evidence from Mexico, 1888-1913

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ABSTRACT

There is a consensus among academics and policy-makers that related lending, a widespread practice in most LDCs, should be discouraged because it provides a mechanism through which bankers can loot their own banks at the expense of minority shareholders and depositors. We argue that neither looting nor credit misallocation are *necessary outcomes* of related lending. On the contrary, related lending often exists as a response by bankers to high information and contract enforcement costs. Whether it encourages looting crucially depends on the other institutions that support the banking system, particularly those give depositors and outside shareholders incentives and mechanisms to monitor directors, and that give directors incentives to monitor one another. We operationalize this argument by examining an LDC banking system in which there was widespread related--Mexico from 1888 to 1913. We find little evidence, during this 25-year period, of tunneling or credit misallocation—even in the midst of a major, externally caused financial crisis that occasioned a government-organized rescue. The banking system was, in fact, remarkably stable and manufacturing enterprises that received related loans performed at least as well as their competitors.

There is a broad consensus that banks in developing countries engage in related lending. They commonly extend credit to firms owned by close business associates of the directors, members of the directors' own families or clans, or businesses owned by the banks themselves. It is also common for bank directors to have significant non-financial interests, and to use their banks as mechanisms to finance those interests.

There are two views about the effect of related lending on the functioning of the financial system. The first view holds that related lending has negative effects. This view argues that related lending provides a mechanism for bankers to loot their own banks at the expense of outside shareholders, depositors, and (when there is deposit insurance) taxpayers. This view comes out of the literature on financial crises in LDCs.[1] The second view holds that related lending is good. It allows banks to overcome information asymmetries and is therefore, in Naomi Lamoreaux's words, an "engine of economic development." Related lending also, according to Charles Calomiris, "provides a strong incentive for continuing diligence by the banker," and avoids potential conflicts of interest between the firm and its creditors. This view is supported by Khanna and Palepu's work on business groups in India and by the financial histories of developed nations in North America, Europe and Asia.[2] In fact, as Kroszner and Strahan have shown, related lending is still widespread in the U.S., Europe, and Japan.[3]

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[1] Johnson, Boone, Breach, and Friedman 2000; Laeven 2001; Bae, Kang, and Kim 2002; Habyarimana 2003; La Porta, López-de-Silanes, and Zamarripa 2003.
[2] Lamoreaux 1994; Calomiris 1995; Fohlin 1998; Khanna and Fisman 2004; Khanna and Palepu 2000a, 2000b.
[3] Kroszner and Strahan 2001.

One might be tempted to reconcile these views by arguing that related lending is only pernicious in LDCs. When the expected returns on investment in a firm fall, insiders have strong incentives to expropriate cash and tangible assets from outside investors and use them for more profitable purposes.[4] In developed countries, strong institutions—efficient and non-corrupt judicial systems, well defined property rights, and the rule of law—limit the ability of insiders to expropriate a firm's resources for their own ends. In LDCs, however, outsiders are not protected by these institutions—insiders can expropriate their wealth with impunity.

The implication of this view is that related lending will have pernicious effects— such as banking instability, widespread tunneling, and the misallocation of capital—in less developed countries with weak formal institutions. These effects will be particularly pronounced during financial crises, when the incentives of insiders to expropriate outsiders are strongest.

We test this hypothesis by examining the performance of the Mexican banking system during the 35-year dictatorship of Porfirio Díaz (1876-1911). We focus on Mexico during this period because it lacked the rule of law, an impartial judiciary, and well-enforced property rights. In addition, related lending was widespread, and the economy was hit with a large external shock in 1908 that produced a financial crisis and prompted a government-organized rescue of the banking system.

One would expect that bankers in this economy should have looted their own banks or used them to transfer resources to firms under their control. At the very least, they should have allocated credit inefficiently, over-investing in relatively inefficient firms that they controlled.

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[4] Johnson, Boone, Breach, and Friedman 2000. Also Rajan and Zingales 1998; Johnson, La Porta, López-de-Silanes, and Shleifer 2000; La Porta, López-de-Silanes, Shleifer, and Vishny 1997, 1998; Mitton 2002.

We find, however, that none of these outcomes obtained. We do find that Mexican banks primarily lent to enterprises owned by their own board members (or enterprises owned by the families of board members). They did so, however, because information was costly and contract rights were extremely difficult to enforce through the legal system.[5] Related lending, in effect, provided an informal means to assess ex ante risk and enforce contracts ex post.

We also find that Mexico's bankers did not use related loans as a mechanism to loot their own banks at the expense of outside shareholders, depositors, or noteholders, even when the economy was hit by a large external shock. In fact, the loans they made to their own enterprises were no worse an allocation of credit than that which they could have obtained by making arm's length loans to comparable enterprises. These results are consistent with the theory and evidence presented by Friedman, Johnson, and Mitton regarding the Asian crisis of 1997-98.[6] The implication is that there is no *necessary connection* between related lending and looting.

We do find that related lending gave rise to more concentration in downstream industries. That outcome, however, was not a necessary consequence of related lending: it obtained because related lending in Mexico took place in the context of a concentrated banking system. That is, bankers allocated credit to entrepreneurs on the basis of relational ties, and the number of such ties was small, because there were few banks.

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[5] For a discussion of the importance of the legal system for financial development and economic growth, see Levine 1998, 1999 and La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1998. For more discussion of the advantages that accrue to creditors from long-term relationships in the credit market see Greebaum, Kanatas and Venezia 1989; Sharpe 1990; Rajan 1992; Petersen and Rajan 1994, 1995.

[6] Friedman, Johnson, and Mitton 2003.

Our findings have implications beyond related lending. In recent years, a large literature has emerged on the effects of institutions on economic growth.[7] One of the findings of the literature is that there are numerous cases of dictatorial governments with unambiguously weak institutions to specify and enforce property rights that, nevertheless, experience prolonged periods of rapid growth.[8] Our findings imply that economic actors may be able to compensate for weak legal institutions (at least for a time) by exploiting ties based on long standing social and business relationships.

SOURCES AND METHODS

The analysis that we carry out on the causes and consequences of related lending in Mexico draw on three bodies of evidence that we have developed. The first body of evidence consists of bank financial reports. These reports were published in the financial press, and allow us to estimate bank rates of return, share prices, dividend payments, and capital-asset ratios.

The second body of evidence focuses on bank lending strategies. For two of Mexico's largest banks, the Banco Nacional de México and the Banco Mercantil de Veracruz, we retrieved internal bank records that allowed us to estimate the extent of related lending over long time periods: 1884-1911 and 1898-1906, respectively. These records were located in the Archivo Histórico Banamex and the Archivo General de la Nación, both in Mexico City. For four other large banks, we developed a data set for a cross-section of the loans they made in 1908. These

[7] North and Weingast 1989; Barro 1991, 1997; Engerman and Sokoloff 1997; Rajan and Zingales 1998; Przeworski et. al. 2000; Bates 2001; Acemoglu, Johnson, and Robinson 2001, 2002; Keefer forthcoming.
[8] Przeworski et. al., (2000): 177.

records were also retrieved from the Archivo General de la Nación.[9] The two banks for which we have collected time series information (Banamex and the Banco Mercantil de Veracruz) accounted on average for nearly half of total bank assets. When we add the four banks for which we have cross-sectional data, our sample of banks covers two-thirds of all bank assets.

The third body of evidence focuses on a downstream industry that received related loans from the banks—cotton textiles. We note that the cotton textile industry is an ideal natural laboratory with which to study the impact of related lending on the real economy. First, cotton textiles were Mexico's largest manufacturing industry. Second, the industry was finance-dependent, but at the same time it approximated the requirements of perfect competition to an unusual degree. There were not barriers to entry produced by patents, proprietary technology, control of raw materials, advertising, branding, or control of wholesale or retail distribution. The capital equipment was easily divisible and scale economies were exhausted at small firm sizes, compared to such industries as steel, cement, paper, and chemicals. The industry was also characterized by a high degree of entry and exit. Third, Mexico's cotton textile industry was protected from foreign competition by a high level of tariff protection.

We study the effect of related lending on this industry by employing the Razo-Haber textile data set. We draw seven censuses from their data set: 1888, 1891, 1893, 1895, 1896, 1912, and 1913. These censuses are enumerated at the mill level and contain information on inputs, outputs, firm location, and ownership. We also draw state and national data on textile inputs

[9] We retrieved records of these loans by examining interbank loan sales to the state-owned Caja de Préstamos para Obras de Irrigación. See the Sesiones Administrativas de la Caja de Préstamos, Box 1, located in Galería 2 of the Archivo General de la Nación in Mexico City. Data for the total size of the loan

and outputs from their data set for every year from 1891 to 1913.[10] This state and national data allows us to make certain that the years for which we have mill-level censuses are not outliers. Table 1 presents data on the overall size and growth of this industry.

TABLE 1 ABOUT HERE

We coded the data set in order to capture relationships between bankers and textile mill owners. Specifically, we coded for bank board members who were the sole proprietors of a textile mill, a partner in a firm that owned a textile mill, or served on the board of directors of a joint stock corporation that owned a textile mill. We denote such mills as "bank-related."[11]

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portfolios of these banks were retrieved from their end-of-year balance sheets published in the *Economista Mexicano*.

[10] This data set links mills and firms across manufacturing censuses and excise tax records over the period 1850-1932. For a discussion of the sources and methods used to build the panel, see Razo and Haber, 1998. The census records employed in this study can be found in García Cubas, 1893; Mexico, Dirección General de Estadística 1894; Mexico, Secretaría de Fomento, 1890; Mexico, Secretaría de Hacienda. 1896a; Mexico, Secretaría de Hacienda. 1896b; Archivo General de la Nación, Ramo de Trabajo, Box 5, file 4; Archivo General de la Nación, Ramo de Trabajo, Box 31, file 2. We have recoded their data set to more effectively follow firms during the 1888-1913 period. We have also recalculated the real value of output by substituting the Gómez-Galvarriato and Musacchio price index for the INEGI cotton textile price index employed by Razo and Haber. In addition, we have culled stamping and knitting mills from the data set, and checked the data set against original manuscripts to verify observations with inordinately high or low values.

[11] We note that our definition of bank-connection is restrictive. Entrepreneurs who were connected to a bank in some way other than overlap between their membership on a bank board and ownership of a textile firm (for example, overlapping board memberships in a third, unobserved firm in a different industry, or marriage to a relative of a member of a bank board) are coded as "non-related" firms. We note that the assumption that overlap between mill ownership and a bank directorship is a good proxy for bank credit is consistent with three fundamental facts about Mexican banking. First, we know from case studies by historians that some banks were founded by textile entrepreneurs for the purpose of financing their existing manufacturing ventures. (Gamboa Ojeda 1985; Gamboa Ojeda and Estrada 1986; Rodríguez López 1995.). Second, in the case of Banamex (Mexico's largest bank), some of its board members were textile industrialists and the bank itself was a major stockholder in one of the country's largest textile companies. We know from the minutes of the bank's board meetings that it lent heavily to these enterprises. (Maurer 2002: 98.). Third, evidence from other large banks (reviewed below) makes it clear that they lent primarily to their own board members, members of their families, and their business associates. We also know that the directors of many of these banks also owned textile mills. The list of banks related to textile entrepreneurs or joint stock textile companies consists of Banamex, the Banco de Londres y Mex-

Table 2 presents aggregate data on the relationships between mill owners and bankers. In 1888, 21 percent of textile mills were owned by bank directors or their close relatives. By 1913, the proportion had grown to 54 percent. The percentage of installed capacity controlled by related mills increased from 33 percent in 1888 to 80 percent in 1913.[12]

TABLE 2 ABOUT HERE

RELATED LENDING AND THE MEXICAN BANKING SYSTEM

In the late 1870s Mexico's banking system was so small as to be practically non-existent. Only two chartered banks existed in the entire country. One was a branch of a British bank that operated in Mexico City and focused primarily on financing foreign trade. The other was a small American-founded operation chartered by the government of the border state of Chihuahua. The reason for the tiny banking system is not hard to divine: Mexico's 19th century governments, fighting for their survival against numerous rebellions, coups, secessions, and foreign invasions, preyed upon private wealth. Bankers feared that as soon as they made their capital visible, by obtaining a charter, the government would confiscate it via forced lending.[13]

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ico, the Banco Oriental, the Banco de Nuevo León, the Banco de Durango, the Banco de Coahuila, the Banco Mercantil de Veracruz, the Banco de Guanajuato, the Banco de Estado de México, and the Banco de Zacatecas.

[12] Following Kane 1988, we measure installed capacity by spindles, which constitute the most important capital input for the production of cotton textile goods.

[13] Until the growth of the chartered banking system in the decades after 1884, most financial intermediation took place in merchant houses, which issued bills of exchange and advanced credits to entrepreneurs in their social networks. These institutions did not, however, have any of the advantages of banks: they did not sell equity to outside investors, they did not have limited liability, they did not take deposits, and their bills of exchange had to be 100 percent backed by specie reserves. In short, they were different from modern banks in a fundamental sense: they made money by speculating with the funds of their proprietor, rather than with funds that belonged to people other than the proprietor. For an examination of how such a merchant house operated, see Walker 1987.

Over the next three decades, spurred on by legislation enacted by Porfirio Díaz, who ruled from 1876 to 1911, Mexico's banking system expanded rapidly. The key to Díaz's banking policies was that he provided bankers with a series of segmented monopolies and oligopolies that raised rates of return high enough to compensate them for the risk of expropriation.[14] In 1897, when Díaz's regulatory system was first codified, the entire banking system was comprised of just ten banks with total assets equal to only 12 percent of GDP. (See Table 3). By 1910, (Díaz's last full year in office before he was overthrown), there were 32 banks with total assets equal to 32 percent of GDP. Not only was this a sizable banking system by the standards of developing countries at the turn of the century, it was large by Mexico's current standards: the ratio of commercial bank assets to GDP in Mexico in 2004 was 33 percent.

TABLE 3 ABOUT HERE

The Banking Act of 1897 divided the banking system into three sectors: banks of issue, which emitted bank notes, discounted bills, and made commercial loans; mortgage banks, which lent long term on agricultural and urban properties; and investment banks (bancos refaccionarios), which were supposed to make long-term loans to agricultural and industrial enterprises. Only one of these sectors, the banks of issue, prospered. Limitations on the number of charters the government was willing to grant to mortgage banks, along with difficulties in enforcing contract rights on real property, meant that there were never more than three mortgage banks in the entire country.[15] From 1897 to 1911, total mortgage bank assets averaged only 6 percent of total banking system assets. The investment banks also faltered. They were at a dis-

[14] Maurer and Gomberg 2004.
[15] Riguzzi 2002.

tinct disadvantage against banks of issue, because they could not issue bank notes. They had to compete, however, in the same markets as banks of issue, because the latter were able to skirt the laws that restricted the term of their loans (to six months) by continually renewing credits as they expired.[16] As a consequence, there were never more than six chartered investment banks, and the combined assets of these banks accounted for only 10 percent of total banking system assets. Moreover, the largest bank of this type (the Banco Central Mexicano) did not actually make any long term loans at all. Instead, it operated a clearinghouse for the notes emitted by smaller banks of issue. The investment banking charter was simply a way to get around regulatory restrictions on creating a clearinghouse. In short, when we speak of Mexican banking during this period, we are really speaking about the banks of issue.

Mexico's banking system had three salient features. First, the federal government tightly regulated the number of banks that competed in any market. Second, the institutions that governed banking produced strong incentives for bank directors to monitor one another: there was no deposit insurance; banks were extremely well capitalized; significant amounts of this capital were owned by banks' own directors; and minority shareholders had mechanisms to monitor bank directors. Third, the vast majority of lending was related lending.

Mexico's banking regulations created binding constraints on entry and competition. Only the federal government could grant a bank charter. It allowed only two banks to branch nationally: the Banco de Londres y México (BLM) and the Banco Nacional de México (Banamex). All other banks were prohibited from branching outside their concession territories, generally contiguous with state lines. With very few exceptions, the government chartered only

[16] Maurer 1999: 335.

one bank in any territory, meaning that there were typically only three banks operating in any state: Banamex, BLM, and the federally-chartered local bank for that state. Special tax concessions and high minimum capital requirements safeguarded these charters. In addition, the law prohibited non-chartered banks from issuing notes, meaning that they could not effectively compete against chartered banks.[17]

Bank directors had strong incentives to monitor one another, because the banks were very highly capitalized—and the directors owned much of that capital. One of the most striking characteristics of Mexico's banks was their high capital-adequacy ratios, which is to say that their stockholders had significant amounts of capital at risk. From 1897 to 1910, the ratio of equity to assets never fell below 24 percent—three times current Basle II standards. (See Table 3). Even the banks of issue, which had lower capital-asset ratios because of their ability to issue bank notes, had extremely high ratios: from 1897 to 1910, their average never fell below 21 percent. In part, these capital ratios were driven by the legal requirement that note issues not exceed two (sometimes three) times a bank's cash on hand or three times its paid-in capital.[18] In equal part, however, these capital ratios were driven by risk aversion on the part of bankers, depositors, and noteholders. Banks did not, in fact, issue notes up to their legal maximum.

Independent directors appointed by minority shareholders also monited bank directors. The 1884 Commercial Code, required the recipients of a bank charter (who became the directors) to subscribe to the first tranche of the bank's capital. Banks could later sell additional tranches to outsiders. In addition, bank directors could (and often did) sell parts of their original

[17] Maurer 2002, chap. 2.
[18] Maurer 2002: 43, 111.

stakes. Outside shareholders (who owned a majority of bank stock) then insisted on the appointment of independent directors who monitored the founding board members. Inasmuch as other banks bought substantial amounts of the additional tranches of stock, the independent directors tended to be directors from those banks. [19] The result was interlocking boards of directors that cross-monitored each other. [20] The presence of outside directors also increased the incentives of the insiders to monitor one another: not only their capital was at risk, their reputations were as well. Outside monitoring was not a distant abstraction for the insiders. In March 1908, for example, the outside shareholders of the Banco de Jalisco, displeased with the discovery of "severe irregularities" in the bank's books, replaced the entire board of directors save Vice-president Eugenio Cuzin.[21]

Mexico's bankers started out by making arm's length loans, but quickly shifted to related lending. Banamex, the largest bank in the country, received one of the first federal charters in 1884. It began by making arm's length loans. The problem was that it lacked good mechanisms to assess the quality of borrowers or the collateral they offered. It therefore responded by placing onerous requirements on borrowers, but these worked to create adverse selection. The history of one of its largest manufacturing loans is instructive in this regard. In 1884, it opened a 200,000 peso credit line (roughly US$200,000) to the Hercules textile factory for the purpose of purchasing new plant and equipment. Banamex charged an interest rate of 8 percent and required that the loan be collateralized with 250,000 pesos worth of the factory's

[19] Ludlow 1985: 299-346; Gamboa Ojeda 2003: 106, 111, 116, 129, 132; Ludlow 2003: 147-149, 152; Cerutti 2003: 196, 211-213; Romero y Barra 2003: 229; Rodriguez Lopez 2003: 271-72; Maurer 2002, pp. 74-80, 94-95, 111-113.
[20] Razo 2003, Musacchio 2005.

inventory, with the warehousing costs to be borne by the factory. Given that the factory had to finance the cost of the inventory, this implied an effective interest rate of 18 percent. Terms like these, of course, tend to attract low quality borrowers—and this case was not an exception to that general rule. The Hercules mill was unable to make its payments. Eventually, Banamex sold a portion of the loan to a New York trading house (for only 65 percent of its face value) and recouped the rest by converting the loan into an equity interest in the mill.[22]

This loan, as well as a series of others in which the collateral turned out to be fictitious or unrecoverable, caused Banamex's directors to shift strategy: after 1886 they lent primarily to members of their families, their close business associates, and themselves. In fact, from 1886 to 1901 *all* of Banamex's private (non-government) loans went to its own directors. After 1901 Banamex extended credit to non-related borrowers, but only if they satisfied one of two criteria: the borrower had a loan guarantee from the federal government (as with some railroad companies); or was the Banco Oriental or one of that bank's directors. The reason given by Banamex board members for the latter exemption is instructive: most of the loans made by the Banco Oriental went to its own directors, all well-known textile magnates. Loans to them, and to their bank, were a means of investing in their manufacturing enterprises. Thus Banco Oriental loans were deemed low risk precisely because the bank practiced related lending.[23]

Related lending, in fact, appears to have been standard business practice for Mexico's banks. Data we have retrieved on the loan portfolio of the Banco Mercantil de Veracruz indi-

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[21] *Boletín Financiero y Minero*, 3/20/08.
[22] Maurer 1999: 336-37.

cates that 86 percent of its loans to individuals from 1898 to 1906 went to the bank's own directors.[24] Banamex's largest competitor, the BLM (which controlled, on average, 17 percent of total bank assets), also made sizable loans to its own board members to finance manufacturing start-ups.[25] A cross-section of loans we have drawn for 1908 for four other banks indicate similar lending strategies. 29 percent of the Banco de Nuevo León's loans went to a single firm, owned by one of its directors. 31 percent of the Banco Mercantil de Monterrey's loans also went to a single firm owned by one of its directors. 51 percent of the Banco de Durango's loans went to enterprises owned by the family members of one of its directors. An astounding 72 percent of the Banco de Coahuila's loans went to a single firm owned by family members of a director.[26] Qualitative evidence from case studies by historians, on the Banco de la Laguna, the Banco Occidental, and the Banco de Durango concur with our quantitative analysis.[27]

Precisely because bank insiders had much at stake, the loans that they granted to one another tended to be made on fairly conservative terms. First, they often lent to directors as individuals, rather than to their enterprises. Second, they typically required that credit lines be secured by liquid assets, such as cash, government securities, or corporate securities, which were physically held by the bank. When lines of credit were secured by a cash deposit, they

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[23] Maurer 2002: 95-103, 108-110; Maurer and Sharma 2001: 953-956. The case of the Banco Oriental, and its relationship to the Puebla textile industry, is detailed in Gamboa Ojeda 1985 and Gamboa Ojeda and Estrada 1986.

[24] The data for this estimate come from a random sample of 50 entries in the *Libro de Responsibilidades* of the Banco Mercantil de Veracruz, located in Galería 2 of the Archivo General de la Nación in Mexico City.

[25] Maurer 2002: 103.

[26] We retrieved records of these loans by examining interbank loan sales to the state-owned Caja de Préstamos para Obras de Irrigación. See the Sesiones Administrativas de la Caja de Préstamos, Box 1, located in Galería 2 of the Archivo General de la Nación in Mexico City. Data for the total size of the loan

were obviously not 100 percent secured. Nevertheless, the existence of a security deposit substantially raised the cost of defaulting and lowered the cost of collateral repossession: the bank simply kept the security that it already held in its vault.[28]

The mechanism by which downstream firms established a relational tie to a bank is consistent with the view that related lending was a response to the inability of bankers to enforce arms-length contracts. Mexico's bankers did not choose to lend to a particular textile company, and then demand a seat on that company's board of directors. Rather, a textile mill owner would obtain a bank charter, sell shares in the bank to outside investors, issue bank notes, and then lend those notes to textile mills that he already owned (or, in some cases, found an entirely new mill). Of the 34 textile mills that switched from being non-related to being bank-related between 1888 and 1912, 33 were owned by textile entrepreneurs who later became bankers. In short, bankers did not look at their banks as independent credit intermediaries in the textbook sense of the term. Instead, they looked at them as the investment arms of their widespread commercial and industrial interests.

DID DIRECTORS LOOT?

Did Mexican bankers use related loans to loot their own banks? One would imagine that they had strong incentives to do so. Mexico was hit by an external shock in 1908 that drove down the prices of its major export commodities between 14 and 56 percent (depending on the product). The decline in prices caused mineral and agricultural producers to drastically curtail

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portfolios of these banks were retrieved from their end-of-year balance sheets published in the *Economista Mexicano*.

[27] Aguilar Aguilar, 2003: 74; Rodriguez López 2003; 272, 278-79; Cerutti 2003; 169-70, 196, 204.

[28] Maurer 1999: 345.

production by between 20 and 64 percent (depending on the product), which in turn caused the demand for manufactured goods to fall by 9 to 20 percent (depending on the product). The decline in Mexico's export and manufacturing sectors soon threatened the banking system. Interest rates on commercial paper rose from 8 percent to 10 percent, net new lending dropped to zero, and bank rates of return fell considerably as borrowers began to default.[29]

In response to the crisis, the government quickly organized a rescue. In September 1908 the federal government chartered the *Caja de Préstamos para Obras de Irrigación y Fomento de la Agricultura*. The Caja was financed by requiring Mexico's four largest banks to purchase 10 million pesos of its shares, 25 percent of which they were not permitted to sell. The Caja then issued 44.5 million pesos of government-guaranteed bonds in Europe, with an effective coupon rate of 5.1 percent. (The nominal yield on Mexican government bonds in 1908 was 4.3 percent.)[30] The Caja used the funds from the bond and equity sales to purchase bank loans and bank-issued mortgage bonds in order to inject liquidity into the banking system.[31]

The most obvious sign of bankers extracting resources from their own banks would be an unstable and unprofitable banking system. There are three testable implications of tunneling. First, tunneling produced bank failures that caused losses for depositors and noteholders. Second, directors diverted profits from their shareholders. Third, shareholders perceived holding bank stock was risky and discounted their value accordingly.

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[29] Bank balances and the interest rate on commercial paper from Economista Mexicano. Bond price data from Escalona Salazar.
[30] *Mexican Herald*, 9/3/1908 and 9/4/1908.
[31] Maurer 2002: 66-68.

The evidence does not indicate that any of these outcomes obtained. Mexico had, in fact, a remarkably stable banking system. As shown in Table 3, the number of reporting banks and total bank assets increased steadily throughout the period under study. The only downturn was in 1909, when, as a result of the crisis of 1908, seven small banks of issue failed (two were later rechartered as investment banks, while the others were purchased by larger, more solvent banks). Nevertheless, depositors appear to have perceived that their wealth was not at risk: bank deposits grew in both absolute and relative terms from 1908 to 1909. (See table 3). In fact, in 1897, deposits (exclusive of those securing credit lines) accounted for only two percent of total bank assets. By 1910, they accounted for 16 percent.

One might argue that although the banking system was stable, the directors were still able to extract resources from outside shareholders. That hypothesis, however, is not consistent with the fact that Mexican banks were extremely profitable enterprises for their shareholders. The real return on the book value of equity in 1901-12 for the entire banking system was 12 percent. These returns were not driven by the profits earned by a few large banks: the unweighted average real return-on-equity for all banks was 10 percent per year. Moreover, the evidence does not indicate that the 1908 financial crisis had a long term impact. The rate of return on equity fell in 1908, but it returned to pre-1908 levels in 1909.

INSERT TABLE 4 AROUND HERE

Mexican banks returned these high profits to shareholders by paying out high and regular dividends. In fact, over the 1901-10 decade, the banks paid out almost all of their profits to

shareholders in the form of dividends.[32] Steady dividends translated into high returns from the ownership of banking stock. As Table 4 shows, someone who purchased an index of banking stock weighted by market capitalization would have earned an average *real* return of 9 percent per year. Our estimate of market returns is not driven by the high returns available from owning the stock of the largest banks: an investment strategy based on purchasing equally-sized stakes in all the banks would have yielded a slightly higher average annual real return of 10 percent. Moreover, the crisis of 1908 does not appear to have had a major impact on the returns to owning an index of banking stock. Investors would still have earned a positive rate of return in 1908. By 1910, their returns would have been back at the average levels for the entire decade. (They would have incurred real losses in 1911 and 1912, but that was because stock prices fell as a result of the overthrow of Díaz in 1911).

The returns available to investors in Mexican banking stock were, in fact, more than twice those available from investing in the Dow Jones Industrials. (See Table 4). They were also no lower, on average, than those available from investing in a portfolio of Mexican manufacturing, mining, or land development firms.[33]

A skeptical reader might argue that large dividends (and hence high returns) are evidence in favor of the hypothesis that directors were tunneling: they tunneled by paying out all of the bank's cash flow to themselves as dividends. This interpretation is not, however, consistent with the evidence about bank shareholders. Banks did not grow by taking deposits (as table

[32] In fact, banks paid dividends worth 106 percent of their profits over the 1901-10 period. We estimated this figure from balance sheets published in the *Economista Mexicano*. Profits were calculated as changes in real net worth (adjusted for issues of new stock) plus dividends in 1900 pesos. Real net worth was calculated by revaluing assets and liabilities in 1900 pesos and subtracting the value of new stock issues, if any.

3 shows, deposits were never accounted for more than 16 percent of assets), they grew by issuing additional shares. Lists of the purchasers of these additional shares, which we have for the Banco de Jalisco, the Banco Mercantil de Veracruz, and the Banco del Estado de México, indicate that the majority of these additional shares (57, 85, and 93 percent, respectively) were bought by outsiders.[34] Thus, paying out high dividends would have been a very inefficient way to tunnel: most of the dividend payments would have gone to outside shareholders.

An even more skeptical reader might argue that bankers tunneled through some other mechanism, and that high dividends paid to outsiders were simply compensation for the risk of tunneling. This argument is not, however, consistent with the evidence regarding the price of bank shares. If stockholders feared that the directors were tunneling, they would have discounted the price of shares. We therefore estimated two measures of the degree to which investors discounted shares: market-to-book ratios and the average yield on banking stock. Neither measure is consistent with the hypotheses that banking stocks were heavily discounted.

Table 5 shows the average (weighted and unweighted) market value-to-book value ratio for Mexican banks in 1900-11. Bank stock traded at an average premium of 33 percent over its book value.[35] Moreover, the crisis of 1908 does not appear to have had a major effect on how investors valued their assets.

INSERT TABLE 5 AROUND HERE

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[33] Musacchio 2005.

[34] Ludlow 200; Oveda 2003; Romero Ibarra 2003.

[35] Only the Banco de Michoacán in the years 1909 and 1910 was valued at less than its book value. The Banco de Michoacán was hard-hit by the financial panic in 1909. Banamex agreed to accept responsibility for redeeming the Banco de Michoacán's banknotes if the Banco de Michoacán would agree to abandon its right to issue further notes in the future. There were no losses to depositors or noteholders. Maurer 2002: 80.

The data on banking yields is also inconsistent with the hypothesis that investors heavily discounted banking stock. Between 1901 and 1912 the difference between the yield on Mexican banking stock and Mexican government bonds dropped from 4.4 percentage points to 3.0 percentage points. Moreover, the 1908 financial crisis does not appear to have had a major effect on this overall trend.

INSERT TABLE 6 AROUND HERE

The evidence, in sum, does not indicate that Mexican bankers tunneled either before or after the crisis of 1908. In fact, there is evidence that during the crisis, bankers propped up banks with whom they shared interlocking directorates. For example, the Banco de Jalisco rescued the Banco de Aguascalientes, while the Banco Oriental purchased and merged with the troubled Banco de Oaxaca and the Banco de Chiapas. Banamex assumed responsibility for the note issues of the Banco de Michoacán and Banco de Campeche when they faced runs and could no longer support their note issues. Banamex also aided two troubled banks on the Yucatán peninsula in merging.[36]

Did the banks succeed in weathering the crisis through the expedient of passing off their bad related loans to the Caja de Préstamos? That is, did Mexican bankers treat the Caja de Préstamos the same way they treated the Fobaproa bailout of the 1990s— transferring related loans with a low probability of repayment to the government? The evidence indicates that in 1908 the banks did transfer related loans to the Caja de Préstamos, but that these were chosen by the government precisely because they were high quality loans. In point of fact, the Caja de Préstamos may be the only banking bailout in world history to have made money. The assets

held by the Caja (loans and mortgage bonds transferred from banks) consistently generated a positive cash flow, allowing the Caja to not only pay the interest due on its bonds, but to pay a 10 percent annual dividend on its outstanding share issues. We calculate that the Caja generated a nominal return to all claimants of its assets (bondholders and shareholders) of 4 percent in 1909, 7 percent in 1910, and 8 percent in 1911 and 1912.[37]

DID RELATED LENDING MISALLOCATE CAPITAL?

One might argue that even if bankers did not tunnel enough to jeopardize the health of the banking system, they may have nonetheless diverted resources to their own, relatively inefficient, enterprises. In order to test this hypothesis we turn to our panel of textile mills. If bankers were using their textile mills to channel resources from the banks to themselves, then we would not expect bank related mills to grow. Textile mills would simply be mechanisms to extract the wealth of the bank.

When we look at the growth in the size of mills, however, we find precisely the opposite: not only did bank-related mills grow, they grew faster than their non-related competitors. In Table 7 we calculate the growth rates of mills that existed (and did not switch between the bank-related and non-related categories) across various census periods. In each period, we find that mills that were bank-related outgrew mills that were not bank-related.

INSERT TABLE 7 AROUND HERE

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[36] Maurer 2002: 58, 68; Luce 2003: 132-33.

[37] Calculated from the balance sheets of the Caja de Préstamos, published in *Economista Mexicano*.

Technical Efficiency

A somewhat weaker argument about tunneling would suggest that bankers may have used their banks to support their own, relatively inefficient firms. In this view, bank-related mills may have been productive enterprises (rather than zombie firms whose purpose was to extract bank resources), but would be less productive than their competitors. If this hypothesis holds, it implies that related lending misallocated capital.

As a first step in testing this hypothesis, we estimate a series of probit regressions, where the dependent variable is whether a mill was bank-related, and the independent variables are the characteristics of mills. If credit was misallocated, then we should be able to predict which firms were bank-related based on their performance characteristics. We measure these characteristics as profitability and technical efficiency. We begin our analysis with the 1893 manufacturing census, because it provides extremely detailed data on the costs and volumes of all inputs and outputs. We employ two measures of mill performance: operating margins, and labor productivity. We add controls for mill size and age.

Regardless of the specification, our qualitative results are the same: there were no statistically significant differences between bank-related and non-related mills. (See Table 8.) We estimate similar probits—whose results are not reported here—for 1888, 1891, 1895, 1896, 1912, and 1913. The only difference is that these probits do not include a variable for operating margins because of data constraints. Not a single one of these probits, regardless of the specification employed, found any relationship between technical efficiency and bank relation. The pro-

bits imply, in short, that there was a dead-heat between bank-related and non-related mills in terms of their technical efficiency.[38]

INSERT TABLE 8 AROUND HERE

One might conceivably argue that the probit results on individual cross sections are too blunt an instrument to pick up small, but consistent, differences in productivity across censuses and mill types. We therefore estimate a time series, cross-sectional regression on labor productivity, and report the results in Table 9.[39] We control for mill age, location, bank-relation, and whether it was publicly traded.[40] Our results do not support the hypothesis that bank-related mills had lower labor productivity than their non-related competitors. None of the coefficients on bank-relation are significant.[41]

INSERT TABLE 9 AROUND HERE

A skeptical reader might argue that our productivity measures treat each observation (a mill-year) equally. The regressions do not weight the results by firm sizes. Thus, it might be the case that small, particularly efficient, related mills drive the regression results. We therefore break the sample of mills into two sectors, non-related and bank-related, and calculate the labor productivity of each sector in the aggregate for individual census years. The re-

[38] These probit results are available from the authors.
[39] We measure output as the real value of production. Following Atack and Sokoloff on productivity in the United States, and Bernard and Jones on international productivity comparisons, we took the number of workers as the measure of the labor input. We adjusted, however, for changes in the legal length of the workday. Attack, 1985; Bernard and Jones, 1996; Sokoloff, 1984.
[40] We do not report the results on mill age, location, and traded status because none of the coefficients were large or significant, and because the addition of these variables had no material impact on our cross-sectional dummies or the interaction of the cross-sectional dummies with the dummy for bank-relation.
[41] We also estimated an OLS regression on labor productivity in which we controlled for mill size and capital intensity. That regression produced similar results. We therefore do not report them here.

sults, reported in Table 10, indicate that for the entire period under study, there were no significant differences in productivity between the bank-related mills, taken as a whole, and their non-related competitors.

INSERT TABLE 10 AROUND HERE

An even more skeptical reader might argue that the productivity growth of bank-related firms is an artifact of a greater propensity for the owners of highly productive mills to found banks. That is to say, highly-productive mills may have been more likely to switch out of the non-related category to the bank-related category as their owners formed banks. In order to test this hypothesis, we estimated a Cox maximum-likelihood proportional hazards model to estimate the effect of mill size, age, and productivity (measured both in terms of TFP and output per worker) on the probability of a mill switching from the non-related category to bank-related. Only mill size had a significant effect on the likelihood of switching.

INSERT TABLE 11 AROUND HERE

Economic Efficiency

As a last ditch effort, our skeptical reader might argue that differences in technical efficiency are too restrictive a criterion. What matters is economic efficiency. Efficient mills thrive and grow. Inefficient mills go out of business. Were bank-related mills less economically efficient than non-related mills? In order to test this hypothesis, we employ a Cox maximum-likelihood proportional hazards model to estimate the effect of bank-relation on the probability of mill failure. Mills are defined as "failed" when they disappeared from the subsequent census, never to reappear. All coefficients (and standard errors) are transformed into hazard rates.

Our findings, presented in Table 11, are not consistent with the hypothesis that bank related mills were less economically efficient. In fact, we find exactly the opposite: bank-related mills were only 23 percent as likely to fail as their non-related competitors. This result is robust to the addition of conditioning variables for mill size, labor productivity, and age.

INSERT TABLE 12 AROUND HERE

The Cox hazard model also suggests that being big was endogenous to being bank related. Bank related firms lived longer, and therefore grew larger. This is consistent with our finding that bank related mills grew much faster than their competitors, reported in Table 7.

Market Structure

If bank-related firms grew at a much faster rate than their non-related competitors, then it logically follows that there should have been big size differences between bank related and non-related mills. Table 12 is unambiguous on this point: in 1888, bank related mills were, on average, almost twice the size of unrelated mills; by 1913, they were nearly four times as large.

INSERT TABLE 13 AROUND HERE

If bank-related mills were larger than non-related mills, then it logically follows that the market structure of the textile industry became more concentrated as the proportion of bank-related mills grew. In order to measure concentration we aggregate mills into firms, and estimate four-firm concentration ratios and the Herfindahl index.

In order to determine how low concentration would have been in the absence of related lending, we specify three counterfactuals. The first compares Mexico to itself over time. Cotton textile manufacturing was characterized by constant returns to scale and the absence of entry

barriers. We should expect that, in the absence of related lending, concentration should have fallen as the industry grew. The second compares Mexico to other countries that had large textile industries, but which did not have Mexico's banking system. We focus on the United States, Brazil, and India.[42] The third, following Sutton, compares the Mexican textile industry's actual market structure to a hypothetical, fully competitive industry, in which the market structure was a function solely of industry size and a stochastic growth process.[43]

The results of all three experiments, reported in Table 13, indicate that the Mexican cotton textile industry was "too concentrated." First, concentration in Mexico actually increased over time, even though the industry was growing quickly. (In the United States, Brazil, and India, concentration fell or remained stable as the textile industry grew.) Second, the Mexican cotton textile industry was much more concentrated than the U.S., Brazilian, or Indian cotton textile industry. Third, the Mexican cotton textile industry showed much higher four-firm ratios compared to the ratio that would be expected in a perfectly competitive market, given the number of firms in the industry.

INSERT TABLE 14 AROUND HERE

We note that even though Mexico's textile industry was concentrated by world standards, our results do not suggest that the industry departed very far from perfect competition. The four-firm ratio never exceeded 38 percent, and the number of firms hovered around 110. It is hard to believe that this level of concentration was sufficient to allow even the largest firms to

[42] Haber 1991, 1997, 2003.

[43] The method assumes that all firms in a market have an identical chance of gaining or losing market share over time. Even under perfect competition, therefore, firms will have unequal market shares in

exercise market power. This interpretation is consistent with the historical evidence about firm behavior during this period.[44]

CONCLUSIONS AND IMPLICATIONS

In recent years, policy-makers and academics have become interested in the nexus between finance and growth. Researchers in this field have noted that poor countries tend to have small banking systems. Some have also noted that banks in poor countries engage in related lending. The consensus view that has emerged from the related lending literature is that causality runs from related lending to a small and inefficient banking system, and from a small banking system to slow growth. The posited mechanism behind the relationship between related lending and a small banking system is that bankers loot their own banks or systematically misallocate capital.

We argue, based on a study of a banking system characterized by widespread related lending, there is no *necessary connection* between related lending and looting. We also find that there is no *necessary connection* between related lending and a misallocation of capital. Our analysis of the performance of a downstream industry indicates that Mexican bankers did not choose to lend to firms that were systematically less productive than their competitors.

Our analysis has two implications. First, the fact that related lending is an endogenous outcome of the ability of bankers to assess risks and enforce contracts means that a ban on related lending may actually produce little (or no) lending at all. The canonical case of this phe-

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equilibrium, but the market share of the largest firms will solely be a function of the number of firms in the industry and a stochastic growth process. See Sutton 1998.

[44] See Haber 1989: 94-95, and Gómez-Galvarriato 1999.

nomenon also comes from Mexico, where regulators have been quite effective in curtailing related lending since a series of accounting and regulatory reforms in 1997. The response of Mexico's banks has been to drastically curtail private lending, shifting their assets into corporate and government securities, as well as loans to states and municipalities.[45]

One might argue that this effect can be mitigated if governments invest in institutions that enhance property rights, thereby encouraging more arm's length lending. We would argue, however, that for both fiscal and political reasons, enhancing property rights, especially in the short run, is much easier said than done. Enhancing property rights comes at a fiscal cost because it requires costly investments in organizations such as property registers, professionalized police forces, and judiciaries that are not subject to bribery and threat. Enhancing property rights also requires political reform because public officials must be blocked from behaving opportunistically when it comes to adjudicating and enforcing private contracts. Removing their discretion requires that they (and the government) be bounded by formal political institutions that create ex ante veto points and ex post sanctions. Thus, to argue that governments can enhance property rights enforcement at the stroke of a pen is to engage in a nirvana thesis.

The second implication of our analysis is that if bankers have their own capital and reputations at risk, they will make related loans based on the performance criteria of the receiving firms. The case we have analyzed indicates that three conditions appear to be crucial. The first condition is that banks enjoy high capital-asset ratios. In the case under study, the capital asset ratios were three times the levels recommended by Basel. The second condition is that bank directors own substantial equity shares in their own banks. This gives bank directors in-

[45] Haber and Musacchio 2004.

centives to monitor one another. The third condition is that depositors and outside shareholders have their own money at risk. This gives depositors and outside shareholders incentives to monitor the directors.

We note that the results we obtained for the Mexican case are consistent with those of other cases—particularly contemporary India.[46] They are also consistent with the results obtained in historical case studies of the United States and continental Europe in the nineteenth century.[47] We would submit, therefore, that far more research is needed into the causes and consequences of related lending before academics and public officials embrace any particular set of policy recommendations.

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[46] Khanna and Fisman 2004; Khanna and Palepu 2000a, 2000b.

[47] Calomiris 1995; Lamoreaux 1994.

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Table 1

The Mexican Textile Industry

	Number of Mills	Output in 1900 Pesos	Output in Meters	Spindles	Workers
1878	73	na	73,597,000	249,294	11,922
1888	84	11,484,000	na	249,591	15,083
1891	85	13,795,758	93,526,834	277,784	14,051
1893	113	19,925,011	122,550,335	370,570	21,963
1895	98	26,013,666	170,928,751	411,090	18,208
1896	100	25,338,269	206,411,839	430,868	19,771
1898	112	na	na	469,547	na
1899	120	32,564,462	231,685,692	491,443	23,731
1900	122	35,458,578	261,397,092	588,474	27,767
1901	133	35,553,376	262,043,539	591,506	26,709
1902	124	27,938,569	235,955,965	595,728	24,964
1903	115	31,338,693	262,169,838	632,601	26,149
1904	115	34,645,972	280,709,989	635,940	27,456
1905	130	46,097,321	310,692,041	678,058	30,162
1906	130	44,894,422	349,711,687	688,217	31,673
1907	129	41,325,963	376,516,577	693,842	33,132
1908	132	35,303,315	368,370,354	732,876	35,816
1909	129	36,656,495	314,227,874	726,278	32,229
1910	121	39,118,584	315,322,022	702,874	31,963
1911	119	39,286,480	341,441,477	725,297	32,147
1912	126	46,848,154	319,668,409	762,149	32,209
1913	128	36,642,671	298,897,198	752,804	32,641

Sources: Haber 1989, Table 8.1; Haber, Razo, Maurer, Tables 5.2 and 5.8. Original censuses for 1888, 1891, 1893, 1895, 1896, 1912, and 1913 can be found in: México, Secretaría de Fomento, 1890; México, de Estadística, 1894; México, Secretaría de Hacienda, 1896a; México, Secretaría de Hacienda,1896b; Archivo General de la Nación, Ramo de Trabajo, Box 5, file 4; Archivo General de la Nación, Ramo de Trabajo, Box 31, file 2. A discussion of how these censuses were merged into a panel with a uniform format can be found in Razo and Haber 1998.

Table 2

Mexico's Textile Industry, By Bank Relation, 1888-1913

	Percent of Mills Related to Banks	Percent of Output (by Value) Produced by Bank Related Mills	Percent of Output (by Volume) Produced by Bank Related Mills	Percent of Capacity (by Spindlage) Installed in Bank Related Mills
1888	21%		32%	33%
1891	20%		32%	
1893	30%	48%	51%	51%
1895	39%	58%	59%	59%
1896	40%	58%	60%	62%
1900	57%	75%		
1904	55%	75%		
1909	61%	81%		
1912	55%	79%	80%	82%
1913	54%	77%	78%	80%

Source: See Table 1.

Table 3
The Mexican Banking Industry, 1897-1913

	Number of Banks[1]	Total Assets (milions of nominal pesos)	Assets as % of GDP	Average Equity Ratio[2]	Deposits as % of Assets	Deposits as % of GDP	Bank of Issue Assets as % of Total Assets
1897	10	147	12%	32%	2%	0%	93%
1898	16	175	15%	32%	3%	0%	94%
1899	18	211	18%	31%	2%	0%	90%
1900	20	259	20%	31%	5%	1%	90%
1901	24	264	15%	35%	4%	1%	87%
1902	25	317	19%	31%	5%	1%	88%
1903	31	380	20%	31%	4%	1%	86%
1904	32	435	24%	30%	3%	1%	88%
1905	32	535	24%	28%	6%	2%	87%
1906	32	629	28%	32%	9%	3%	88%
1907	34	724	31%	30%	9%	3%	83%
1908	34	757	31%	31%	9%	3%	81%
1909	32	917	35%	26%	16%	6%	80%
1910	32	1,005	32%	24%	16%	5%	80%
1911	33	1,119		22%	13%		81%
1912	34	1,086		23%	15%		78%
1913	28	1,105		21%	15%		77%

1. Includes banks of issue, mortgage banks, and investment banks (bancos refaccionarios).

1913 figure does not include 6 banks that did not report because of the revolution.

2. Weighted by assets.

3. Weighted by market capitalization.

Source: Number of banks, book equity, assets, and deposits calculated from Secretaria del Estado y del Despacho de Hacienda y Credito Publico y Comercio, Anuario de Estadistica Fiscal, 1912-1913. GDP from Instituto Nacional de Estadistica Geografia e Informática (1994), p. 401.

Table 4

Real Rates of Return on Mexican Banking, 1901-12[a]

	Real Returns on Book Equity		Real Returns from Owning an Index of Bank Stocks		Real Returns from the Dow Jones Index
	Weighted Average[1]	Unweighted Average	Weighted Average[1]	Unweighted Average	(Peso Terms)
1901	10%	10%	11%	17%	-7%
1902	14%	13%	16%	17%	-7%
1903	1%	0%	8%	14%	-24%
1904	4%	7%	6%	7%	41%
1905	40%	29%	33%	29%	37%
1906	23%	13%	16%	20%	-5%
1907	4%	6%	6%	8%	-41%
1908	0%	4%	2%	3%	52%
1909	14%	9%	12%	-1%	7%
1910	4%	3%	9%	10%	-21%
1911	20%	14%	-8%	-4%	9%
1912[b]	11%	10%	-2%	1%	1%
Average	12%	10%	9%	10%	4%

a. All values converted to 1900 pesos using the Gómez-Musacchio index.

b. First semester, annualized.

1. Weighted by market capitalization.

Source: Stock prices and dividends reported in the Economista Mexicano.

Dow Jones data from Haber, Razo, Maurer, Table 5.12.

Table 5

Market to Book Ratios for Mexican Banks

	Weighted Average[1]	Unweighted Average
1901	1.52	1.20
1902	1.63	1.27
1903	1.69	1.25
1904	1.84	1.27
1905	1.95	1.35
1906	1.81	1.44
1907	1.76	1.41
1908	2.09	1.45
1909	2.14	1.33
1910	2.09	1.37
1911	1.90	1.33
Average	1.86	1.33

1. Weighted by market capitalization.

Source: Stock prices and dividends reported in the Economista Mexicano.

Table 6

Banking Stock Yields

	Average Yield on Bank Shares[1]	Average Yield on Government Bonds	Bank Share Premium
1901	9.4%	5.0%	4.4%
1902	8.4%	4.9%	3.5%
1903	8.3%	4.9%	3.4%
1904	7.5%	4.8%	2.7%
1905	8.1%	4.3%	3.8%
1906	8.0%	4.3%	3.7%
1907	7.1%	4.4%	2.7%
1908	7.5%	4.3%	3.2%
1909	6.8%	4.3%	2.5%
1910	7.4%	4.3%	3.1%
1911	7.7%	4.5%	3.2%
1912	7.6%	4.6%	3.0%

1. Dividends divided by market price of common stock.

Source: Stock prices and dividends reported in the Economista Mexicano.

Government bond yields from Escalona Salazar, p. 93.

Table 7

Average Annual Growth in Capacity Across Census Periods[1]

	Years Between Censuses	Bank-Related Mills	Non-Related Mills
1888-93	5	5.5%	4.0%
1893-95	2	11.0%	8.4%
1895-96	1	7.6%	4.1%
1896-1912	16	2.4%	0.4%

1. Rate of growth in capacity, measured in spindles, among firms listed in both censuses. Thus, 1888-93 cohort represents firms listed in both the 1888 and 1893 censuses.

Source: See Table 1.

Table 8

Probit Results for 1893 Census Cross-Section

Dependent Variable = 0 if Independent, 1 if Bank-Related

T Statistics in Parentheses

	Spec. 1	Spec. 2	Spec. 3	Spec. 4	Spec. 5	Spec. 6
Number of Observations	81	81	81	101	100	100
Pseudo R2	0.01	0.01	0.10	0.01	0.01	0.11
Constant	-0.70***	-0.65**	-4.93***	-1.70	-1.67	-4.08***
	(3.89)	(2.05)	(3.09)	(-1.50)	(-1.49)	(-2.88)
Operating Margins	0.64	0.63	-0.05			
	(0.98)	(0.97)	(0.08)			
Ln (Output per worker)[1]				0.18	0.19	-0.15
				(1.02)	(1.18)	(0.71)
Age of Mill		0.00	-0.01		0.00	-0.01
		(0.21)	(-0.72)		(-0.44)	(-1.04)
Ln (Size)[2]			0.58***			0.60***
			(2.78)			(3.25)

* Significant at the 90 percent level.

** Significant at the 95 percent level.

*** Significant at the 99 percent level.

1. Output measured by value.
2. Size measured as natural log of installed spindlage.

Source: Dirección General de Estadística, 1894.

Table 9
Labor Productivity Regressions[1]

Dependent variable = (LN) Output Per Worker (in 1900 Pesos)
T statistics in parentheses

	Spec 1	Spec 2
Observations	486	486
Mills	164	164
R^2	0.2706	0.2808
Constant	6.47***	6.45***
	(98.69)	(83.78)
1895	0.59***	0.62***
	(8.19)	(6.69)
1896	0.60***	0.64***
	(8.29)	(6.91)
1912	0.58***	0.53***
	(7.94)	(4.73)
1913	0.60***	0.57***
	(8.25)	(5.18)
Bank-Related 1893		0.06
		(0.46)
Bank-Related 1895		-0.13
		(-0.10)
Bank-Related 1896		-0.05
		(-0.40)
Bank-Related 1912		0.10
		(0.85)
Bank-Related 1913		0.09
		(0.76)

1. Functional form is OLS. Controls for mill age, location and traded status did not materially affect the results.

* Significant at the 90 percent level

** Significant at the 95 percent level

*** Significant at the 99 percent level

Source: See Table 1.

Table 10

Weighted Labor Productivity, By Mill Type

	Output Per Worker (1900 Pesos)		
	Non-Related	Bank-Related	Difference
1893	991	1,049	6%
1895	1,243	1,266	2%
1896	1,204	1,201	0%
1912	1,371	1,403	2%
1913	1,384	1,373	-1%

Source: Table 1.

Table 11

Cox Hazard Model

Dependent Variable=1 if Switch to Bank-Related, 0 if Remain Independent[1]

T Statistics in Parenthesis

	Spec. 1	Spec. 2	Spec 3	Spec 4	Spec 5	Spec 6
Number of Observations	301	296	164	267	164	267
Prob > chi2	0.0162	0.0464	0.3168	0.0503	0.2396	0.0631
LN (Installed Spindlage)--Proxy for Size	1.50**	1.43**	1.42	1.62**	1.49	1.54**
	(2.34)	(2.02)	(1.28)	(2.44)	(1.44)	(2.26)
Age of Mill		1.01	1.01	1.00	1.01	1.00
		(0.73)	(0.76)	(0.48)	(0.82)	(0.47)
LN (TFP)--Value[2]			-1.00			
			(-0.55)			
LN (TFP)--Meters[2]				1.00		
				(0.98)		
LN (output per worker)--Value[2]					-0.70	
					(-1.00)	
LN (output per worker)--Meters[2]						1.15
						(0.55)

1. When coefficients are transformed into hazard rates they represent the effect that the independent variable has on the mill failing. The smaller the coefficient, the greater the independent variable's impact on the mill's chance of switching from independent to bank-related. For example, a coefficient of 1.50 on the size variable means that for every doubling of bank-related rises 50 percent in any given period.

Table 12

Cox Proportional Hazard Model

Dependent Variable=1 if Survive, 0 if Fail1

T statistics in Parenthesis

	Spec. 1	Spec. 2	Spec. 3	Spec. 4
Number of Observations	467	431	275	271
Prob > chi2	0	0	0.0001	0.0004
Bank-Related Dummy	0.23***	0.39**	0.32***	0.34**
	(-3.96)	(-2.53)	(-2.62)	(-2.45)
LN (Installed Spindlage)--Proxy for Size		0.59***	0.63**	0.66*
		(-3.92)	(-2.06)	(-1.76)
LN (Output Per Worker)--Real Value2			0.89	0.92
			(-0.49)	(-0.36)
Age of Mill				0.98
				(-1.25)

1. When coefficients are transformed into hazard rates they represent the effect that the independent variable has on the mill failing. The smaller the coefficient, the greater the independent variable's impact. For example, a coefficient of 0.23 on the bank connection dummy means that a bank connected mill has a 23 percent chance of failing in any given period compared to an independent mill.

2. Output per worker data adjusted for changes in length of legal workday.

* Significant at the 90 percent level.

** Significant at the 95 percent level.

*** Significant at the 99 percent level.

Source: See Table 1.

Table 13

Average Textile Mill Size (In Spindles), By Mill Type

	Non-Related Mills	Bank-Related Mills	Size Ratio (Bank Related/Non Related)
1888	2,549	4,611	181%
1893	2,320	5,467	236%
1895	2,759	6,711	243%
1896	2,862	6,417	224%
1912	2,303	8,725	379%
1913	2,234	8,680	389%

Source: See Table 1.

Table 14

Industrial Concentration in Cotton Textiles,
Mexico, Brazil, India, and the United States

	Four Firm Ratio					Herfindahl Index		
Circa	Mexico	Mexico Expected	Brazil	India	U.S.A.	Mexico	Brazil	India
1888	18%	19%	37%		8%	0.022	0.058	
1891	20%	19%				0.020		
1893	29%	15%				0.038		
1895	33%	17%	35%			0.042	0.059	
1896	30%	16%				0.041		
1900	30%	14%		19%	7%	0.038	0.028	0.018
1904	33%	15%	21%			0.042		
1909	38%	15%				0.045		
1912	30%	14%		19%	8%	0.039		0.018
1913	31%	14%	14%			0.041	0.014	

Source: For Mexico see Table 1; for Brazil, Haber 1997; for India and the U.S.A., Haber 2003.