

THE NEW INSTITUTIONAL ECONOMICS AND LATIN AMERICAN ECONOMIC HISTORY: THEORY AND APPLICATION

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There has been, in recent years, a revolution in the social sciences related to the role of institutions in determining a broad range of economic and political outcomes. Institutions in this context are understood not as the organizations that societies are composed of (the banks, churches, factories, governments), but are the sets of rules that govern how those organizations work.¹

That “institutions matter” is not, of course, a controversial (or new) proposition in Latin American history. Most historians, Latin Americanists among them, firmly hold to the notion that human beings devise all kinds of social constructs that affect their behavior in empirically verifiable ways. While historians may firmly believe that “institutions matter,” they have, however, lacked the analytic and quantitative tools to explain *which* institutions mattered, *how* they mattered, and the *extent to which* they mattered.

What the New Institutional Economics (NIE) has offered to historians are two sets of tools. The first is that the NIE is a formalized theory that permits the specification of testable hypotheses. Second, because its roots are in formal political science and economics, fields that have long traditions of statistical hypothesis testing against systematically gathered data, the NIE is easily linked to the methods of econometric history that Latin American historians have been employing with some success over the past several decades.² The combination of new methods and a new theoretical framework have, in turn, produced a corpus of work that is bringing about a substantive revision of the economic history of Latin America. In particular, scholars have begun to look at how the particular organization of political systems gave rise to particular economic policies or regulations, and how those policies or regulations, in turn, exerted an empirically demonstrable impact on the rate of growth, the structure of economies, and the distribution of income and wealth.

The purpose of this paper is threefold. First, it presents, in broad strokes, a brief explanation of the NIE. Second, it presents an argument about the importance of Latin American history to the development of the NIE. In particular, I argue that Latin American economic history is an ideal natural laboratory to study many of the propositions that emanate from the New Institutionalism. At the same time, the NIE provides Latin American historians with a powerful set of analytic tools that is useful for doing better history. Third, it presents a practical application of the NIE to a question in Latin American economic history: what are the political origins of regulatory laws related to securities markets and banks, and what impact did those laws have on the structure and performance of real economies?

THE NEW INSTITUTIONAL ECONOMICS

A few words about the core concepts of the NIE are in order. The NIE argues that economic growth is caused by productivity increases that are brought about by the more efficient allocation of factors of production through more smoothly functioning firms and

markets. Smoothly functioning firms and markets, in turn, are the product of changes in institutions--the laws, rules and informal agreements within societies that both permit and bound economic or other types of social behavior. An institution is a set of rules or procedures that an individual or corporate body is prescribed to follow when interacting with others in a particular situation. Institutions limit the universe of actions that an individual can take, and therefore function as societal constraints that guide and coordinate social interaction. Ultimately, the function of institutions is to provide a set of rules --established patterns of admissible behavior-- to regulate and reduce uncertainty about those interactions.³ All things being equal, according to the NIE, societies that create institutions that clearly specify and enforce property rights, ease the formulation and enforcement of contracts, limit the ability of governments to intervene in the economy for their own short-term advantage, and generally support the operation of efficient markets will generate more rapid rates of economic growth than those that do not.

The NIE relaxes many of the strong assumptions of traditional economics with respect to the motivations of, and the information available to, individual decision makers. Neoclassical economics had assumed that the rules of social interaction are given, in the form of the rules of an efficient market economy, and that people do not deviate from the equilibrium path indicated by those rules. One of the basic assumptions of neoclassical economics was that economic agents had perfect information and zero transactions costs. In this world of perfect information and zero transactions costs, institutions were not consequential: any attempt to constrain the activities of economic agents could be easily mitigated by contracting around whatever rules or regulations governments created. The problem is, of course, that we do not live in a world of perfect information and zero transactions costs. In the real world of asymmetric information, bounded rationality, and non-zero transactions costs, the specific content of policies, regulations, and formal rules matters—and matters a great deal—in the ability of individuals, firms, and markets to respond to economic opportunities.⁴

This has resulted in three insights. First, there is a whole range of economic activity that may not take place because the costs of transacting are too high. The outcome is slower economic growth. Second, formal rules may be designed in such a way as to permit particular groups of economic agents to engage in a particular activity, while constraining everyone else from doing so. The outcome is a stream of rents that can only be earned by that particular group, with negative distributional and efficiency consequences for the rest of society. Third, economic agents may choose not to obey the rules of social interaction. Instead, they may devote resources to changing the inherited set of rules, often with the goal of redefining the rules so as to generate rents for themselves.⁵

This is not to say, however, that economic institutions are created in a random fashion. One of the insights of the NIE is that the political determination of economic institutions is the result both of interest group demands *and* the specific features of decision making in the political system—which is itself governed by institutions. In fact, the political system *is* a set of institutions designed to aggregate individual preferences. On the one hand, these political institutions include the rules about *who* has the authority to legislate and enforce the regulations that govern economic activity and *what* are the legitimate extensions of that authority. On the other hand, these political institutions also specify the way in which a polity might change the rules about who has the authority to regulate and the legitimate

extent of regulation. Thus, the study of the origins and consequences of economic institutions requires also the study of the institutions that structure political decision making.

There are, of course, a broad range of rules and regulations that both permit and impinge upon the activities of economic agents. Most of them, however, can be grouped into two broad categories: those that specify and enforce property rights; and those that specify and enforce the revenues obtained from those property rights. There are institutions that define the rules regarding the possession, use, and transfer of property. It is these rights to property that governments abrogate by, for example, nationalizing them or transferring them to another private party. There are also, however, a whole range of institutions, which take the form of government policies or regulations, that affect the ability of those who hold property rights to earn revenues from that property. From the point of view of economic agents, these are equally important because an asset that cannot provide revenue is, by definition, valueless—even if the right to the property has not been abrogated or diminished. In fact, from the point of view of governments, it may make sense to support and enforce property rights precisely so that they can create a stream of revenues that can be taxed.

Permit us a discussion of the impact of import tariffs to make the distinction between property rights and the revenues from property clear. Imagine a situation in which a particular industry has grown under a protective tariff. Industrialists own the factories and the related assets (buildings, land, and the like) and they earn a stream of revenues from those assets. Now imagine that the government eliminates the tariff, pushing product prices down below the level where industrialists can earn a positive rate of return on their assets. The property rights of industrialists have not been abrogated—they still own the factories. Their rents, however, have been reduced, and this, in turn, reduces the value of the factories. Changes in tax regimes, labor laws, monetary policies, exchange rates, and a whole host of other regulations can exert similar effects on rents.

There is therefore a complex interaction between the institutions that govern the polity and the institutions that govern the economy. Working backwards, we can specify the relationship in the following way. Economic institutions (sets of rules and regulations that specify property rights, regulate entry, create and administer taxes, encourage the formation of human capital, and the like) directly affect the performance and structure of markets, industries, and firms. Some of these institutions develop outside of the political system, through an evolutionary process of private contracting. Ultimately, however, these institutions become subject to the influence of the political system, because they require third party enforcement. More often than not, however, economic institutions are the direct product of the political system. Indeed, economic institutions are often formulated in order to accomplish political ends, such as the distribution of rewards or benefits to a legislator's constituents. The reform of economic institutions through the political process may also come about because of a perceived failure of the existing economic structure. The political determination of economic institutions means, therefore, that they may, or may not, be designed in order to improve social welfare or increase per capita income.

Political decision making is, in turn, governed by its own set of institutions that determine the governance structure of a society (rules about who has the authority to enact and enforce economic legislation), and the specific features of decision making within each branch of the government. On the one hand, these institutions serve to delineate a division of

labor to perform government tasks. On the other hand, these institutions structure the process by which the constituent branches of the government go about drafting, debating, and enacting particular pieces of legislation. As a practical matter, the specific features of this division of labor within the government exert a powerful effect on the actual substance of economic regulation. The political institutions that delineate a division of labor within the government are themselves bounded by yet another set of institutions—those that structure the way that the political system can decide to change the rules about decision making. This type of political institution (rules about the rules, so to speak) includes constitutions and constitutional amendments, as well as the judicial review of proposed policies and laws.

Changes in any of these sets of political institutions (as well as changes in economic institutions) are themselves bounded by sets of informal institutions (socially and culturally-embedded norms and values). These informal institutions both provide legitimacy to the formal institutions of the society, and at the same time set limits on the degree to which changes in those formal institutions will be viewed as legitimate. In short, economic activity and economic change takes place within a complex and interdependent web of political and social institutions, some of which are formal (legally codified) and some of which are informal (culturally-embedded).

LATIN AMERICAN HISTORY AND THE NEW INSTITUTIONAL ECONOMICS

Despite its recent popularity, the New Institutionalism has seldom been subjected to systematic and direct tests of consistency with evidence. The New Institutionalism is advanced by theorists not as a set of necessary truths, but as a set of hypotheses to be tested.⁶ Yet, of the three types of confirmatory logics employed to sustain truth claims in the social sciences (formal theory, the historical record, and econometric or statistical hypothesis testing), the New Institutionalism rests primarily on only one, theory.⁷ The success of the approach, as well as the relevance of its policy implications will ultimately depend, however, on its ability to explain actual economic outcomes, not just theoretical ones.

Social scientists are therefore confronted by a peculiar problem: there is widespread agreement that institutions matter—and matter a great deal—in the process of economic growth. Yet, they are simultaneously unsure by what degree institutions affect growth and which particular institutional arrangements are crucial (and which are merely incidental) to economic performance. They therefore have difficulty, as a practical and policy matter, separating the independent impact of particular institutional changes from the effects of other economic transformations.

Unfortunately, operationalizing the testable hypotheses of New Institutional Theory using either the historical record or econometric analysis has proven elusive. Four factors have hampered research that links theory and the historical record. First, most empirical studies in the New Institutionalism do not, in fact, attempt to test or refine the theory against the past record of economic performance. Rather, they attempt to apply the theory as a metaphorical means to better understand the historical record of economic growth.⁸ One potential outcome of this type of research strategy can be the misapplication of theory, or the fitting of history to the theory, rather than the other way around.⁹

The second factor limiting the attempt to assess the fit between theory and the historical record is that the historical case studies selected for analysis are weak and partial tests of the theory. Scholars have typically chosen cases for analysis in which putatively more efficient institutions produced faster economic growth.¹⁰ Yet, if positive institutional innovations (more secure property rights, credible commitments by governments to not expropriate private assets, and the like) exert a positive influence on economic growth, then it should also follow that negative institutional changes (such as revolutions that make property rights less secure, the rise of predatory states, or government regulations that distort markets) should produce slow or negative rates of economic growth. The literature to date, however, has not tended to address these types of cases in a systematic fashion.

Third, most of the literature has looked at economies in which institutional change proceeded gradually. The incremental nature of institutional change in these economies, coupled with the fact that there are often multiple institutions undergoing such incremental changes at any one time, means that it is difficult, if not impossible, to pinpoint particular institutional reforms that have been crucial for economic growth. This problem is accentuated by a fourth factor: most of the work done to date has focused on economies that have had long histories of well-developed markets. In these economies, the market has anticipated institutional changes, meaning that it is extremely difficult to demonstrate the effects of any particular institutional reform.¹¹ Indeed, in economies in which there are well developed markets, there is an endogeneity that may exist between the market and institutional development; markets as they become more efficient may affect the process of institutional development, which, in turn, feeds back into markets, and so on.

These problems are amplified when scholars attempt to move beyond stylized historical correlations by developing formalized econometric or statistical tests of the relationship between institutional change and economic growth. Not only do all of the problems of endogeneity and selection bias again emerge, but scholars are confronted by the numerous technical difficulties associated with tying any particular change in institutions to an acceleration in productivity and income growth.

Some scholars have attempted to demonstrate the connections between the political or institutional features of societies and the growth of their economies through cross-country growth regressions. The results of these exercises, however, have been inconclusive. First, this body of literature offers no theoretical model of how institutions and growth interact: it is a purely inductive exercise in growth accounting. Second, there are econometric considerations that make these estimates dubious. The statistical results of growth accounting regressions tend to be highly sensitive to the number of observations, the choice of cases, and the specification of the regressions.¹² Third, there are serious problems of measurement error and mis-specification of instrumental variables. The instruments we have to measure the institutional or political features of societies are poorly developed.¹³ Finally, there are fundamental concerns about the stability of the statistical relationship between economic and political variables, and about the ability of capturing the complex interaction of political and economic institutions through any single linear equation. In short, on both theoretical and econometric grounds, growth accounting exercises are highly unlikely ever to produce the level of certainty that most social scientists would find compelling.

In recent years, economists and political scientists interested in the systematic analysis of institutional change and historians of Latin America who have embraced the

quantitative and systematic methods of the social sciences have to carry out the kind of basic historical research that is necessary to test and refine New Institutional Theory. This literature is still in its infancy. Nevertheless, a general consensus has emerged about research methods and approaches to evidence and theory. In short, scholars are attempting to employ the history of Latin American economies as a laboratory for empirical research in the New Institutionalism.

At the same time that Latin American economic history has become a laboratory for the NIE, the NIE has exerted an influence on Latin American history as a discipline. The reason is not hard to divine: the NIE offers a theory relevant to understanding the causes of Latin American underdevelopment. It therefore offers a set of theoretical insights that can be employed in understanding the interaction of political and economic phenomena over time.

EMPIRICAL RESEARCH RESULTS

Summarizing the range of historical work on Latin American influenced by the NIE is beyond the scope of this paper.¹⁴ Instead, permit me to offer an example of the way in which Latin American history can be employed as a laboratory for the NIE, and in so doing, give a sense to readers of what the present state of research looks like.

The topic I address is the oft-noted fact that the banking systems of most Latin American countries are small, concentrated, and inefficient. Financial markets do not serve as a substitute for banks: few firms can mobilize capital through the markets; and even the largest exchanges tend to be dominated by one or two issues. The questions, then, are as follows: first, what role do political institutions play in determining the economic institutions that governed banks and financial markets; second what impact do financial markets and banks have on the real economy? Do imperfections in capital markets serve as a barrier to entry, and, if so, do financial barriers to entry have an effect on the competitive structure and performance of industry?

In order to answer this question, I employ the economic histories of Brazil and Mexico as natural laboratories. I focus on these cases because they allow for a natural experiment of the impact of particular financial market reforms on the performance of manufacturing industry. That is, circa 1890-1910, Brazil and Mexico were similar in a number of dimensions—except for the specific content of the financial market and banking reforms that they carried out. Both countries had (for Latin America) large economies. Both built national markets via the subsidization of foreign owned railroads during the period 1880-1914. Both were highly protectionist. Finally, both had miniscule banking systems and financial markets until a series of reforms in the 1880's and 1890's completely rewrote the rules about banking and financial markets. But, in the impact of these reforms, Brazil and Mexico strongly diverged.

In order to estimate the impact of financial market and banking reforms on the real economy I look at a single industry: cotton textiles. I do so for both practical and theoretical reasons. First, the cotton goods manufacture was the most important industry in the countries under study. It surpassed all other industries in terms of capital invested, size of the work force, or percentage of value-added it contributed to total industrial output. Second, there are compelling reasons to focus on cotton textiles. In many industries it is extremely

difficult to separate out the effects of capital constraints on the structure and performance of industry from other factors, such as economies of scale or barriers to entry created by advertising, patents, or the legal system.¹⁵ In the cotton textile industry, however, these other factors did not come into play: the capital equipment was easily divisible, the minimum efficient scale of production was small, and there were no barriers to entry created by patents, brands, or access to raw materials or other inputs.¹⁶ The only important barrier to entry was access to finance. The textile industry therefore provides an excellent test case of the relationship between the development of the financial markets and banks that provide capital to an industry, and the development of the industry itself.¹⁷

The argument I advance runs in the following terms. The specific features of government regulation had a powerful effect on the size and structure of banking systems and financial markets. The size and structure of banking systems and financial markets, in turn, played a crucial role in determining the size, structure, and productivity of the textile industry. In Mexico, where government policies constrained the number of banks in any market, the distribution of bank loans among potential textile industrialists was narrow. In addition, financial markets did not serve as a substitute for the banking sector, except for a very limited number of well-connected financial capitalists, many of whom already had bank connections. In short, a small group of powerful financiers was able to obtain all they capital they needed, while everyone else was starved for funds. In Brazil, on the other hand, institutional reforms meant that securities markets were able to serve as a substitute for the banking system. The distribution of funds among potential textile industrialists was much broader than in Mexico. Access to institutional sources of finance did not serve as a barrier to entry. The outcomes were threefold: the Brazilian textile industry grew faster; the Brazilian textile industry had a more competitive industrial structure; and the Brazilian textile industry had rates of productivity growth twice that of the Mexican textile industry.

I. BANKS, FINANCIAL MARKETS, AND TEXTILE FINANCE

MEXICO

Modern banking arrived late to Mexico and remained poorly developed until the 1880's. As late as 1884, there were only eight banks in operation. This banking system developed on an ad hoc basis: special charters were granted either by the federal government or state legislatures.

The fact that the Mexican government was continually broke, however, created a strong incentive for the federal government to monopolize bank chartering as a means to provide itself with a ready source of credit. Essentially, the federal government engineered the merger of Mexico City's two largest banks in 1884, creating the Banco Nacional de México (Banamex). The intention of the government was to model Banamex on the early Bank of England, granting it a monopoly over the issuance of paper money in return for providing a credit line to the federal government and acting as the treasury's financial agent. At the same time, the federal government erected high barriers to entry for competing banks. The Commerce Code of 1884 required that they obtain the permission of Congress and the Secretary of the Treasury to obtain a bank charter or increase their capital.

They also had to pay a five percent tax on their issuance of bank notes. Banamex was exempted from the tax. Finally, Banamex was permitted to issue banknotes up to three times the amount of its reserves. Other banks were not afforded this privilege.¹⁸

Mexico's already extant banks, particularly the Banco de Londres y México, realized that the commercial code and Banamex' special privileges put them at a serious disadvantage. The ensuing legal and political battle ground on for 13 years, until a compromise was finally hammered out by Secretary of Finance Limantour in 1897.¹⁹

There were four groups that pressured the federal government in the crafting of the 1897 General Credit Institutions and Banking Act: the stockholders of Banamex; the stockholders in the Banco de Londres y México; the stockholders in other, smaller, state-level banks; and the state governors (who wished to award cronies with bank charters). In addition, Secretary of the Treasury Limantour was not a disinterested party: his brother was one of the major stockholders in two of the country's largest banks. The resulting law could easily be predicted from knowledge of the players in the negotiations: Banamex shared many (although not all) of its special privileges with the Banco de Londres y México; the state banks were given local monopolies; and the state governors were able to award concessions to their cronies. Holding the arrangement together was the fact that the federal government monopolized bank chartering. Legal barriers to entry into banking could not be eroded by competition among states for bank business, because states did not have the right to charter banks.²⁰

The resulting competitive structure had the following features. Banamex and the Banco de Londres y México were granted a duopoly in the Mexico City market. In addition, only Banamex and the Banco de Londres y México had the right to branch across state lines. They were also permitted to hold lower ratios of reserves to banknotes than the state-level banks: 33 percent as opposed to 50 percent. Banamex was also granted an exclusive privilege of providing financial services to the government: collecting tax receipts, making payments, holding federal deposits, and underwriting all foreign and domestic federal debt issues. In short, the compromise was that Banamex would retain the special privileges granted to it in 1884, and some of these privileges would also be extended to the Banco de Londres y México.

State level banks, and their powerful patrons—the state governors—were also protected from competition. The law was written in such a way that, as a practical matter, only one bank could be established in each state, although existing banks were grandfathered in. The law specified that bank charters (and additions to capital) had to be approved by the Secretary of the Treasury and the Federal Congress. In order to make this commitment credible beyond the tenure of Limantour as Treasury Secretary, the law also created three other barriers to entry. First, the law created very high minimum capital requirements, U.S. \$125,000 (later raised to U.S. \$250,000). Even the initial figure of \$125,000 was more than twice the minimum capital required for a national bank charter in the United States, which was set at \$50,000. Second, the law established a two percent annual tax on paid-in capital. The first banks granted a charter in each state, however, were granted an exemption from the tax. This gave the first banks into each market an insuperable advantage. Third, state banks were not allowed to branch outside of their concession territories. This prevented banks chartered in one state from challenging the monopoly of a

bank in an adjoining state. In short, the only threat to the monopoly of a state bank could come from a branch of Banamex or the Banco de Londres y México.²¹

The result was that Mexico had a very small and concentrated banking sector. In 1910, even if we include mortgage banks and count Banamex branches as independent banks, there were only 42 formally incorporated banks in the entire country. The United States, for comparison purposes, had 25,151 banks and trust companies in that year.²² The capital available to this banking system was also small: total assets in 1910 totalled approximately U.S. \$400 million.²³ For comparison purposes, total assets of the U.S. banking system were \$22.9 billion.²⁴ Finally, not only were Mexico's banks few in number and of small size, but the level of concentration was extremely high: Banamex and Banco de Londres y México accounted for more than 60 percent of all assets.²⁵ Estimates by Maurer put the Herfindahl index at .2, which is to say that even had there been interstate competition, the competitive structure of the industry would have been identical to that of an industry with only five, equally-sized banks.²⁶

The problems posed by a small and concentrated banking sector were compounded by the fact that banks had no way to assess the creditworthiness of potential borrowers, other than to rely on the personal connections of their directors. The result, as Noel Maurer has shown, was that most lending went to insiders: bank directors, members of their families, or close friends.²⁷ This was a common practice just about everywhere in the world in the nineteenth century—even in the United States.²⁸ There was a difference, however, between Mexico and the United States: Mexico had a few dozen banks; the United States had tens of thousands. Thus, the potential number of entrepreneurs who could tap the banking system in Mexico was very small.

The upshot was twofold. First, some entrepreneurs were able to obtain bank loans, but most were not. Second, even those entrepreneurs who could obtain bank loans had to do so as individuals with full liability, not as corporations with unlimited liability. This necessarily reduced the amount of debt that any entrepreneur would take on. Thus, even large, publicly traded companies in Mexico during this period had amazingly low debt-equity ratios. An analysis of the balance sheets of three of the country's largest cotton textile producers during the period from 1907 to 1913 indicates debt-equity ratios averaging .18:1.00. Virtually all of this debt was short term, most of it consisting of trade credits provided by suppliers.²⁹

The financial markets did not fill the vacuum created by the banking system. Equity financing through the creation of a publicly-held, joint stock company was also unknown in the Mexican textile industry until the late 1880's. It was not, in fact, until 1889 that Mexico passed a general incorporation law. Soon thereafter, the first limited liability, joint stock companies began to appear. Yet, even after this institutional innovation, most entrepreneurs were unable to access outside capital from the markets. By 1908 only 14 industrials were traded on the Mexico City Stock Exchange: no new firms joined their ranks until the late 1930s. Of those industrial companies only four were cotton manufacturers. Thus, of Mexico's 100 cotton textile firms in 1912 (controlling 148 mills), only four percent represented publicly traded joint stock companies.³⁰ These four firms, however, took a disproportionate share of total capital invested in the industry, accounting for 27 percent of all active spindles. Surprisingly, none of these four firms issued debentures.

The reason that the financial markets developed so slowly even after legal reforms should have encouraged the public ownership of corporations can largely be explained by the fact that it was not possible for outside investors to monitor the activities of firms' directors and managers. Financial reporting requirements were not enforced. Although it was legally required, publicly traded manufacturing companies often failed to publish balance sheets in public documents (such as the Diario Oficial or the financial press) in many years. Moreover, even if balance sheets had been available, investors could not readily determine whether the founders (who served as firm directors) had divested themselves of their holdings in the firm. The result was that individuals tended to invest only in those enterprises controlled by important financial capitalists with proven track records.

In short, when institutional innovations created opportunities for firms to obtain impersonal sources of finance, only a small group of entrepreneurs was able to benefit. The result was differential access to credit and capital: most entrepreneurs had to rely upon retained earnings and their informal network of business associates for funds; a small group of entrepreneurs were able to obtain capital from the banks and the financial markets.

BRAZIL

Until the last decade of the nineteenth century, Brazilian textile entrepreneurs faced a banking system and securities markets similar to their Mexican counterparts. Beginning in the late 1880's, there was a short experiment with bank deregulation, and that experiment produced some lending to textile manufacturers. The experiment was cut short by the federal government in the late 1890's. Financial markets, however, substituted for the banking system. In fact, Brazil developed surprisingly active stock and bond markets in industrial securities in the 1890's. These remained active through the 1920's. The result was that impersonal sources of finance became widely available to Brazilian textile manufacturers.

Throughout most of the nineteenth century, organizations and markets designed to mobilize impersonal sources of capital were largely absent in Brazil. An organized stock exchange had functioned in Rio de Janeiro since early in the century, but it was seldom used to finance industrial companies. During the period from 1850 to 1885 only one manufacturing company was listed on the exchange, and its shares traded hands in only 3 of those 36 years. Neither could Brazil's mill owners appeal to the banking system to provide them with capital. In fact, formal banks were so scarce as to be virtually nonexistent. As late as 1888 Brazil had but 26 banks, whose combined capital totaled only 145,000 contos--roughly \$48 million U.S. Only 7 of the country's 20 states had any banks at all, and half of all deposits were held by a few banks in Rio de Janeiro.³¹

The slow development of these institutions can be traced in large part to public policies designed to restrict entry into banking. The imperial government, which held the right to charter banks, was primarily concerned with creating a small number of large super-banks that could serve as a source of government finance and that would prevent financial panics. The absence of banks not only restricted the amount of credit available to entrepreneurs, but it also meant that banks could not underwrite securities trading or finance securities speculation, the way they did in the United States and Western Europe.³² Finally, restrictive policies discouraged the spread of the corporate form of ownership: Founding a joint stock company required special government permission; shareholder liability was not

limited; investors were not allowed to purchase stocks on margin; and banks were restricted from investing in corporate securities.³³

In the last decades of the nineteenth century a dramatic reform of the regulations governing Brazil's capital markets took place. These changes began in 1882, when the government removed the requirement that joint stock companies obtain special charters from parliament. This reform also lowered, from 25 to 20 percent, the amount of paid-in capital required before the stock could be traded. Investors were still liable in the case of insolvency, however, for the firm's debts, even if those shares had been traded away as long as five years before.³⁴ As one might imagine, the lack of limited liability meant that these reforms had very little effect on the use of the stock and bond markets as sources of industrial investment.

The real impetus to regulatory reform did not get underway until 1888, when the imperial government abolished slavery. The end of slavery produced a series of unexpected and unintended outcomes that set in motion both the overthrow of the monarchy and the complete reform of banking and securities market regulation. Abolition drove a wedge between Brazil's planter class, which historically had been the mainstay of the monarchy, and the imperial government. In an effort to placate the planters by making credit more easily available to them, the imperial government awarded concessions to 12 banks of issue and provided 17 banks with interest free loans. The easy credit policies of 1888 were not enough, however, to stem the tide of Brazil's republican movement. In November of 1889 Dom Pedro II, Brazil's emperor, was overthrown and a federal republic was created.

The finance minister of the new republican government, Rui Barbosa, quickly pushed through three crucial reforms. First, the government deregulated the banking industry: banks could now engage in whatever kind of financial transactions they wished, including the right to extend long term loans and to invest in corporate securities. Second, the new general incorporation law limited liability to the face value of their shares. Third, the government instituted a set of mandatory disclosure laws that were highly unusual for the time. Brazil's publicly-owned corporations were required to produce financial statements annually (many in fact produced them twice per year) and reprint them in public documents, such as state or federal gazettes or the newspaper. In addition, their annual reports had to list the names of all shareholders and the number of shares they controlled. Finally, the annual report had to list the number of shares that had changed hands during the year, including information on the number of shares that traded in each transaction. Investors could thus obtain reasonably good information on the health of firms, the potential liquidity of their shares, and the identities of a firm's major shareholders.³⁵

The results of these reforms were dramatic. The nominal capital of corporations listed on the Rio de Janeiro and Sao Paulo exchanges, which had stood at 410,000 contos (roughly \$136 million) in May of 1888, doubled to 963,965 contos by December 1889 under the impact of the new banking laws, and then doubled again by December 1890 when the use of the markets spread to other areas of economic activity. By December 1891, it reached 3,778,695 contos. Even if we were to deflate these figures for inflation, the real increase in the value of corporations listed on the Sao Paulo and Rio de Janeiro exchanges increased six-fold from 1888 to 1891.³⁶

The Encilhamento financed large numbers of banks. In the short run these banks provided loans to Brazil's textile industry, and in some cases banks directly organized and ran textile companies. Bank-financed industrial development was not, however, to be long-lasting in Brazil. The boom created by the Encilhamento created a speculative bubble, which burst in 1892 bringing down many of the banks. The government therefore decided in 1896 to once again restrict the right to issue currency to a single bank acting as the agent of the treasury. These more restrictive regulations, coupled with the already shaky financial situation of many of the banks, produced a massive contraction of the banking sector. In 1891 there were 68 banks operating in Brazil. By 1906 there were only ten, and their capital was only one-ninth that of the 1891 banks.³⁷ The banking system then began to expand, led and controlled by a semi-official super-bank, the third Banco do Brasil, which acted both as a commercial bank and as the treasury's financial agent.

After the contraction of the banking system in 1896, Brazil's banks appear to have lent very little money for long-term investment. Banks played an important role, however, in providing short-term, working capital to manufacturers by discounting commercial paper. In order to study the importance of such discounts in providing working capital I drew a sample of financial statements of 15 publicly-traded cotton textile manufacturing firms covering the years 1895 to 1940. These 15 firms are not a random sample, but were chosen because it was possible to retrieve complete sets of their financial statements.³⁸ These 15 firms controlled 42 percent of the industry's installed capacity in 1905 and 24 percent even as late as 1934. It is clear from comparing the financial data in the censuses to the financial data in these reports that these firms were more likely to have significant long-term bonded debt than was the norm, even for publicly-traded, joint stock companies. These financial statements permit, however, the more detailed study of the structure of debt and equity than do the censuses. As Table 1 shows, during the period 1895-1915 short-term debt accounted for from 29 to 42 percent (depending on the year) of the total indebtedness of these 15 firms.

The more important, long-run effect of the Encilhamento was that the regulatory reforms of the securities markets gave rise to the widespread sale of equity and bonded debt to the investing public in order to mobilize long-term capital. The first reform was the establishment of limited liability. Limited liability overcame a fundamental asymmetry in incentives: before 1890 the law created disincentives for entrepreneurs to issue debt and disincentives for investors to purchase equity because an investor was held to be fully liable for a firm's debts in the case of insolvency, even if he had traded away the stock. From the point of view of founding groups of investors, the new limited liability law meant that they could go out to the debt markets and not be personally liable for those debts if the company failed. From the point of view of potential investors from outside the founding groups, limited liability meant that they could purchase equity shares in firms and not have to be concerned that they would be held personally liable for the firm's debts if it went bankrupt.

The second crucial reform in securities markets were those related to mandatory disclosure. The 1890 regulatory law required firms to produce financial statements, reprint at least the balance sheets in public documents, such as a newspaper or state gazette, and include a statement in the report about the identities of each stockholder and the number of shares they owned. In the early stages of the use of the market it is likely the case that investors made decisions about which firms to invest in based on the reputations of the founding group of entrepreneurs. Over time, however, potential investors had far more

information to go on: they knew who held controlling interest in the firm and they had a great deal of financial information available, including the firm's history of dividend payments, its level of indebtedness, the size of its reserves, and the liquidity of their investment.

The effect of these regulatory reforms was to reduce transaction and monitoring costs, thereby lowering the cost of capital to firms that adopted the joint stock, limited liability form.³⁹ In the absence of these reforms, access to capital could have served as a barrier to entry because some firms could have used the reputational capital or personal connections of their owners to obtain investment funds from third parties, while most other firms would have been unable to do so.

Essentially, corporate finance took the following form: a group of entrepreneurs tied through kinship or established business relationships would come together and found a joint stock company. They would then issue a prospectus, find a broker or bank to act as an intermediary, and sell shares to the public. These offerings would often be advertised in newspapers or state gazettes. As a firm's capital requirements grew it would either issue new shares, which would be advertised in a public offering and handled by a broker, or they would issue bonds which would also be subscribed by the public through the services of a broker or a bank. Over time, therefore, stock ownership grew more diversified and individuals could choose between owning equity or owning debt. In the early stages of the development of the market this looked much like the Boston Stock Exchange: stocks tended to be closely held by the founding groups. Gradually, however, stock ownership became more diversified, particularly for the larger, more successful companies. By the 1920's, larger companies typically had more than 100 shareholders, and the rate of turnover of shares in the secondary markets was roughly 10 percent per year. It was also generally the case that no individual stockholder controlled more than 10 percent of a firm's shares. In fact, in the country's largest textile firm, the Companhia America Fabril, the minority shareholders actually banded together in the early 1920's and forced a reform of the board of directors, removing the founding group of entrepreneurs from their control of the firm.⁴⁰

In 1866 there were no joint stock companies in the Brazilian cotton textile industry. By the early 1880's there were two, accounting for 32 percent of the industry's installed capacity. By 1895, 13 joint stock firms had been founded, and their capacity was seven times that of the joint stock companies in 1883. This mushroomed to 66 joint stock firms (accounting for 60 percent of industry capacity) by 1914, and to 80 joint stock firms (accounting for 70 percent of capacity) by 1925. This is especially impressive when you consider that total capacity was growing at an extremely rapid pace. Measuring capacity by the number of spindles in service (which gives lower-bound estimates because it does not capture increases in the speed of machines over time) total capacity increased more than three-fold from 1881 to 1895, and then tripled again by 1905. It then doubled again by 1914, and then grew an additional 50 percent to 1925. At this point, total capacity was 2.4 million spindles, which is to say that capacity was roughly 30 times what it had been in the early 1880's. (See table 4).

As important as the development of the equities markets in Brazil was the simultaneous development of markets for long term debt. As was the case with equities, debt issues came in small denominations: virtually all had a par value of 200 milr eis (about \$50 in nominal terms at the 1900 dollar-milr eis exchange rate), implying that they could be held

by medium sized savers. These debts took the form of general obligation bonds, were callable, carried nominal interest rates of from five to eight percent, and had terms of 20 years or more.

These debt issues raised significant amounts of capital. A comparison of the 1905 and 1915 censuses indicates that firms located in Rio de Janeiro or the Distrito Federal, where the market was well developed, financed 69 percent of their increase in total capitalization through the sale of new debt. For the country as a whole, 29 percent of new investment came in the form of long-term debt (See Table 2). In 1915 the average (weighted) debt equity ratio for firms in Rio de Janeiro or the Distrito Federal, not bank loans, discounts, or other sources of short-term credit was .43:1.00, three times its level in 1905. For the country as a whole, the debt-equity ratio in 1915 was .27:1.00, nearly twice its level in 1905. (See Table 3).

This analysis based on census data significantly understates the importance of debt financing, because it does not include trade debt from suppliers, short-term liabilities (mostly commercial paper), and the small quantity of mortgage debt owed to banks. For that reason, I have estimated financial ratios for the 15 firm sample of publicly owned companies from their balance sheets. In 1915 the average (weighted) debt-equity ratio for these 15 firms was .57:1.00 (see table 1). The balance sheet data also corroborate the census data in regard to the pattern of bond finance: the use of the bond market was most important during the periods 1905-10, when new bond debt accounted for 29 percent of all new investment, and 1910-15, when new bond debt accounted for 45 percent of all new investment (See Panel II of Table 1).

The use of long-term bond debt and the high percentages of capital coming from debt issues were quite remarkable by the standards of other countries. As late as 1910, the average debt-equity ratio of large-scale firms in the United States textile industry (those listed in Moody's Industrials) was .40, roughly one-third lower than the debt-equity ratios for comparable Brazilian firms.⁴¹ Even by 1920, when a few of the largest U.S. firms began to issue long term bonds, the average debt-equity ratio of large-scale firms was only .29.⁴² Most U.S. textile firms, of course, were not able to make use of the bond market and had to resort to the less-optimal option of issuing preferred shares when they wanted to grow faster than was possible through the reinvestment of retained earnings.⁴³

The development of the bond market appears to have been slowed by the First World War. Between 1915 and 1925, new long-term bond issues accounted for only four percent of net new additions to invested capital. Thus, by 1925 debt-equity ratios fell to .13:1, less than half their 1915 levels (See Tables 2 and 3) and roughly on par with Mexican debt-equity ratios circa 1910. In the 1920's the most important source of new investment capital for the Brazilian textile industry became retained earnings, which accounted for 58 percent of new additions to capital. The remainder of new capital spending was made up of new equity issues by already established companies and the founding of new firms, particularly in the state of Sao Paulo.⁴⁴ In the latter part of the 1920's the debt market began to recover, though it appears that much of the debt issued was used to fund operating losses during the Great Depression. As table two indicates, the increase in debt almost exactly matches the contraction of retained earnings during the period 1927 to 1934.

In short, Brazilian textile industrialists were limited in their sources of finance throughout most of the nineteenth century. Beginning in the late 1880s, however, regulatory reforms brought about important innovations in financial intermediation that made access to institutional sources of finance relatively easy for many entrepreneurs. Even though the development of these new sources of finance was slowed by the First World War, it still produced an extraordinarily large and well integrated capital market by the standards of developing economies at the time.

FINANCE AND THE STRUCTURE AND GROWTH OF THE TEXTILE INDUSTRY

What effects did these differences in the development of capital markets have on the development of the textile industry in Brazil and Mexico? One would expect at least four. First, Mexico's textile industry should have grown much more slowly than that of Brazil. Second, in Mexico, privileged access to capital should have served as a barrier to entry: capital market rigidities should have resulted in high levels of industrial concentration. Third, we would expect different trajectories of concentration. Concentration should have fallen in Brazil, but not in Mexico. Fourth, one might expect differences in the rate of growth of productivity. Efficient Brazilian firms should have been able to expand rapidly because they would not have been liquidity constrained, as was the case with their Mexican counterparts. One would therefore expect that total factor productivity growth would have been faster in Brazil than in Mexico. One would also expect that the firms with the fastest productivity growth in both countries would be those firms that were able to use banks or the securities markets to mobilize capital.

An examination of the data on the development of the textile industry in the two countries bears out these hypotheses. In regard to the rate of growth of the textile industry, the Brazilian textile industry, which had been virtually nonexistent in the first half of nineteenth century, quickly outgrew Mexico's after its capital markets opened up. As late as 1883, the entire modern sector of the Brazilian cotton goods industry numbered only 44 firms running just under 80,000 spindles, less than one-third the size of Mexico's cotton goods industry (see Table 4). This relative size relationship continued into the mid-1890s, but over the following ten years widespread access to impersonal sources of capital in Brazil meant that its cotton textile industry was able to outgrow Mexico's by a factor of five, producing for the first time an absolute size difference in favor of Brazil. By the outbreak of World War I, Brazil's industry was roughly twice the size of Mexico's, a gap which grew to three to one by the onset of the Great Depression.

As for the effects of capital immobilities on industrial concentration, the data are unequivocal: access to capital had a significant effect on the level of concentration. Table 5 presents estimates of four-firm concentration ratios (the percent of the market controlled by the four largest firms) and Herfindahl indices (the sum of the squares of the market shares of all firms in an industry).⁴⁵ For purposes of international comparison, I also present data on the United States and India. There are a number of striking features of the data.

The first is that Mexico's financial market reforms actually produced an *increase* in concentration. The trend in Mexico from the 1840's to the early 1880's was a gradual decrease in concentration: exactly the trend that one would expect in an expanding industry characterized by constant returns to scale technology. As Table 5 indicates, Mexico's four-

firm ratio fell from a high of .579 in 1840 to a low of .158 in 1883, while the Herfindahl dropped from a .114 to .019 over the same period. Beginning in the 1880s, the trend reversed, even though the industry was witnessing rapid growth. By 1902, both the four-firm ratio and the Herfindahl had surpassed their 1843 levels, standing at .381 and .063, respectively. Concentration then gradually decreased until 1912, after which point there it oscillated without a long run trend. By international standards, Mexico's textile industry was extremely concentrated. To provide a comparison, the four firm ratio in the U.S. textile industry in 1900 was .07, roughly one-sixth of the Mexican level. The Indian textile industry had a concentration ratio of .19, roughly one-half the Mexican level.

Concentration in Brazil displays exactly the opposite pattern from Mexico. Prior to the 1890s, Brazil's relatively small textile industry displayed higher levels of concentration than Mexico's. By 1905, however, relatively widespread access to institutional sources of capital drove Brazil's four firm ratio down to two-thirds of Mexico, a ratio that was then maintained through the 1930's. The drop in the Herfindahl Index was even more pronounced. During the period 1875-78, the Herfindahl Index for Brazil was more than ten times that of Mexico. By 1905-06, Brazil's Herfindahl was 34 percent lower than Mexico's, and by 1912-14 it was 69 percent lower.⁴⁶

One might argue that Mexico's higher concentration ratios had little to do with capital immobilities: Mexico had higher levels of concentration and a different trajectory of concentration because it had a smaller textile industry than Brazil. There are four problems with this line of argument.

The first is that this argument assumes that there is a direct link between industry size and industry structure: the larger a country's industry, the less concentrated it should be. In order to test this notion, I estimated four-firm concentration ratios and Herfindahl Indices for the Indian cotton textile industry. Since India's industry was roughly three times the size of Brazil's we should observe a lower level of concentration there. In fact, India's average level of concentration during the first three decades of the twentieth century was very close to that of Brazil, and during the 1920's exceeded Brazilian concentration (see table 5).

The second is that Mexico's industry leaders were tremendous operations in an absolute sense. Mexico's leading firms were not simply large relative to the small Mexican market, they were enormous operations, even by U.S. and Indian standards. Mexico's largest firm in 1912, for example, the *Compañía Industrial de Orizaba (CIDOSA)*, was a four-mill operation employing 4,284 workers running 92,708 spindles and 3,899 looms. Had it been located in the United States, it would have ranked among the 25 largest cotton textile enterprises.

The third problem with this argument is that it does not stand up to empirical evidence on the relationship between total factor productivity (TFP) and firm size. I have estimated Cobb Douglas Production Functions for both the Mexican and Brazilian cotton industries, and these do not reveal positive scale economies. In fact, in the Mexican case, for the census years 1895, 1896, 1912, and 1913 the scale coefficient is negative, indicating that firms were suboptimally large.⁴⁷ These production function results are buttressed by survivor analysis, which indicates that in both Brazil and Mexico the minimum efficient scale of production was a firm size that corresponded to less than a one percent market share.

The fourth problem with this hypothesis is that it cannot explain why Mexican concentration increased during a period when the industry was experiencing rapid growth, the years 1878-1902. Without some supply factor intervening during this period, Mexican concentration should have continued to decline, instead of jumping back up to its 1843 level.

III. TOTAL FACTOR PRODUCTIVITY GROWTH

One could argue that high levels of concentration were good for Mexico. Large firms might have been able to concentrate R&D, thereby affording Mexico faster rates of productivity growth. One might also argue, however, that high levels of concentration were bad for Mexico. Concentrated industry discourages competitive behavior, especially in an economy that was also highly protectionist.

Which way this cut is ultimately an empirical question. I therefore estimated levels and rates of growth of total factor productivity (TFP) for the Mexican and Brazilian textile industries. These estimates involved locating the textile censuses for Brazil and Mexico, putting them into machine readable form, and then estimating TFP. Because the data were enumerated in the censuses at the firm level, I coded the data sets with dummy variables for age of firm, location of firm, and, perhaps most importantly, for the firm's source of capital.⁴⁸

Following Kane's work on the United States, we employ the number of spindles as a proxy for the capital input of each company. Following Atack and Sokoloff on productivity in the United States, and Bernard and Jones on international productivity comparisons, we employed the number of workers as the measure of the labour input.⁴⁹ Output was proxied by the real value of production.

We employ multivariate regression analysis in order to estimate trend rates of growth of total factor productivity (TFP) and in order to decompose TFP by firm type, size, and access to capital from banks or securities markets. We used an unbalanced panel procedure to estimate basic pooled and fixed-effects specifications of regressions of the following type:

$$Y_{it} = \alpha + \beta \cdot X_{it} + u_{it}$$

where Y_{it} is the dependent variable of firm i at time t ; α is the overall intercept term for all firms; β is a vector of coefficients corresponding to the X_{it} vector of independent variables and u_{it} is a stochastic term.⁵⁰ We assume usual normality and independence conditions to obtain least-squares estimates of β .⁵¹

We assume a Cobb-Douglas production function of the form $Y = A \cdot K^\gamma \cdot L^{1-\gamma}$ with constant returns to scale where K and L represent the capital and labor inputs and A is a function that captures improvements in technology over time. In order to use linear estimation procedures, we take natural logarithms of a normalised production function of the form $y = k^\alpha$ where $y = Y/L$ and $k = K/L$ and add explanatory variables to arrive at the following model.

$$\ln y = \alpha + \beta_1 \cdot \ln k + \beta_2 \cdot \ln L + \beta_3 \cdot \text{Time Trend}$$

This specification allows us to both test for economies of scale as well as to obtain the rate of total factor productivity growth, the coefficient on the Time Trend. We use variations of this equation to estimate the impact of other features of firms (location, traded status, vintage, and other relevant variables).⁵²

Table Seven estimates TFP for Brazilian textile firms. Specification 1 indicates that, as predicted, there were negligible scale economies in the Brazilian cotton textile industry (the coefficient on firm size is negative, of small magnitude, and not statistically significant). The industry was, however, characterized by rapid productivity growth: the time trend was 6.1 percent per year. As expected, newer firms (those founded after 1905) had higher productivities than their older competitors (the coefficient translates into roughly an 8 percent TFP advantage for newer firms, everything else being equal). Perhaps most striking is the sizable impact of the joint stock corporate form. The coefficient of .226 on the joint stock dummy translates into a 25 percent TFP advantage over non-joint stock firms.

One might think that firms that were actively traded on an organized exchange might have been more efficient than joint stock firms that were not traded. The notion is that firms that were regularly traded were monitored more closely by large investors. Ideally, we would add a traded dummy to specification 1, to measure the *marginal impact* of being publicly traded. Traded firms were, however, a subset of joint stock firms, meaning that there is collinearity between the two variables. We therefore estimate the impact of being traded in specification 2 by substituting a traded dummy for the joint stock dummy. We are able to reject the hypothesis that traded status explains the advantage that joint stock firms had over their competitors: the coefficient is large and statistically significant, but it is of a smaller magnitude than that on joint stock firms alone. It may have been the case that the secondary markets for equity were too thin to serve as efficient monitors. Or, it may be the case that some of the most productive joint stock companies' shares were closely held by their original investors.

What impact did the ability to issue bonds have the growth of TFP for Brazilian firms? One view would hold that there should be a positive correlation between being able to sell debt and higher levels and rates of growth of productivity. In this view, firms that have established track records for being well managed will be the most likely to succeed in selling debt to the investing public. In turn, this reduces their cost of capital and further increases their growth of productivity. An alternative view, associated with Brander and Spencer, is that if an owner-manager substitutes borrowed funds for equity, then the effort of the owner declines and the firm's output falls. The reason for this is that bondholders have less incentive than equity holders to monitor managers.⁵³ Specification 3 tests these hypotheses by introducing a dummy variable for firms whose bonds were traded on either the Rio de Janeiro or Sao Paulo exchanges. The magnitude of the coefficient is much smaller than that for being a joint stock company, indicating that while firms that issued bonds were roughly 10 percent more productive than the average firm, they were less efficient than joint stock firms as a group.

One might argue that the differences in TFP between joint stock and privately-owned firms are due purely to regional productivity differences. Perhaps all of the low TFP firms were located in isolated markets where transport barriers protected them from competition. Specifications 4 and 5 test this hypothesis. Specification four introduces a dummy variable for firms located in the highly integrated, rapidly growing, four-state market of Rio de Janeiro, the Distrito Federal, Minas Gerais, and Sao Paulo. The coefficient on region (.300) indicates that there were in fact sizable regional productivity differences. Specification 5 decomposes the effects of region and joint stock status by introducing dummy variables for joint stock firms located outside of the competitive region, joint stock firms located in the region, and all other firms in the region.⁵⁴ The results indicate that even if we control for regional effects, there was still a positive residual for firms that took the joint stock form (note that the coefficient in 9B is of greater magnitude than 9A, and both are significant at the one percent level). The regressions also indicate that joint stock firms outside of the competitive region also had a sizable productivity advantage against their privately-owned competitors. The coefficient of .285 (Line 6A, Specification 5) translates into a 33 percent productivity differential.

We estimated similar sets of regressions for Mexico. In the Mexican case it was not possible to estimate the marginal impact of being able to issue long term bonds, as there was no bond market. It was possible, however, to estimate the marginal impact of access to bank capital, as we have been able to code our textile data set for relationships between bankers and textile owners by looking at the interlock of bank and manufacturing firm directorates.⁵⁵

What effect did bank connection or being a publicly traded company have on TFP? The TFP estimates for Mexico are presented in table 8. The first specification indicates that the rate of growth of total factor productivity was only one-half that of Brazil, 3 percent as opposed to 6 percent. This result is consistent with theory: the more concentrated structure of industry created lower incentives to compete, and the more difficult access to impersonal sources of capital made it more difficult for firms to purchase new plant and equipment quickly. Specification 1 also indicates that there were negligible scale economies in the Mexican textile industry.

The data also indicate that the marginal productivity of capital was much higher in Mexico than in Brazil. Regardless of the regression specification, the coefficient on the capital-labor ratio in Mexico is always twice that in Brazil (roughly .6 versus .3). This result is also consistent with theory. Mexican firms were, on the whole, more capital-constrained than Brazilian firms. On the margin, additional units of capital in Mexico increased output much more than in Brazil.

Did Mexican firms that were bank-connected or that were joint stock companies have a productivity advantage over their more liquidity-constrained competitors? The results are clear: regardless of the specification we used, we could find no significant difference in TFP between bank-connected and independent firms. In addition, firms that were joint stock companies did not enjoy higher TFP than their privately owned competitors. Being traded on the Mexico City exchange appears to have given firms a one-time productivity advantage, but the coefficient on traded is significant only at the 10 percent level of confidence (the T statistic is 1.76). Whatever productivity advantage these firms did enjoy at the time of their incorporation was dissipated over time: the interaction of traded status and time was negative. The only significant effect is a regional one: firms located in and around

Mexico City were roughly 25% more productive. In short, the results we obtained for Mexico stand in stark contrast to those for Brazil. The implication is that in Mexico the financial markets and the banks were not choosing winners, they were choosing insiders.

The vast differences between Brazil and Mexico in *rates of growth of TFP* indicate that there must also have been large absolute differences in the *average productivity* of capital and labor. We therefore draw a cross-sectional comparison of the average productivity of the Brazilian and Mexican textile industries in real U.S. dollars for 1912-1914. We used capital- labor weights derived from a production function estimated on the Mexican data, in order to bias the TFP estimates in favor of Mexico. The results are as one would expect: average annual output (in 1929 U.S. dollars) per worker/spindle in 1912 in Mexico was \$23,858. Average annual output per worker/spindle in Brazil was \$31,850, 33 percent higher than Mexico. Similar calculations for 1925 reveal even larger differences in average productivity.

IV. CONCLUSIONS

What lessons are there to be drawn from this story about government regulation, capital market development, and the growth and structure of industry?

The first is that government regulatory policies had a significant effect on the growth of banking systems and financial markets. The development of the stock and bond markets in the two countries studied here was not completely endogenous to the process of economic growth: differences in the specific features of the institutions that governed banks and financial markets gave rise to very different sizes and structures of markets. Second, those differences in regulation were the product of the specific features of decision making in the two polities. Third, differences in capital market development had a significant impact on the rate of growth of industry. Fourth, imperfections in capital markets also had a significant effect on the structure of industry. The much more limited opening of the capital markets in Mexico gave rise to higher levels of concentration than in Brazil. Fifth, the data analyzed to date suggest that Mexico's peculiarly uncompetitive structure of industry may have created disincentives to new investment by its industry leaders. In addition, the need to rely on retained earnings to finance most new investment slowed the rate of growth of productivity. Had Mexican firms been less liquidity constrained, they would have enjoyed rates of TFP growth closer to that of Brazilian firms.

NOTAS:

¹ This definition differs from the common view of institutions as entities such as schools, government agencies, and the like. Here, we follow North's distinction between institutions, which are simply the restrictions on acceptable behavior, and institutional entities or organizations. See Douglass C. North, *Institutions, Institutional Change, and Economic Performance* (Cambridge, England: Cambridge University Press, 1990), p. 4-5. Institutions can be both formal and informal. Formal institutions are often legally codified. Examples include labor laws, environmental laws, regulations governing the operation of banks and securities markets, laws governing the formation and dissolution of families, and other legally codified restrictions on the activities of individuals and corporate bodies. Informal institutions are not legally

codified: they include the norms and values that are often culturally embedded in societies. Examples include norms and values related to honesty, civic mindedness, group identity, and the like.

² For an introduction to the literature on the New Economic History of Latin America see: Stephen Haber ed., How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800-1914 (Stanford University Press, 1997); John H. Coatsworth and Alan Taylor eds., Latin America and the World Economy Since 1800 (David Rockefeller Center on Latin American Studies/Harvard University Press, 1998).

³ See Randall L. Calvert. "The rational choice theory of social institutions: cooperation, coordination, and communication" in Jeffrey S. Banks and Eric A. Hanushek, Modern Political Economy (Cambridge, England: Cambridge University Press, 1995), p 217.

⁴ There are essentially three variants in the literature on institutions and economic growth. One variant focuses on the institutions that govern the operation of markets. This strand of the literature focuses on how changes in institutions make credible commitments possible, property rights more secure, and contracts enforceable, thereby lowering transactions costs and increasing the range of exchanges that are mediated through the market. This, it is argued, increases allocative efficiency and encourages entrepreneurs to adopt longer time horizons, thereby increasing investments in physical and human capital. A second, and related, variant of the NIE focuses on the institutions that limit governments. This body of literature argues that economic growth will be enhanced if governments are constrained in their ability to reduce the property rights or increase the tax burdens faced by economic agents. The focus here is on the mechanisms that constrain governments from using their authority to engage in opportunistic behavior in order to satisfy their short-term financial needs at the expense of long-term economic growth. A third variant of the literature focuses on the institutions that affect contracts within firms. Changes in the rules and norms that bound or limit the types and nature of intra-firm contracts, it is argued, have an impact on the ability of firms to engage in organizational or technological innovations that increase productivity

For an example of the first variant see: Douglass C. North, Institutions, Institutional Change and Economic Performance (Cambridge: Cambridge University Press, 1992). For examples of the second variant see: Douglass C. North and Barry R. Weingast, "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth Century England," The Journal of Economic History 44:4 (Dec. 1989); Barry R. Weingast, "The Political Foundations of Limited Government: Parliament and Sovereign Debt in 17th- and 18th-Century England" in John N. Drobak and John V.C. Nye (eds.) The Frontiers of the New Institutional Economics (San Diego: Academic Press, 1997), pp. 213-246. For examples of the third variant see: Ronald Coase, The Firm, the Market, and the Law (Chicago: University of Chicago Press, 1988); Oliver Williamson, The Economic Analysis of Institutions and Organizations (Paris, 1993); Oliver Williamson, The Economic Institutions of Capitalism: Firms, Markets, and Relational Contracting (New York: The Free Press, 1985).

⁵ For a discussion of the genesis of the NIE, see Christopher Clague, "The New Institutional Economics and Economic Development," in Christopher Clague ed., Institutions and Economic Development: Growth and Governance in Developed and Post-Socialist Countries (Baltimore: Johns Hopkins University Press, 1997), pp. 13-36.

⁶ See Douglass C. North, Institutions, Institutional Change, and Economic Performance (Cambridge: Cambridge University Press, 1992), chapter one; Douglass C. North, "Toward a Theory of Institutional Change," in William A. Barnett, Melvin J. Hinich, and Norman J. Schofield, Political Economy: Institutions, Competition, and Representation (Cambridge: Cambridge University Press, 1983); Leonid Hurwicz, "Toward a Framework for Analyzing Institutions and Institutional Change," in Samuel Bowles, Herbert Gintis and Bo Gustafsson (eds.), Markets and Democracy: Participation, Accountability, and Efficiency (Cambridge: Cambridge University Press, 1993); Avner Greif, "Microtheory and Recent Developments in the Study of Economic Institutions Through Economic History," in David M. Kreps and Kenneth F. Wallis, eds., Advances in Economic Theory Vol II (Cambridge: Cambridge University Press,

1997), pp. 79-113; Masahiko Aoki, "Towards a Comparative Institutional Analysis: Motivations and Some Tentative Theorizing," The Japanese Economic Review 47:1 (March 1996), p. 1-19.

⁷ Truth claims in the social sciences are generally supported by either of three types of confirmatory logics: formal models; goodness of fit with the historical record; and hypothesis testing through the econometric analysis of quantitative data. The first confirmatory standard (formal models) assesses truth claims based on the logical consistency of hierarchically organized if-then statements. Such models may take a mathematical form. Though logical models are axiomatically derived, they are often given verisimilitude through the application of "stylized facts" (facts that may or may not be true, but are assumed to be true for the purpose of the construction of the model). The second confirmatory standard (goodness of fit with the historical record) stresses the fit between a theory and what actually happened in the past. The third confirmatory standard (econometric hypothesis testing) stresses the explicit specification of hypotheses that operationalize the testable implications of a theory. These hypotheses are then subjected to falsification through the systematic retrieval and analysis of relevant quantitative data. Such tests are set up in such a way as to bias the tests against the hypotheses under consideration in order to insure that the results are not driven by the choice sampling techniques, functional form, or model specification. In this way, econometric testing seeks to constrain the priors or beliefs of researchers from influencing substantive results. The strongest truth claims in the social sciences are supported by all three types of confirmatory logics.

⁸ See, for example, Lee J. Alston, Thráinn Eggertsson, and Douglass C. North eds., Empirical Studies in Institutional Change (Cambridge: Cambridge University Press, 1996); Avner Greif, "Political Organizations, Social Structure, and Institutional Success: Reflections from Genoa and Venice During the Commercial Revolution," Journal of Institutional and Theoretical Economics 151:4 (December 1995); Avner Greif, "Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Trader's Coalition," The American Economic Review 83:3 (June 1993).

⁹ Two prominent examples of the misapplication of theory and the fitting of the historical record to suit the theory, rather than the other way around, include Dependency Theory and Trade and Development theories current in the 1960's and 1970's. For a discussion of these examples, see Anne O. Krueger, "Trade Policy and Economic Development: How We Learn," The American Economic Review 87:1 (March 1997), pp. 1-22; Robert A. Packenham, The Dependency Movement: Scholarship and Politics in Development Studies (Cambridge: Harvard University Press, 1992); Stephen Haber, "Economic Growth and Latin American Economic Historiography," in Stephen Haber ed., How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800-1914 (Stanford: Stanford University Press, 1997), p. 1-33.

¹⁰ See, for example, Jean Laurent Rosenthal, The Fruits of Revolution: Property Rights, Litigation, and French Agriculture, 1700-1860 (Cambridge: Cambridge University Press, 1992); Douglass C. North and Barry R. Weingast, "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth Century England," The Journal of Economic History 44:4 (December 1988), pp. 803-832. For a critique of North and Weingast, see Gregory Clark, "The Political Foundations of Modern Economic Growth: England 1540-1800," Journal of Interdisciplinary History 26:4 (Spring 1996), pp. 563-588.

¹¹ Economic agents realize that there is about to be a reform of institutions, and so bid asset prices up or down accordingly before the reform actually takes place. See, Clark, "Political Foundations."

¹² Ross Levine and David Renelt, "A Sensitivity Analysis of Cross-Country Growth Regressions," The American Economic Review 82:4 (Sept. 1992), p. 943.

¹³ Barro, for example, employs the number of revolutions and coups per year and the number of political assassinations per million population as measures of instability, and then goes on to "interpret [these] variables as adverse influences on property rights." See Robert J. Barro, "Economic Growth in a Cross Section of Countries," Quarterly Journal of Economics (May 1991), p. 432. Other investigators have tried to refine these measures. See Alberto Alesina, Sule Özler, Nouriel Roubini, and Phillip Swagel, "Political Stability and Economic Growth," Journal of Economic Growth 1 (June 1996).

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- ¹⁴ Recent work would include Jeremy Adelman, Republic of Capital: Buenos Aires and the Legal Transformation of the Atlantic World (Stanford University Press, 1999); William R. Summerhill, Order Against Progress: Government, Foreign Investment, and Railroads in Brazil, 1854-1913 (Stanford University Press, 2000); Stanley L. Engerman, Stephen Haber, and Kenneth L. Sokoloff, "Inequality, Institutions, and Economic Growth: A Comparative Study of New World Economies Since the Sixteenth Century," in Claude Menard ed., Institutions, Contracts, and Organizations: Perspectives from New Institutional Economics (Edward Elgar Publishing, 2000); Noel Maurer, The Power and the Money: Credible Commitments, Political Instability, and the Financial System in Mexico, 1876-1934 (Stanford University Press, forthcoming); Jeffrey Bortz and Stephen Haber, eds., The Mexican Economy, 1870-1930: Essays on the Economic History of Institutions, Revolution, and Growth (Stanford University Press, forthcoming); Aurora Gómez Galvarriato, "The Impact of Revolution: Business and Labor in the Mexican Textile Industry, Orizaba, Veracruz, 1900-1930" (Ph.D. Dissertation, Harvard University, 1999); Stephen Haber, Armando Razo, and Noel Maurer, "The Political Economy of Instability: Political Institutions and Economic Performance in Revolutionary Mexico" (unpublished book manuscript, Stanford University).
- ¹⁵ Cement is a classic case. The high bulk-to-price ratio of cement means that it is economical to ship it only over short distances. In order to expand output and enter new markets, firms must erect new production facilities close to those markets. In order to keep out potential rivals, firms tend to erect more productive capacity than they require. The result is that the cement industry tends, almost everywhere in the world, to be characterized by local monopolies with excess capacity. See Johnson and Parkman.
- ¹⁶ The technology to produce cotton goods was easily available: British (and later American) machinery companies competed to provide machines and other inputs. There were also no barriers to entry created by advertising or branding: the wholesale purchasers of cotton cloth were expert judges of quality.
- ¹⁷ This does not mean that scale economies were insignificant in cotton textile production. Indeed, had economies of scale been negligible, access to capital could not have served as a barrier to entry. It does mean, however, that scale economies were exhausted in textiles at relatively small firm sizes compared to such industries as steel, cement, and chemicals.
- ¹⁸ For a detailed discussion of the original Banamex charter and the Commercial Code of 1884 see Maurer, chapter two.
- ¹⁹ Unlike English common law, in which any activity is legal unless it is specifically prohibited by law, Mexico's Spanish legal tradition held that all economic activities undertaken without authorization from either a general law or a specific concession were illegal. During the years from 1884 to 1897 Mexico possessed no body of banking law. Thus, bank charters had to be obtained by a special concession granted by the Secretary of the Treasury. Changes in the identity of the Treasury Secretary had a direct impact on the ease with which a bank could obtain a charter.
- ²⁰ Had states had the right to charter banks, they would have been tempted to ratchet downwards the minimum requirements for a bank charter as they competed against one another for bank business.
- ²¹ For discussions of the 1897 law see: Haber, "Industrial Concentration and the Capital Markets; Maurer, chapter three; Maurer and Haber.
- ²² Historical Statistics of the United States, Series X 580-587.
- ²³ *Anuario de Estadística Fiscal*, 1911-12, p. 255.
- ²⁴ Historical Statistics of the United States, Series X 580-587.
- ²⁵ Calculated from data in *Anuario de Estadística Fiscal*, 1911-12, pp. 236 and 255.
- ²⁶ Maurer, chapter three. The Herfindahl index is calculated as the sum of the squares of the market shares of all of the firms in an industry. The reciprocal of the Herfindahl is the number of equal-sized firms that it would take to produce the same competitive structure.

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- ²⁷ Maurer, chapter six.
- ²⁸ Lamoreaux.
- ²⁹ Haber, *Industry and Underdevelopment*, pp. 65-67.
- ³⁰ The activity of the Mexico City stock exchange was followed by Mexico's major financial weeklies: *La Semana Mercantil*, 1894-1914; *El Economista Mexicano*, 1896-1914; *Boletín Financiero y Minero*, 1916-1938. The behavior of the shares of these firms is analyzed in Haber, *Industry and Underdevelopment*, chap. 7. The total number of firms is from textile manuscript censuses in Archivo General de la Nación, Ramo de Trabajo, caja 5, legajo 4 (also see caja 31, legajo 2).
- ³¹ Topik, *Political Economy*, p. 28; Peláez and Suzigan, *História monetária*, chaps. 2-5; Saes, *Crédito e bancos*, p. 73; Levy, *História da bolsa*, p. 109-12; Stein, *Brazilian Cotton Textile Manufacture*, pp. 25-27.
- ³² Sylla, *American Capital Market*, pp. 52, 209.
- ³³ Levy, *História da bolsa*, p. 117; Peláez and Suzigan, *História monetária*, pp. 78-83, 96-97; Saes, *Crédito e bancos*, pp. 22, 86.
- ³⁴ Hanley, "Capital Markets," pp. 24, 27.
- ³⁵ Shareholder lists were not always published in the abbreviated reports reprinted in the newspapers, but they were published in the original reports.
- ³⁶ 1888 data from Neuhaus, *História monetária do Brasil*, p. 19ff. Data for 1889, 1890, and 1891 calculated from *O Estado de Sao Paulo* and *Jornal do Commercio*, consolidated stock tables. See table 1. A conto was equal to 1,000 milreis, the basic unit of Brazilian currency. There were roughly three milreis to the dollar in 1890.
- ³⁷ Neuhaus, p. 22. For a discussion of bank portfolios see: Hanley; Triner.
- ³⁸ The 15 firms are: Companhia de Fiação e Tecidos Aliança, Companhia America Fabril, Companhia Brasil Industrial, Companhia de Fiação e Tecelagem Carioca, Companhia de Fiação e Tecidos Industrial Campista, Companhia de Fiação e Tecidos Cometa, Companhia de Fiação e Tecidos Confiança Industrial, Companhia de Fiação e Tecidos Corcovado, Companhia de Fiação e Tecidos Industrial Mineira, Companhia de Fiação e Tecidos Mageense, Companhia Manufactora Fluminense, Companhia Petropolitana, Companhia Progresso Industrial do Brasil, Companhia de Fiação e Tecidos Santo Aleixo, Companhia Fabrica de Tecidos Sao Pedro de Alcantara.
- Some of these reports were located in the Bibliotheca Nacional in Rio de Janeiro, filed erroneously in the Periodicals Section. Most were retrieved from the *Journal do Commercio* (Rio de Janeiro's major financial daily) and the *Diario Oficial* (Brazil's equivalent of the Federal Register). In theory, it would be possible to retrieve the reports of all publicly traded companies from these and similar sources--such as the *Diario Oficial* for each state and the major financial daily's of all the major cities, because under Brazilian law firms had to reprint abbreviated versions of their financial statements in public venues. In practice, however, this is a costly procedure because none of the relevant publications are indexed and each runs to roughly 20,000 pages per year. I therefore concentrated on the months of January, February, March, April, July, and August (when most firms produced their financial statements) for the *Jornal do Commercio* and the *Diario Oficial*. Even restricting analysis to these four publications and concentrating solely on the months listed above still requires the researcher to look at roughly 1 million frames of microfilm to cover the 60 years from 1880 to 1940.

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- ³⁹ First, mandatory disclosure makes it easier for investors to monitor managers. Second, limited liability eliminates the need for investors to monitor one another. In a situation in which liability is not limited, investors must create costly covenants that restrict the transferability of ownership rights to individuals with sufficient wealth to cover their share of any liability resulting from insolvency. Alternatively, investors must engage in costly monitoring to verify the liquidity of their partners. See Carr and Mathewson, pp. 766-784.
- ⁴⁰ Von de Weid and Rodrigues Bastos.
- ⁴¹ Low debt-equity ratios had characterized the development of the U.S. textile industry since the nineteenth century. In 1860 the large-integrated textile manufacturers of New England typically had debt-equity ratios of .20. All of this debt was short-term accounts payable and commercial paper. On the early industrial U.S. see Davis, "Sources;" McGouldrick.
- ⁴² These debt-equity ratios are probably upper bound estimates because they do not represent the universe of U.S. cotton textile firms. If firms were privately held they would not have been listed in *Moody's Industrial Manual*, and thus would not enter our sample. See *Moody's Industrial Manual*, 1900, 1910, and 1920.
- ⁴³ Preferred shares are less favorable for firms than bonds because, like bonds, they carry the requirement of guaranteed interest payments, but at the same time they afford the firm much less flexibility. Unlike bondholders, preferred shareholders have the right to make claims on profits beyond the guaranteed interest rate. In addition, bonds are amortized, while preferred shares are not. Unless repurchased from shareholders, preferred shares require the payment of guaranteed returns to their holders in perpetuity. Finally, any such repurchase must be done at the market value of the shares, unlike callable bonds, which are repurchased at their par value. Since preferred shareholders have the right to a share of profits beyond the guaranteed interest rate, this means that the profitability of the firm becomes capitalized in their market value. Thus, almost by definition, a firm that has the ability to buy back its preferred shares is going to have to pay a price significantly above the par value of the shares to do so.
- ⁴⁴ Calculated from Vasco, *A industria*; Centro Industrial, *O centro industrial*; Centro Industrial de Fiação e Tecelagem, *Relatorio, 1924*. All averages are weighted by the value of capital.
- ⁴⁵ These estimates of concentration are calculated at the firm level. This involved combining the market shares of all mills held by a single corporation, partnership, or sole proprietor. Market shares for Mexico and Brazil were calculated from estimates of the actual sales or value of output of mills. Market shares for India and the United States were calculated from data on installed capacity. Econometric work on the United States indicates that there was a 25 percent difference in output per spindle between average and best practice techniques. I therefore assumed that the largest firms in both countries were 25 percent more productive than the average and adjusted their market shares accordingly. On average and best practice techniques see Davis and Stettler, p. 231.
- ⁴⁶ One might argue that these differences in concentration would disappear if imports of foreign textiles were accounted for, but that argument does not stand up to the empirical evidence on textile imports. Indeed, both Brazil and Mexico followed highly protectionist policies after 1890, virtually eliminating imported cloth except for fine weave, high value goods.
- ⁴⁷ Razo and Haber, pp. 481-517.
- ⁴⁸ These TFP estimates follow earlier work done by Haber, Maurer and Haber, and Razo and Haber. See: Haber, "The Efficiency Consequences of Institutional Change;" Razo and Haber, "The Rate of Growth;" Maurer and Haber, "Institutional Change and Economic Growth?"
- ⁴⁹ This method of estimating inputs does not capture quality improvements in either labor or machinery over time. It will therefore tend to overestimate the unexplained residual output that cannot be attributed to capital or labor. See Kane; Atack; Sokoloff; Bernard and Jones.

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- ⁵⁰ For OLS estimates, this coefficient would be the same for all firms; for fixed effects, it was not estimated as it was allowed to vary freely among cross-sections. Both models, the basic pooled and fixed effects produced the same qualitative results with minor differences in the magnitude of the estimated coefficients. In some cases, as with the time trend, the estimates were nearly identical. Thus, to avoid repetition, we report only results from the basic pooled model.
- ⁵¹ In the construction of time series for each observation units, it is evident that plain OLS techniques would result in biased estimates because some of the variables in latter periods could be predicted from earlier years (e.g., spindles at time t could very well be equal to spindles at time $t+1$). The panel procedure individually identifies each company over time to correct for potential autocorrelation in its variables.
- ⁵² This specification provides a simple test for economies of scale, following the methodology of Atack, Estimation of Economies of Scale. The sign of β_2 would indicate whether, if negative, there are decreasing returns to scale or, if positive, increasing returns to scale. The magnitude of β_2 would indicate the level to which production deviates from the standard case of constant returns to scale. A coefficient of small magnitude, that is not statistically significant, would corroborate the hypothesis of constant returns to scale. The additional variables, **Dummies** and **Interaction Terms**, are vectors of dummy explanatory variables (including limited liability status, trading in the stock market, and location in the central region), respectively; δ and γ are correspondingly the coefficient vectors. We use these to further decompose the rate of growth (β_3) of TFP. We obtain the same results if we used a specification where the variables were not normalised by the labour input but in that case we would not be able to test for economies of scale. Whether or not we normalise by labour, β_3 remains the rate of total factor productivity growth because in both cases, the contribution of the two inputs would have been accounted by the estimates of β_1 and β_2 .
- ⁵³ Brander and Spencer, pp. 833-849.
- ⁵⁴ The fact that virtually all of the joint stock companies were located in the four state region means that these variables are likely to be collinear. Thus, we cannot simultaneously introduce dummy variables for region and joint stock to measure the marginal impact of being traded taking region into account.
- ⁵⁵ Other measures of bank connection, based on internal bank data, produce similar qualitative results. For a complete discussion see Maurer and Haber.